

はじめに

IAUMDC のリストそのままを利用することは難しい。このことは MSS でも何回か触れているが、具体的にどのような流星群リストが望まれるのかは示していなかった。本稿は SonotaCo ネットのデータ(2007-18)を利用して、流星群の基礎データを作成することを試みたものである。

調査範囲

既に IAUMDC の流星群表の中で、ビデオ観測で確実にとらえられている流星群にどのようなものがあるか、MSS でも 2 度ばかり発表している。今回は、それらを踏まえて対象とする流星群を選んだ。

SonotaCo ネット 10 年間の観測で見た“確定群” 2018/Feb.4/MSS

SonotaCo ネットの ALL\_SHOWER\_NAMES について——改定・増補への提言 2019/Oct.6 MSS

流星群の活動を認定する方法は何通りもあり、また、どれも長所と短所をもっている。また、眼視、写真、ビデオ、電波によって観測される対象がかなり異なっている。しかも、流星群の活動は時間と共に変化している。さらに流星群と散在流星の活動に明確な境界などあるはずもない。ここでは、2007~18 年に SonotaCo ネットでビデオ観測された流星の中で、筆者の個人的見解により「流星群」として認められたものを取り上げる。基本的には、輻射点の集中が認められ、出現にある程度のまとまりがあることである。

調査方法

- (1) 上に掲げた先行研究により、各流星群について最もよく表している IAUMDC リスト内のデータ（輻射点の位置、極大の太陽黄経）を選択する。Nr<=3 及び DR による活動曲線から調査する太陽黄経の範囲を決める（Nr<=3 は、輻射点移動の中心から 3 度以内の輻射点数。DR3、DR10、DR15 は、それぞれ、輻射点移動の中心から 3~6 度、6~10 度、10~15 度に存在する輻射点数に対する輻射点移動の中心から 3 度以内の輻射点数の天球上の面積比を考慮した輻射点密度の比である）。
- (2) 選択した輻射点の位置から 3 度以内に入るものを群流星とみなして、分布図の(x, y)座標と太陽黄経との関係を調べる（回帰直線を求める）。
- (3) 回帰直線が収束するまで、(2)の作業を続ける。
- (4) 収束したものにより、輻射点移動（軌道変化）及び活動曲線を求める。

表 1 に 82 の流星群の概要を示す。流星群名が標準和名になっているものは『確定群』で、英語名のものは'working list'のものである。

表 1 : 基本データ

DR<sub>max</sub> は近日点黄経 3 度ごと 1 度刻みの移動平均であり、基本的に DR15 の最大値であるが、DR3 を用いた場合には数値の前に\*、DR10 の場合には#を付している。N<sub>max</sub> は 1 度ごと 0.1 度刻みの移動平均であり、データ集の説明で述べた(9)のグラフの最大値である。λ<sub>S\_DR</sub> と λ<sub>S\_N</sub> はそれぞれ DR<sub>max</sub> と N<sub>max</sub> の近日点黄経であり、両者を勘案して実際の極大に最も近いと推定される値を λ<sub>S</sub> として記載している。出現期間(λ<sub>start</sub>~λ<sub>end</sub>)は DR の値が 2 を超える期間を目安として示した。α、δ、V<sub>g</sub> は輻射点移動を考慮して λ<sub>S</sub> に対する推算値として求めたものである。

Code をクリックすることで該当のページにスキップできる。

No.	Code	Name	DR <sub>max</sub>	N <sub>max</sub>	λ <sub>S_DR</sub>	λ <sub>S_N</sub>	λ <sub>S</sub>	λ <sub>start</sub>	λ <sub>end</sub>	α	δ	V <sub>g</sub>
450	<a href="#">AED</a>	April epsilon Delphinids	28.7	1.3	19.5	19.4	19.4	15	30	307.3	11.4	60.6
27	<a href="#">KSE</a>	へび座κ流星群	23.0	0.8	25.5	25.9	26.0	21	32	247.5	17.9	45.6
21	<a href="#">AVB</a>	おとめ座α流星群	*15.0	0.8	25.5	25.3	28.0	17	41	201.4	3.9	19.3
6	<a href="#">LYR</a>	4 月こと座流星群	254.2	43.3	32.5	32.4	32.4	25	39	272.4	33.3	46.8
343	<a href="#">HVI</a>	おとめ座 h 流星群	15.8	1.1	41.5	41.6	41.0	34	44	203.7	-11.4	17.6
31	<a href="#">ETA</a>	みずがめ座η流星群	554.9	39.4	44.5	44.9	45.0	25	75	337.5	-1.1	65.5
145	<a href="#">ELY</a>	こと座η流星群	40.8	3.4	50.5	49.4	49.6	46	55	290.6	43.5	43.9
152	<a href="#">NOC</a>	くじら座ω北昼間流星群	55.1	0.3	52.5	53.7	53.0	44	63	17.1	19.7	40.1
171	<a href="#">ARI</a>	おひつじ座昼間流星群	151.6	0.6	73.5	73.8	73.8	68	86	41.4	23.7	40.5
431	<a href="#">JIP</a>	6 月ペガサス座ι流星群	16.8	2.0	94.5	93.8	93.8	93.4	95.4	331.5	29.3	58.6
372	<a href="#">PPS_0</a>	うお座φ流星群	21.8	1.4	97.5	92.5	94.0	82	103	9.9	21.4	66.5
165	<a href="#">SZC</a>	6 月わし座南流星群	75.8	0.9	103.5	108.2	104.0	95	110	318.3	-27.0	39.7

533	<a href="#">JXA</a>	7月おひつじ座 $\xi$ 流星群	34.4	1.1	102.5	108.5	105.5	93	125	32.7	7.8	68.4
372	<a href="#">PPS_1</a>	うお座 $\phi$ 流星群	12.4	1.8	110.5	108.2	108.0	101	120	20.7	27.9	65.9
175	<a href="#">JPE</a>	7月ペガスス座流星群	26.5	2.8	110.5	108.4	108.4	102	136	347.8	10.8	64.1
411	<a href="#">CAN</a>	アンドロメダ座 $c$ 流星群	19.7	1.2	110.5	109.7	110.0	91	118	32.6	48.3	56.9
164	<a href="#">NZC</a>	6月わし座北流星群	89.6	1.4	101.5	112.7	113.0	81	129	319.4	-2.4	37.7
444	<a href="#">ZCS</a>	zeta Cassiopeids	27.3	4.2	112.5	113.5	113.5	105	120	7.4	50.9	57.2
184	<a href="#">GDR</a>	7月りゅう座 $\gamma$ 流星群	82.7	3.0	125.5	125.3	125.3	121	131	280.4	50.6	27.3
5	<a href="#">SDA</a>	みずがめ座 $\delta$ 南流星群	227.7	22.8	126.5	127.6	127.6	116	148	340.3	-16.3	40.3
1	<a href="#">CAP</a>	やぎ座 $\alpha$ 流星群	85.3	7.8	127.5	127.5	128.0	105	142	306.4	-9.1	22.0
191	<a href="#">ERI</a>	エリダヌス座 $\eta$ 流星群	32.4	3.3	127.5	134.5	134.0	108	168	40.9	-13.0	63.9
183	<a href="#">PAU</a>	みなみのうお座流星群	4.8	0.8	136.5	135.0	135.0	129	138	353.3	-20.2	43.0
7	<a href="#">PER</a>	ペルセウス座流星群	660.3	296.3	139.5	140.0	140.0	112	159	48.1	58.0	58.8
12	<a href="#">KCG</a>	はくちょう座 $\kappa$ 流星群	19.7	2.5	145.5	141.7	141.0	129	154	286.2	50.2	22.2
	<a href="#">AXD</a>	August xi Draconids	8.2	1.7	140.5	141.6	142.0	132	155	276.4	53.6	20.3
26	<a href="#">NDA</a>	みずがめ座 $\delta$ 北流星群	14.5	2.4	147.5	148.7	148.0	127	166	352.6	4.4	38.2
197	<a href="#">AUD</a>	8月りゅう座流星群	14.5	1.5	154.5	153.2	153.0	140	166	259.1	62.8	21.3
523	<a href="#">AGC</a>	August gamma Cepheids	12.1	1.4	155.5	155.4	155.5	150	161	358.6	76.8	43.8
206	<a href="#">AUR</a>	ぎょしゃ座流星群	#21.3	2.3	157.5	158.5	158.4	149	166	91.0	39.2	65.4
33	<a href="#">NIA</a>	みずがめ座 $t$ 北流星群	6.4	1.3	160.5	168.0	162.0	153	183	358.5	3.3	29.9
208	<a href="#">SPE</a>	9月ペルセウス座 $\varepsilon$ 流星群	37.7	15.5	166.5	167.2	167.2	160	189	47.8	39.5	64.2
337	<a href="#">NUE</a>	エリダヌス座 $v$ 流星群	8.9	1.9	169.5	168.3	168.0	158	181	68.2	0.7	65.7
81	<a href="#">SLY_0</a>	September Lyncids	9.9	1.5	168.5	168.1	168.0	163	176	108.8	55.8	59.3
81	<a href="#">SLY_1</a>	September Lyncids	4.5	0.8	187.5	187.9	185.0	173	190	110.9	47.9	65.4
221	<a href="#">DSX</a>	ろくぶんぎ座 $\mu$ 流星群	96.4	0.3	189.5	190.0	190.0	183	196	156.8	-3.3	32.1
281	<a href="#">OCT</a>	10月きりん座流星群	23.6	9.5	191.5	192.7	192.7	192.1	192.8	167.3	78.6	45.4
333	<a href="#">OCU</a>	10月おおぐま座流星群	41.7	4.5	202.5	202.5	202.5	200	207	145.3	64.2	55.3
23	<a href="#">EGE</a>	ふたご座 $\varepsilon$ 流星群	*4.7	3.5	204.5	207.9	205.0	191	219	100.8	28.2	68.5
2	<a href="#">STA_SE</a>	おうし座南流星群	38.6	7.3	199.5	207.6	205.0	180	230	39.0	10.5	28.2
480	<a href="#">TCA</a>	tau Cancrids	6.6	1.8	206.5	207.3	207.0	183	224	137.3	29.7	67.1
22	<a href="#">LMI</a>	こじし座流星群	58.4	5.3	209.5	207.9	208.0	198	223	158.8	37.2	61.4
8	<a href="#">ORI</a>	オリオン座流星群	255.7	172.3	207.5	208.0	208.0	183	240	95.2	15.6	66.1
524	<a href="#">LUM</a>	おおぐま座 $\lambda$ 流星群	8.7	1.6	214.5	214.5	214.7	207	219	158.0	49.4	60.8
526	<a href="#">SLD</a>	りゅう座 $\lambda$ 南流星群	9.8	2.4	221.5	221.4	221.4	219	225	161.3	68.2	48.6
388	<a href="#">CTA</a>	おうし座 $\chi$ 流星群	#4.2	1.7	222.5	221.9	222.0	210	231	63.9	27.2	40.1
445	<a href="#">KUM</a>	おおぐま座 $\kappa$ 流星群	13.7	6.3	223.5	223.0	223.0	220	230	144.2	45.6	64.7
2	<a href="#">STA_SF</a>	おうし座南流星群	72.2	17.6	221.5	223.0	223.0	198	256	53.7	14.4	27.7
18	<a href="#">AND</a>	アンドロメダ座流星群	15.6	1.8	230.5	224.1	230.0	213	245	22.2	32.0	16.9
17	<a href="#">NTA</a>	おうし座北流星群	52.1	15.0	229.5	232.4	230.0	200	260	58.7	22.8	27.6
338	<a href="#">OER</a>	エリダヌス座 $o$ 流星群	11.4	1.1	243.5	224.5	231.0	210	250	58.6	-1.0	27.7
13	<a href="#">LEO</a>	しし座流星群	120.4	49.3	235.5	235.9	236.0	213	258	154.2	21.6	70.0
246	<a href="#">AMO</a>	いっかくじゅう座 $\alpha$ 流星群	6.9	2.2	240.5	239.8	239.8	237	243	117.6	0.7	61.6
488	<a href="#">NSU</a>	November sigma Ursae Majorids	5.9	1.8	242.5	241.8	242.0	240	245	148.9	59.0	54.5
250	<a href="#">NOO</a>	11月オリオン座流星群	34.5	9.8	249.5	249.4	248.0	228	265	91.4	15.4	42.3
340	<a href="#">TPY_0</a>	theta Pyxidids	15.7	2.9	248.5	249.4	249.4	246	254	138.7	-25.6	59.7
257	<a href="#">ORS</a>	オリオン座 $\chi$ 南流星群	4.4	2.3	253.5	253.3	250.0	232	265	78.9	18.1	26.5
336	<a href="#">DKD</a>	12月りゅう座 $\kappa$ 流星群	38.3	6.3	250.5	250.9	250.9	247	261	186.1	70.7	43.4
339	<a href="#">PSU</a>	おおぐま座 $\nu$ 流星群	7.4	3.3	251.5	252.0	252.0	247	259	168.8	43.9	60.8
502	<a href="#">DRV</a>	Decemberrho Virginids	8.8	1.7	252.5	253.4	253.4	247	271	185.5	12.9	68.2
16	<a href="#">HYD</a>	うみへび座 $\sigma$ 流星群	103.2	22.3	254.5	252.6	255.0	240	284	124.3	2.9	58.8
19	<a href="#">MON</a>	12月いっかくじゅう座流星群	59.4	10.3	257.5	258.6	259.0	241	273	101.0	8.2	41.0
529	<a href="#">EHY</a>	うみへび座 $\eta$ 流星群	7.9	3.0	260.5	261.6	260.0	244	281	135.4	1.8	61.8
335	<a href="#">XVI</a>	12月おとめ座 $\chi$ 流星群	#35.4	2.2	259.5	256.4	260.0	244	279	189.4	-9.3	68.2
4	<a href="#">GEM</a>	ふたご座流星群	705.9	860.6	262.5	262.1	262.0	237	273	113.5	32.3	33.8
340	<a href="#">TPY_3</a>	theta Pyxidids	7.3	1.9	265.5	266.6	266.6	256	288	154.3	-24.4	62.5
20	<a href="#">COM</a>	かみのけ座流星群	33.3	18.8	267.5	266.1	267.0	249	320	160.4	31.1	63.0
428	<a href="#">DSV</a>	12月おとめ座 $\sigma$ 流星群	11.7	2.1	263.5	276.3	270.0	244	304	207.2	4.6	66.1

15	<a href="#">URS</a>	こぐま座流星群	97.8	25.3	270.5	270.4	270.5	261	273	219.0	75.3	33.0
97	<a href="#">SCC</a>	かに座 $\delta$ 南流星群	4.2	1.1	275.5	274.6	275.0	273	287	105.3	17.6	26.9
319	<a href="#">JLE</a>	1月しし座流星群	6.7	1.9	282.5	282.0	282.0	277	287	147.5	23.9	52.0
10	<a href="#">QUA</a>	しぶんぎ座流星群	289.1	234.2	283.5	283.3	283.3	275	296	230.0	49.7	40.2
331	<a href="#">AHY</a>	うみへび座 $\alpha$ 流星群	52.2	2.3	285.5	286.4	285.0	264	302	127.9	-8.4	43.3
515	<a href="#">OLE</a>	omicron Leonids	7.0	1.3	289.5	289.0	289.0	269	302	137.7	9.6	41.7
96	<a href="#">NCC</a>	かに座 $\delta$ 北流星群	4.0	1.3	287.5	290.1	290.0	274	307	122.0	22.5	27.6
323	<a href="#">XCB</a>	かんむり座 $\xi$ 流星群	16.1	0.7	294.5	297.3	295.0	289	300	249.9	30.0	45.5
341	<a href="#">XUM</a>	1月おおぐま座 $\xi$ 流星群	32.3	4.7	298.5	299.1	299.0	294	301	169.6	32.4	40.9
530	<a href="#">ECV</a>	からす座 $\eta$ 流星群	6.6	1.5	298.5	304.4	301.0	287	316	190.7	-17.7	67.6
429	<a href="#">ACB</a>	alpha Coronae Borealis	9.3	2.8	308.5	307.4	307.4	306	316	231.1	28.1	56.5
110	<a href="#">AAN</a>	ポンプ座 $\alpha$ 流星群	5.5	0.5	313.5	313.1	313.1	302	317	158.3	-9.9	44.3
346	<a href="#">XHE</a>	ヘルクレス座 $\chi$ 流星群	15.6	1.8	350.5	351.3	351.3	346	360	254.4	48.6	35.4
11	<a href="#">EVI</a>	おとめ座 $\eta$ 流星群	22.6	2.3	358.5	356.9	357.0	348	5	185.3	3.3	27.0

## 本稿で取り上げなかった「流星群」

[AAN](#) (ポンプ座 $\alpha$ 流星群) は『確定群』とされているが、本稿で『流星群』として認定したものの中で基準をкаろうじて満たした下限に近いものである。AAN は輻射点分布図ではある程度の集中があるが、出現グラフで明瞭な極大は認められない。かろうじて DR10 と DR15 のグラフでそれらしき変化が見られるだけで、 $Nr \leq 3$  では変化の幅が大きくて流星群の活動と認めるのは難しい。右下に示した  $Nr \leq 3$  と活動推算グラフの縦軸は、SonotaCo ネットでほぼ一晩に捉えられる同時流星を表しており、AAN では極大あたりで1日1個以下である。IAUMDC のリストにある AAN の主要な観測は電波であり、ビデオと電波で観測される流星の違いを表しているとも言える。

本稿で取り上げた流星群は IAUMDC のリストのほんの一部であり、取り上げなかったものはほぼ AAN 以下の活動である。今後、AAN 程度あるいはそれ以下の流星活動について補足をする予定ではあるが、それらは必ずしも散在流星の活動と明瞭に判別できる「流星群」とは限らないであろう。

## 流星群データ集の説明

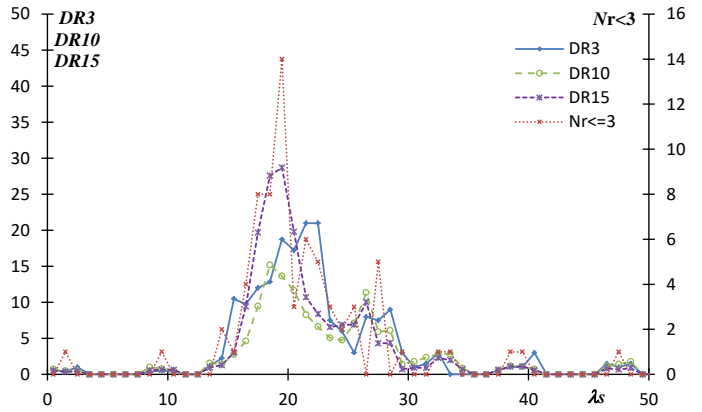
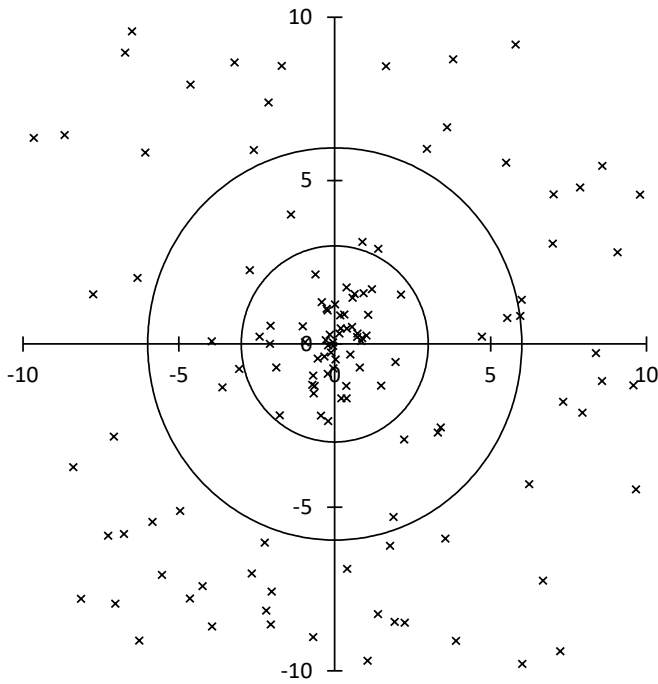
表1に示した $\lambda_s$  (推定極大の太陽黄経) 順に掲げる。最初の [AED](#) を例にデータ集の記載について説明する。

- (1) 第1行目は IAUMDC のリスト中で各流星群の最初に掲載されているものの要点。AED が IAUMDC で450番目に掲載され、輻射点の赤道座標( $\alpha, \delta$ )が(307.2, 11.8)であり、極大の太陽黄経が20.2であることを示す。これらの値は各流星群の代表値として用いられることが多いが、以下に述べるように代表値としては適切でない場合が多い。本稿で代表値としたものは活動グラフ下に示した。
- (2) 輻射点分布図(左)は最終的に求められた輻射点移動を考慮したもので調査期間内のものである。
- (3) 活動グラフ(右)には以下に示すような活動度を表す指標をグラフにしたものである。なお、調査期間外については、輻射点移動を外挿して求めた推算値である。
- (4) Code、 $\lambda_s$ 、 $\lambda - \lambda_s$ 、 $\beta$ は本稿で使用した IAUMDC のデータ。AED00は IAUMDC で第1行目に記載されていることを示す。なお、\*のついたものは独自の値を利用している。また、KCG 及びそれに関連する AUD、AXD(仮称 August  $\xi$ -Draconids)と STA については少し異なる分析方法を用いている。具体的には各流星群の項目を参照されたい。
- (5)  $\Delta r$ 、 $\Delta \lambda_s$  はそれぞれ、輻射点移動の中心から群流星と判定する距離、調査範囲の太陽黄経の半値幅。
- (6)  $\lambda_s$  と max はグラフ中で最大となる  $Nr \leq 3$ 、DR3、DR10、DR15 の値と対応する太陽黄経である。4通りのグラフで極大が一致しないことが多いが、それぞれの特性を考慮して、実際の極大がどこにあるか、考える必要がある。また、DR は太陽黄経3度幅の移動平均なので、極大幅が広く表示されている。
- (7) 輻射点移動を考慮した、輻射点の位置及び、それに基づいた軌道要素。なお、太陽黄経は等間隔とは限らないことに注意が必要である。参考として想定される活動期間の外側も記している。
- (8) 輻射点移動の中心から $\Delta r$ または $\Delta x$ 、 $\Delta y$ で示した範囲内の輻射点数の年別分布。
- (9) 太陽黄経1度以内に得られた輻射点移動の中心から3度以内の輻射点数の太陽黄経0.1度ごとの移動平均。観測年数12年で除してあるので、縦軸はほぼ1日当たり得られる同時流星数を意味する。図中の曲線は流星群の軌道から推定した出現の消長である。推定方法の詳細は省略する。

#0450AED

April epsilon Delphinids

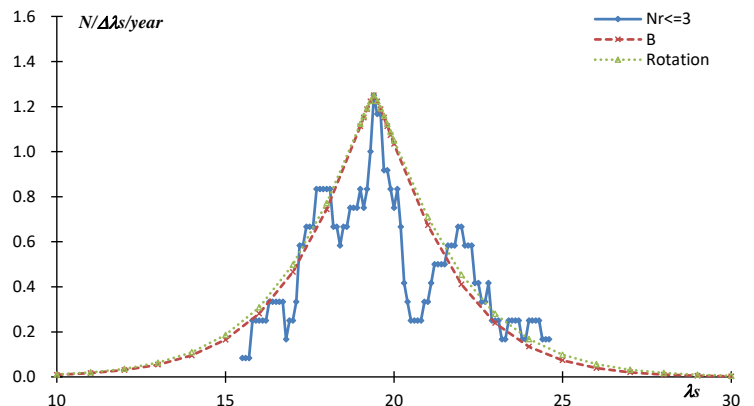
$\alpha=307.2, \delta=11.8, \lambda_s=20.2$

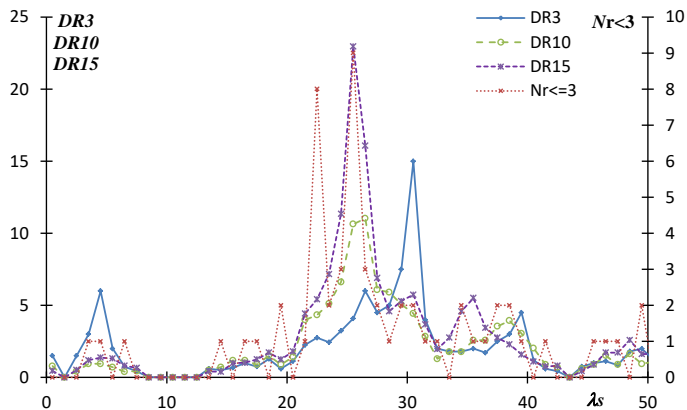
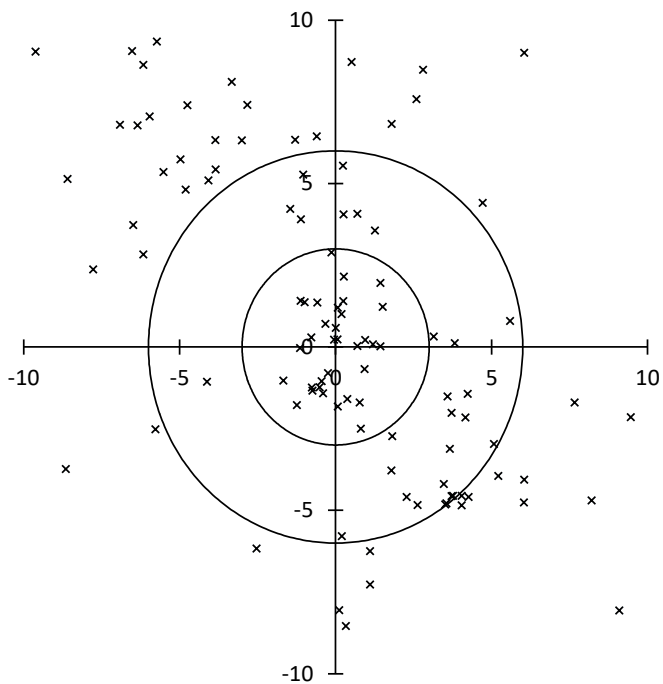


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
AED00	20.2	292.8	29.9
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	19.5	14	
DR3	21.5	21.0	
DR10	18.5	15.2	
DR15	19.5	28.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
10	292.2	26.3	298.7	6.0	61.0	0.872	0.701	127.6	111.1	10.0	247.7	47.6	5.48
11	292.3	26.7	299.6	6.6	61.0	0.879	0.703	127.0	111.5	11.0	247.8	48.0	5.82
12	292.5	27.0	300.5	7.1	60.9	0.886	0.705	126.4	111.9	12.0	247.9	48.3	6.21
13	292.6	27.3	301.5	7.7	60.9	0.894	0.707	125.8	112.3	13.0	248.0	48.7	6.66
14	292.8	27.7	302.4	8.3	60.8	0.901	0.709	125.2	112.7	14.0	248.1	49.0	7.18
15	292.9	28.0	303.3	8.8	60.8	0.909	0.710	124.6	113.0	15.0	248.1	49.3	7.80
16	293.1	28.3	304.2	9.4	60.7	0.917	0.712	123.9	113.4	16.0	248.2	49.6	8.54
17	293.2	28.7	305.1	10.0	60.7	0.924	0.714	123.3	113.8	17.0	248.2	49.8	9.45
18	293.4	29.0	306.0	10.6	60.6	0.932	0.716	122.8	114.2	18.0	248.3	50.1	10.59
19	293.5	29.4	306.9	11.2	60.6	0.940	0.718	122.2	114.6	19.0	248.3	50.3	12.05
20	293.7	29.7	307.8	11.8	60.5	0.949	0.720	121.6	115.0	20.0	248.3	50.6	14.00
21	293.8	30.0	308.7	12.4	60.5	0.957	0.722	121.0	115.4	21.0	248.3	50.8	16.72
22	294.0	30.4	309.6	13.0	60.4	0.965	0.724	120.4	115.8	22.0	248.3	51.0	20.79
23	294.1	30.7	310.4	13.6	60.4	0.974	0.726	119.8	116.2	23.0	248.3	51.1	27.57
24	294.3	31.1	311.3	14.3	60.3	0.982	0.728	119.2	116.6	24.0	248.3	51.3	41.03
25	294.5	31.4	312.2	14.9	60.3	0.991	0.731	118.7	117.0	25.0	248.3	51.4	80.74
26	294.6	31.7	313.0	15.5	60.2	1.000	0.733	118.1	117.4	26.0	248.3	51.63	203.83
27	294.8	32.1	313.9	16.2	60.2	1.009	0.735	117.5	117.8	27.0	248.2	51.7	-84.42
28	294.9	32.4	314.7	16.8	60.1	1.018	0.737	117.0	118.2	28.0	248.2	51.8	-41.52
29	295.1	32.7	315.6	17.5	60.1	1.027	0.739	116.4	118.6	29.0	248.2	51.9	-27.46
30	295.3	33.1	316.4	18.1	60.0	1.036	0.741	115.8	119.0	30.0	248.2	51.9	-20.49

Year	N
2007	1
2008	0
2009	9
2010	3
2011	5
2012	3
2013	5
2014	10
2015	2
2016	5
2017	4
2018	7
Total	54

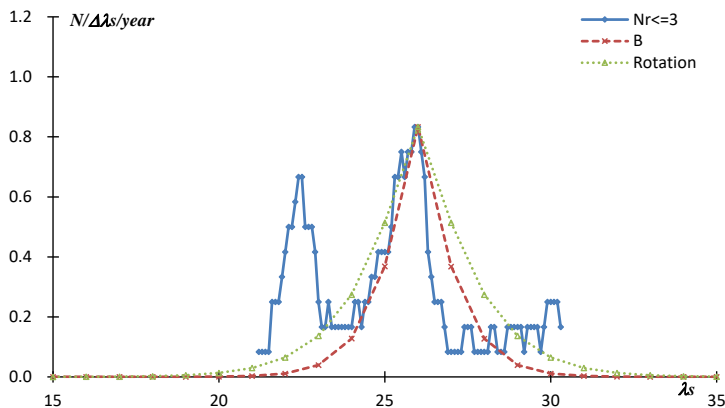




Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
KSE03	25.9	216.7	38.3
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
Nr<=3	25.5	9	
DR3	29.5	7.5	
DR10	26.5	11.0	
DR15	25.5	23.0	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
15	218.3	36.4	239.9	16.7	48.1	0.984	0.482	78.7	272.6	15.0	297.8	-78.4	29.51
16	218.1	36.6	240.6	16.8	47.9	0.981	0.486	78.1	272.2	16.0	296.5	-77.9	26.12
17	217.9	36.9	241.3	16.9	47.7	0.979	0.490	77.6	271.8	17.0	295.4	-77.4	23.46
18	217.7	37.1	242.0	17.0	47.4	0.977	0.494	77.0	271.4	18.0	294.4	-76.9	21.30
19	217.5	37.4	242.7	17.1	47.2	0.974	0.498	76.5	271.1	19.0	293.6	-76.4	19.53
20	217.3	37.6	243.4	17.2	47.0	0.972	0.502	75.9	270.7	20.0	292.8	-75.9	18.04
21	217.1	37.9	244.1	17.3	46.7	0.970	0.506	75.4	270.3	21.0	292.2	-75.4	16.78
22	216.9	38.2	244.8	17.4	46.5	0.967	0.510	74.9	269.9	22.0	291.7	-74.9	15.69
23	216.7	38.4	245.5	17.5	46.3	0.965	0.514	74.4	269.5	23.0	291.3	-74.4	14.74
24	216.5	38.7	246.2	17.6	46.0	0.963	0.518	73.8	269.1	24.0	290.9	-73.8	13.90
25	216.3	38.9	246.9	17.8	45.8	0.960	0.523	73.3	268.7	25.0	290.6	-73.3	13.17
26	216.0	39.2	247.5	17.9	45.6	0.958	0.527	72.8	268.4	26.0	290.4	-72.7	12.51
27	215.8	39.4	248.2	18.0	45.3	0.955	0.531	72.3	268.0	27.0	290.3	-72.2	11.92
28	215.6	39.7	248.9	18.2	45.1	0.953	0.535	71.8	267.6	28.0	290.2	-71.6	11.38
29	215.4	39.9	249.6	18.3	44.8	0.951	0.539	71.3	267.2	29.0	290.2	-71.1	10.90
30	215.2	40.2	250.2	18.4	44.6	0.948	0.543	70.8	266.8	30.0	290.2	-70.6	10.46
31	214.9	40.4	250.9	18.6	44.4	0.946	0.548	70.3	266.4	31.0	290.3	-70.0	10.05
32	214.7	40.7	251.5	18.7	44.1	0.943	0.552	69.8	265.9	32.0	290.4	-69.4	9.68
33	214.5	40.9	252.2	18.9	43.9	0.940	0.556	69.4	265.5	33.0	290.5	-68.9	9.34
34	214.3	41.2	252.8	19.0	43.7	0.938	0.560	68.9	265.1	34.0	290.7	-68.3	9.02
35	214.0	41.5	253.5	19.2	43.4	0.935	0.565	68.4	264.7	35.0	290.9	-67.8	8.73

Year	N
2007	1
2008	1
2009	0
2010	0
2011	2
2012	2
2013	2
2014	4
2015	2
2016	7
2017	7
2018	5
Total	33

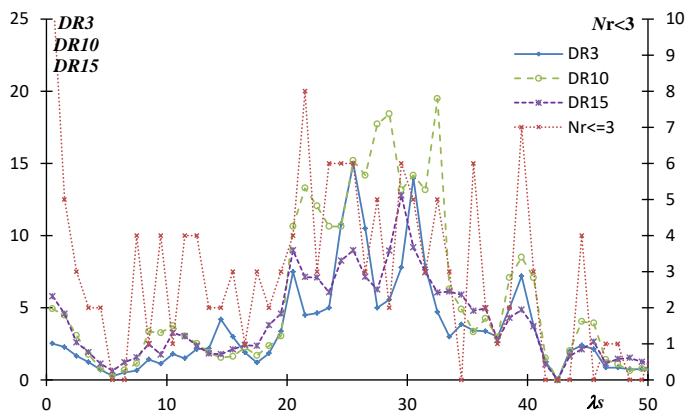
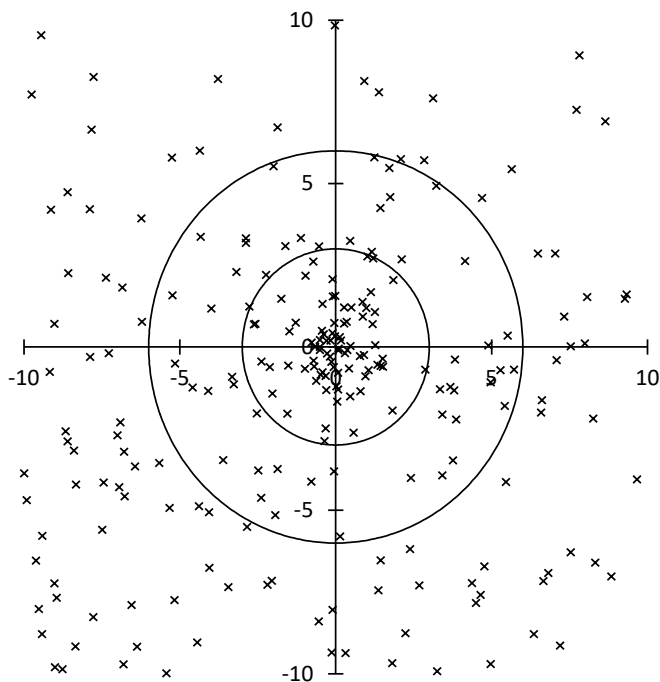


#0021AVB

alpha Virginids

$\alpha=179.9, \delta=-7.7, \lambda_s=28$

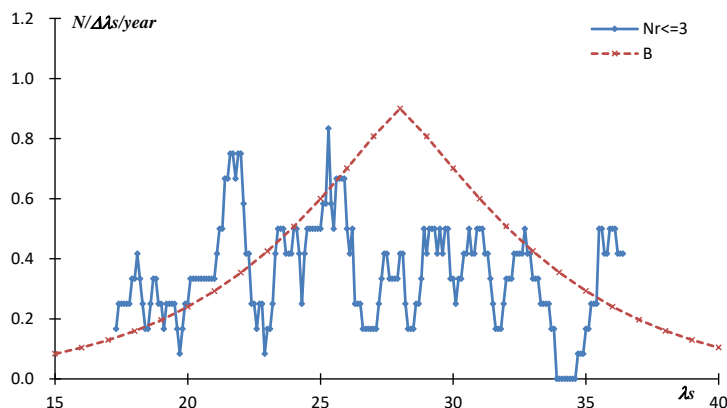
[注釈を読む](#)



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
AVB04	27*	168.7	11.8
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	21.5	8	
DR3	25.5	15.0	
DR10	32.5	19.5	
DR15	29.5	12.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
15	176.2	9.6	194.1	4.4	21.2	0.729	0.642	6.5	261.4	15.0	276.3	-6.4	2.37
17	175.3	10.0	195.2	4.3	20.9	0.728	0.655	6.6	259.6	17.0	276.6	-6.5	2.41
19	174.4	10.4	196.4	4.3	20.6	0.727	0.668	6.7	257.9	19.0	276.8	-6.5	2.44
20	174.0	10.5	196.9	4.2	20.5	0.726	0.675	6.7	257.1	20.0	277.0	-6.5	2.46
21	173.5	10.7	197.5	4.2	20.3	0.725	0.681	6.7	256.2	21.0	277.1	-6.6	2.48
22	173.1	10.9	198.1	4.1	20.2	0.725	0.687	6.8	255.4	22.0	277.3	-6.6	2.50
23	172.6	11.1	198.6	4.1	20.0	0.724	0.694	6.8	254.6	23.0	277.5	-6.6	2.51
24	172.1	11.3	199.2	4.1	19.9	0.724	0.700	6.9	253.8	24.0	277.6	-6.6	2.53
25	171.7	11.5	199.8	4.0	19.7	0.723	0.706	6.9	252.9	25.0	277.8	-6.6	2.55
26	171.2	11.7	200.3	4.0	19.6	0.722	0.712	6.9	252.1	26.0	278.0	-6.6	2.56
27	170.8	11.8	200.9	4.0	19.4	0.722	0.718	6.9	251.3	27.0	278.2	-6.6	2.58
28	170.3	12.0	201.4	3.9	19.3	0.721	0.724	7.0	250.5	28.0	278.4	-6.6	2.59
29	169.9	12.2	202.0	3.9	19.2	0.720	0.729	7.0	249.7	29.0	278.6	-6.6	2.61
30	169.4	12.4	202.6	3.9	19.0	0.719	0.735	7.0	249.0	30.0	278.8	-6.6	2.62
31	168.9	12.6	203.1	3.8	18.9	0.718	0.741	7.0	248.2	31.0	279.0	-6.5	2.63
32	168.5	12.7	203.7	3.8	18.7	0.718	0.746	7.1	247.4	32.0	279.3	-6.5	2.64
33	168.0	12.9	204.2	3.8	18.6	0.717	0.752	7.1	246.7	33.0	279.5	-6.5	2.65
34	167.5	13.1	204.8	3.8	18.4	0.716	0.757	7.1	245.9	34.0	279.7	-6.5	2.66
35	167.1	13.3	205.3	3.7	18.3	0.715	0.763	7.1	245.2	35.0	280.0	-6.5	2.67
36	166.6	13.4	205.9	3.7	18.1	0.714	0.768	7.1	244.4	36.0	280.3	-6.4	2.68
37	166.2	13.6	206.4	3.7	18.0	0.713	0.773	7.1	243.7	37.0	280.5	-6.4	2.69

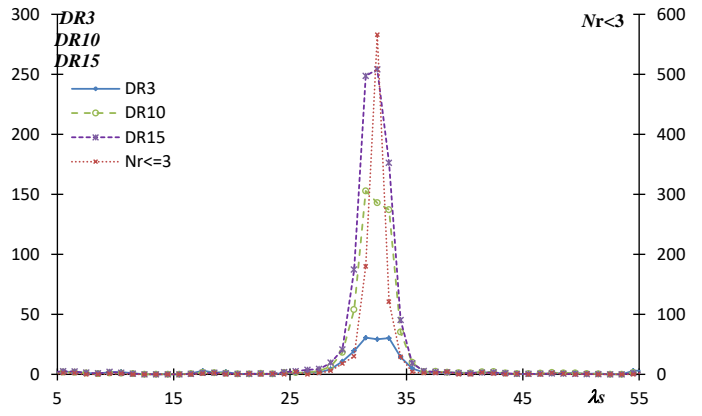
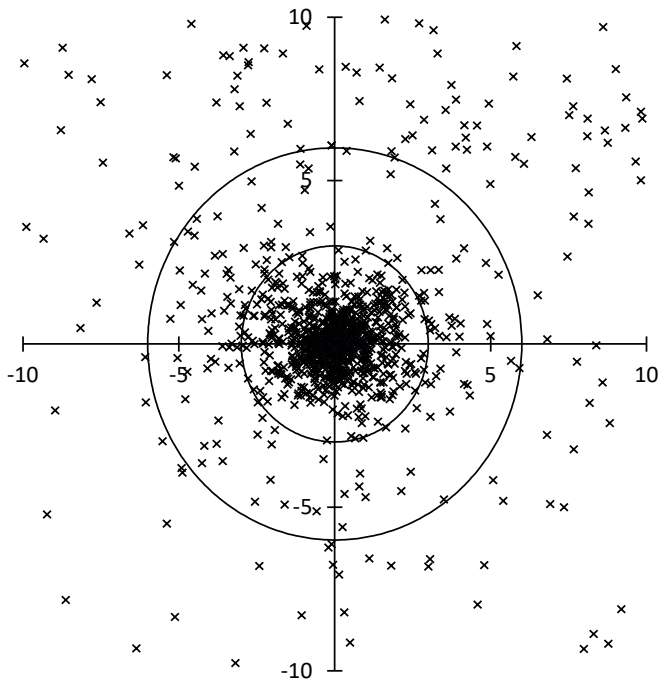
Year	N
2007	1
2008	5
2009	9
2010	2
2011	9
2012	3
2013	7
2014	11
2015	5
2016	6
2017	13
2018	10
Total	81



#0006LYR

April Lyrids

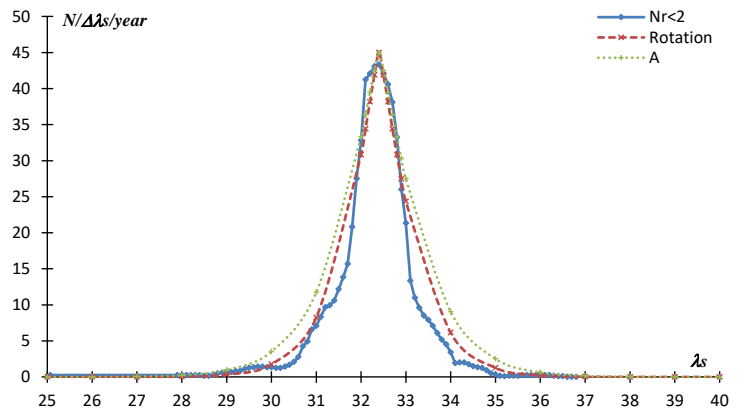
$\alpha=272.0$ .  $\delta=33.3$ ,  $\lambda_s=32.4$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
LYR03	32.4	240.6	56.7
$\Delta r=$	2		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	32.5	566	
DR3	31.5	30.6	
DR10	31.5	152.8	
DR15	32.5	254.2	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
25	235.6	58.8	264.0	35.5	44.2	0.930	0.908	74.0	216.6	25.0	216.5	-34.9	13.07
26	236.4	58.5	265.1	35.2	44.5	0.933	0.910	74.8	216.3	26.0	216.9	-34.8	13.67
27	237.2	58.2	266.3	34.9	44.9	0.936	0.911	75.6	215.9	27.0	217.3	-34.6	14.35
28	238.0	58.0	267.4	34.6	45.2	0.940	0.913	76.3	215.6	28.0	217.6	-34.5	15.11
29	238.7	57.7	268.5	34.3	45.6	0.943	0.915	77.1	215.3	29.0	218.0	-34.3	15.97
30	239.5	57.4	269.7	34.0	45.9	0.946	0.916	77.8	215.0	30.0	218.4	-34.1	16.96
31	240.2	57.1	270.8	33.7	46.3	0.949	0.918	78.6	214.6	31.0	218.8	-33.8	18.09
32	241.0	56.8	271.9	33.4	46.6	0.953	0.920	79.4	214.3	32.0	219.2	-33.6	19.42
32.2	241.1	56.8	272.2	33.3	46.7	0.953	0.920	79.5	214.2	32.2	219.2	-33.5	19.71
32.4	241.3	56.7	272.4	33.3	46.8	0.954	0.921	79.7	214.1	32.4	219.3	-33.5	20.02
32.6	241.4	56.6	272.6	33.2	46.8	0.955	0.921	79.8	214.0	32.6	219.4	-33.4	20.33
32.8	241.6	56.6	272.9	33.2	46.9	0.955	0.922	80.0	214.0	32.8	219.5	-33.4	20.65
33	241.7	56.5	273.1	33.1	47.0	0.956	0.922	80.1	213.9	33.0	219.6	-33.3	20.99
34	242.4	56.2	274.2	32.9	47.3	0.960	0.924	80.9	213.5	34.0	220.0	-33.0	22.88
35	243.1	55.9	275.4	32.6	47.7	0.963	0.926	81.7	213.1	35.0	220.4	-32.7	25.19
36	243.8	55.6	276.5	32.4	48.0	0.967	0.928	82.4	212.7	36.0	220.8	-32.4	28.10
37	244.5	55.3	277.7	32.2	48.4	0.971	0.930	83.2	212.3	37.0	221.3	-32.1	31.85
38	245.2	55.0	278.9	31.9	48.7	0.975	0.932	84.0	211.9	38.0	221.7	-31.7	36.89
39	245.8	54.6	280.0	31.7	49.1	0.979	0.934	84.8	211.5	39.0	222.2	-31.3	44.02
40	246.5	54.3	281.2	31.5	49.4	0.983	0.936	85.5	211.0	40.0	222.7	-30.9	54.88

Year	N
2007	3
2008	57
2009	72
2010	15
2011	27
2012	9
2013	131
2014	106
2015	103
2016	24
2017	125
2018	138
Total	810

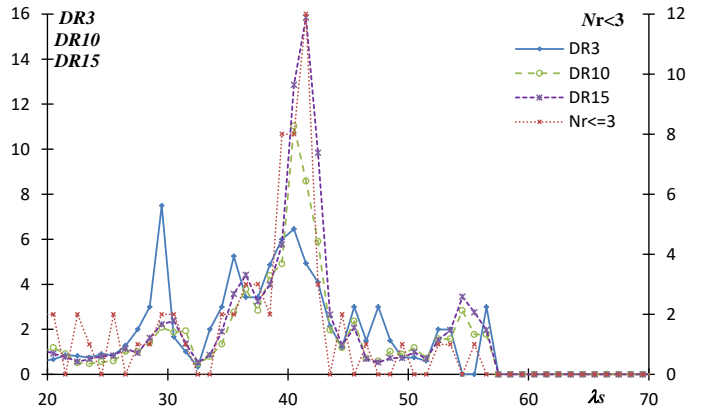
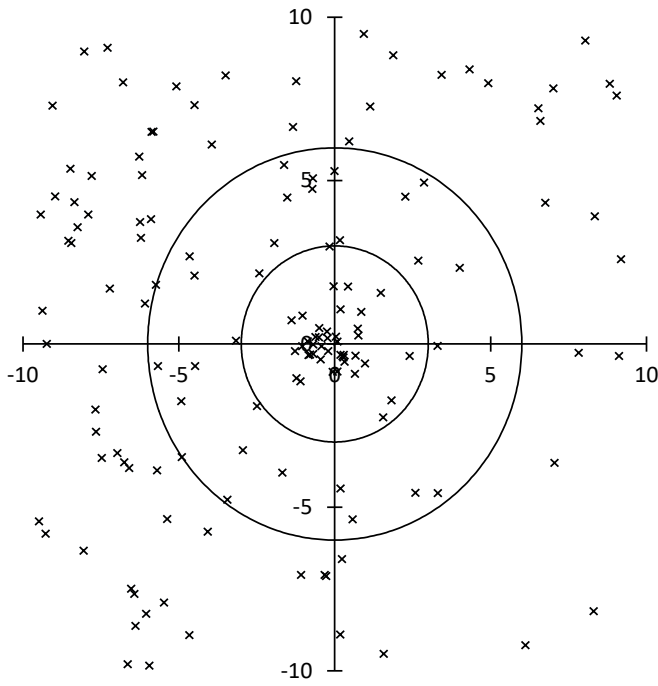


#0343HVI

h Virginids

$\alpha=204.2, \delta=-11.6, \lambda_s=39.0$

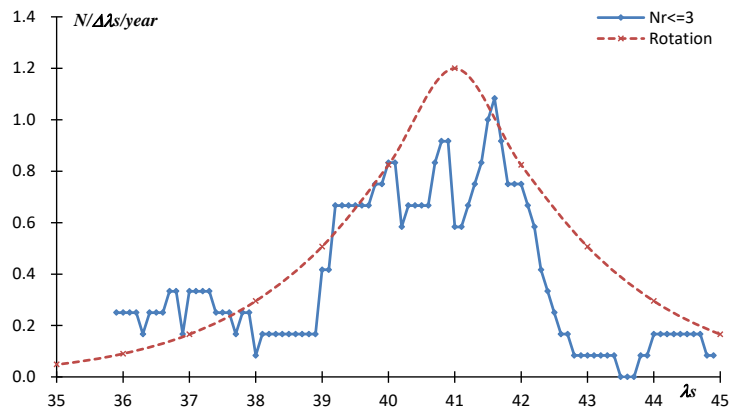
[注釈を読む](#)



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
HVI03	40.6	165.6	-1.3
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$Nr \leq 3$	41.5	12	
DR3	40.5	6.5	
DR10	40.5	11.0	
DR15	41.5	15.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
30	173.3	-0.8	201.2	-9.8	20.2	0.730	0.675	0.5	77.2	210.0	287.2	0.5	2.50
31	172.5	-0.9	201.5	-10.0	20.0	0.729	0.685	0.5	75.9	211.0	286.9	0.5	2.53
32	171.8	-0.9	201.7	-10.1	19.8	0.729	0.694	0.6	74.6	212.0	286.6	0.5	2.56
33	171.1	-1.0	201.9	-10.3	19.5	0.728	0.704	0.6	73.2	213.0	286.2	0.6	2.59
34	170.3	-1.0	202.1	-10.4	19.3	0.727	0.713	0.6	72.0	214.0	286.0	0.6	2.61
35	169.6	-1.1	202.4	-10.5	19.0	0.726	0.723	0.6	70.7	215.0	285.7	0.6	2.64
36	168.8	-1.2	202.6	-10.7	18.8	0.725	0.732	0.7	69.5	216.0	285.5	0.6	2.66
37	168.1	-1.2	202.8	-10.8	18.6	0.724	0.741	0.7	68.2	217.0	285.2	0.6	2.68
38	167.4	-1.3	203.0	-11.0	18.3	0.722	0.749	0.7	67.0	218.0	285.0	0.6	2.70
39	166.6	-1.3	203.3	-11.1	18.1	0.721	0.758	0.7	65.8	219.0	284.8	0.6	2.72
40	165.9	-1.4	203.5	-11.3	17.8	0.719	0.766	0.7	64.6	220.0	284.6	0.6	2.73
41	165.1	-1.4	203.7	-11.4	17.6	0.718	0.775	0.7	63.5	221.0	284.5	0.7	2.74
42	164.4	-1.5	203.9	-11.6	17.4	0.716	0.783	0.7	62.3	222.0	284.3	0.7	2.75
43	163.6	-1.5	204.2	-11.7	17.1	0.714	0.790	0.8	61.2	223.0	284.2	0.7	2.76
44	162.9	-1.6	204.4	-11.8	16.9	0.711	0.798	0.8	60.1	224.0	284.1	0.7	2.76
45	162.2	-1.6	204.6	-12.0	16.6	0.709	0.806	0.8	59.0	225.0	284.0	0.7	2.77
46	161.4	-1.7	204.8	-12.1	16.4	0.706	0.813	0.8	58.0	226.0	284.0	0.7	2.77
47	160.7	-1.7	205.1	-12.3	16.2	0.703	0.820	0.8	56.9	227.0	283.9	0.7	2.76
48	159.9	-1.8	205.3	-12.4	15.9	0.700	0.827	0.8	55.9	228.0	283.9	0.7	2.76
49	159.2	-1.8	205.5	-12.5	15.7	0.697	0.834	0.8	54.8	229.0	283.8	0.7	2.75
50	158.5	-1.9	205.7	-12.7	15.5	0.693	0.840	0.8	53.8	230.0	283.8	0.7	2.74

Year	N
2007	0
2008	13
2009	14
2010	0
2011	0
2012	0
2013	1
2014	4
2015	7
2016	1
2017	2
2018	0
Total	42

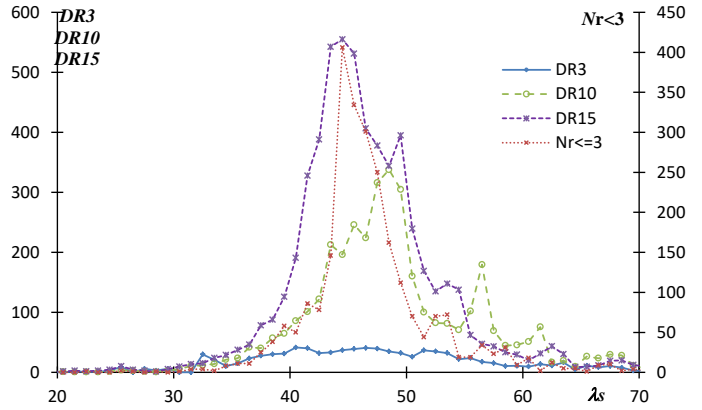
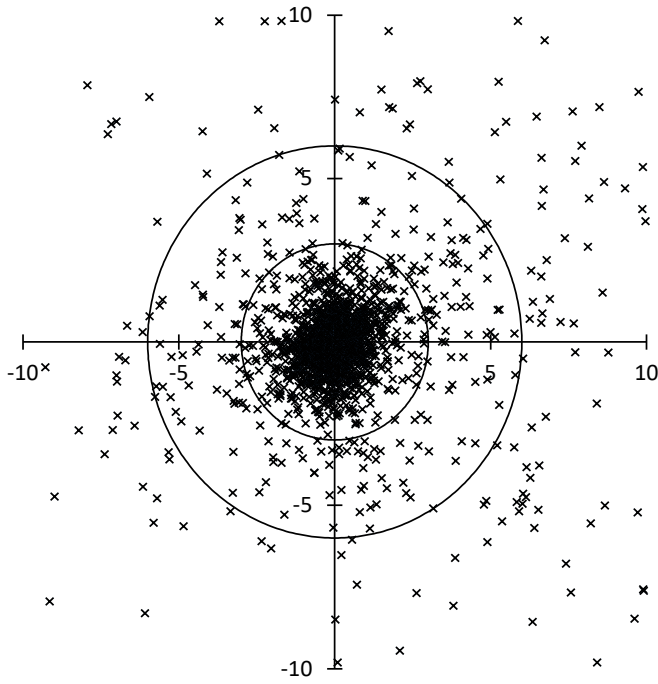




#0031ETA

eta Aquariids

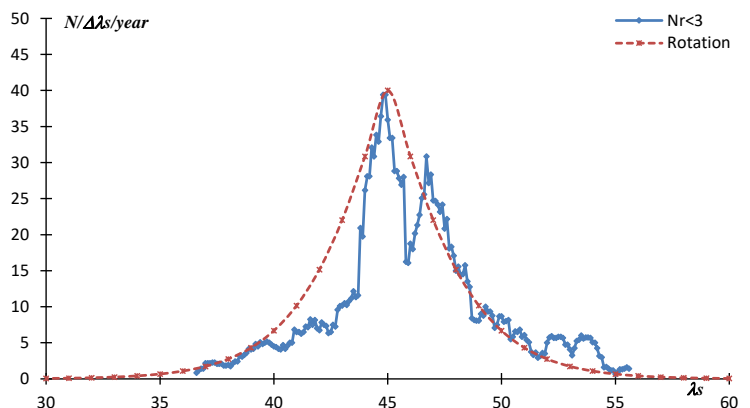
$\alpha=36.9, \delta=-1.5, \lambda_s=46.9$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ETA04	46.3	293.3	7.7
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$Nr \leq 3$	44.5	406	
DR3	40.5	41.5	
DR10	48.5	337.7	
DR15	44.5	554.9	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
30	297.4	6.8	327.3	-6.0	64.3	0.957	0.458	164.4	83.6	30.0	306.7	15.5	10.58
35	296.2	7.1	330.7	-4.4	64.7	0.953	0.495	164.1	87.7	35.0	307.4	15.9	10.46
39	295.2	7.3	333.4	-3.1	65.0	0.950	0.525	163.9	91.1	39.0	307.9	16.1	10.49
40	295.0	7.4	334.1	-2.8	65.1	0.949	0.533	163.8	91.9	40.0	308.0	16.1	10.52
41	294.7	7.5	334.8	-2.5	65.2	0.949	0.541	163.8	92.8	41.0	308.1	16.2	10.55
42	294.5	7.5	335.5	-2.1	65.2	0.948	0.548	163.7	93.6	42.0	308.2	16.2	10.59
43	294.3	7.6	336.2	-1.8	65.3	0.948	0.556	163.7	94.5	43.0	308.3	16.3	10.63
44	294.0	7.7	336.8	-1.5	65.4	0.947	0.564	163.6	95.3	44.0	308.4	16.3	10.69
45	293.8	7.7	337.5	-1.1	65.5	0.947	0.571	163.6	96.2	45.0	308.5	16.3	10.75
46	293.5	7.8	338.2	-0.8	65.6	0.947	0.579	163.5	97.1	46.0	308.6	16.3	10.82
47	293.3	7.8	338.8	-0.4	65.6	0.946	0.586	163.5	98.0	47.0	308.7	16.3	10.90
48	293.0	7.9	339.5	-0.1	65.7	0.946	0.594	163.4	98.8	48.0	308.8	16.4	10.99
49	292.8	8.0	340.2	0.2	65.8	0.946	0.602	163.4	99.7	49.0	308.9	16.4	11.08
50	292.5	8.0	340.9	0.6	65.9	0.946	0.609	163.3	100.6	50.0	308.9	16.4	11.19
51	292.3	8.1	341.5	0.9	65.9	0.945	0.617	163.3	101.5	51.0	309.0	16.4	11.31
52	292.1	8.2	342.2	1.3	66.0	0.945	0.625	163.2	102.4	52.0	309.1	16.4	11.44
53	291.8	8.2	342.9	1.6	66.1	0.945	0.632	163.2	103.3	53.0	309.1	16.3	11.58
54	291.6	8.3	343.5	1.9	66.2	0.945	0.640	163.1	104.2	54.0	309.2	16.3	11.73
55	291.3	8.3	344.2	2.3	66.3	0.946	0.648	163.1	105.1	55.0	309.3	16.3	11.89
60	290.1	8.6	347.5	4.0	66.7	0.947	0.685	162.9	109.6	60.0	309.5	16.1	12.97
65	288.9	8.9	350.8	5.8	67.1	0.951	0.722	162.6	114.3	65.0	309.7	15.8	14.61

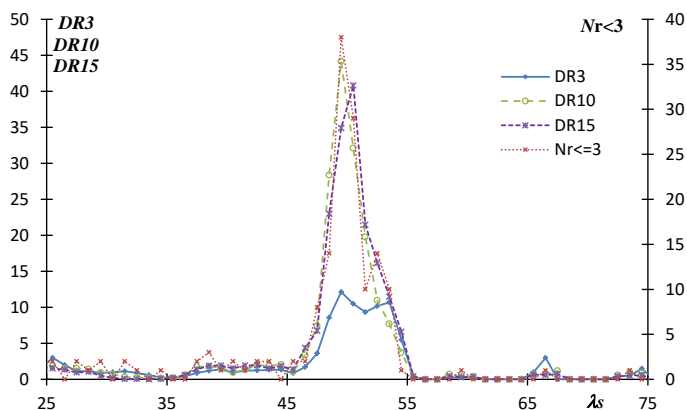
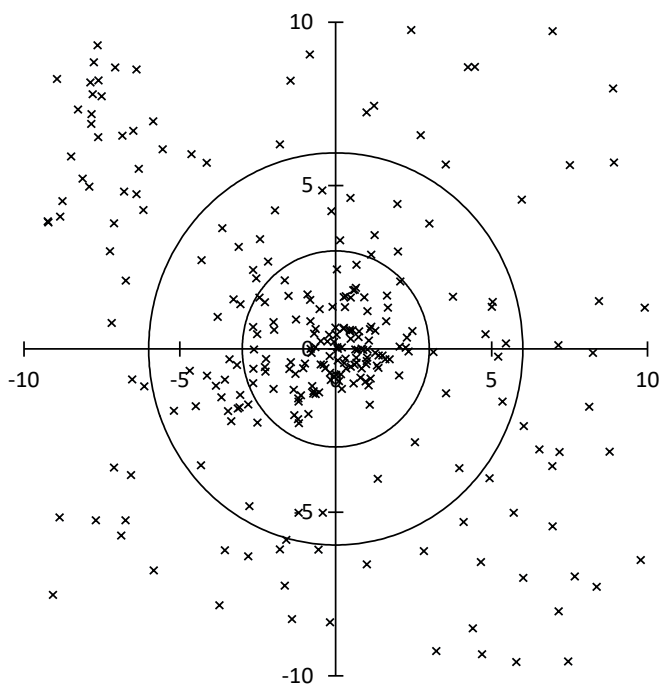
Year	N
2007	84
2008	104
2009	189
2010	198
2011	120
2012	166
2013	550
2014	224
2015	137
2016	159
2017	265
2018	155
Total	2351



#0145ELY

eta Lyrids

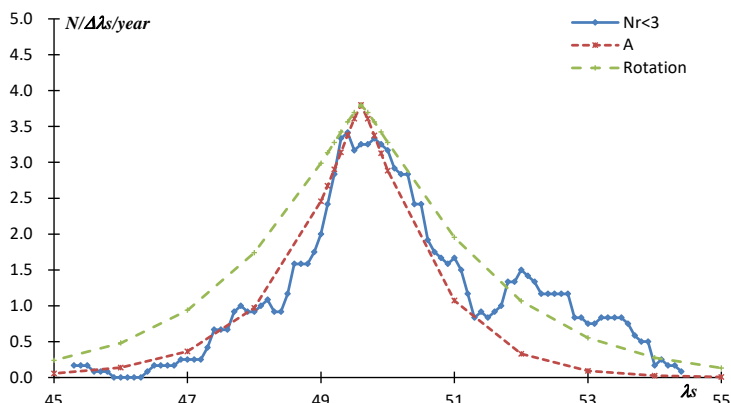
$\alpha=292.5, \delta=39.7, \lambda_s=49.1$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ELY03	50	257.2	64.1
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$Nr \leq 3$	49.5	38	
DR3	49.5	12.1	
DR10	49.5	44.2	
DR15	50.5	40.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
40	260.6	61.0	288.7	39.5	48.2	1.081	1.001	81.3	188.7	40.0	221.3	-8.6	-12.32
41	260.2	61.3	288.9	39.9	47.8	1.066	1.001	80.5	189.0	41.0	222.5	-8.9	-15.07
42	259.8	61.7	289.2	40.4	47.3	1.052	1.001	79.8	189.3	42.0	223.7	-9.1	-19.35
43	259.4	62.1	289.4	40.8	46.9	1.037	1.001	79.1	189.6	43.0	224.8	-9.4	-26.89
44	259.0	62.4	289.6	41.2	46.4	1.023	1.001	78.4	189.9	44.0	226.0	-9.7	-43.78
45	258.6	62.8	289.8	41.6	46.0	1.009	1.001	77.7	190.1	45.0	227.2	-9.9	-115.76
46	258.2	63.1	290.0	42.1	45.5	0.995	1.001	77.0	190.4	46.0	228.4	-10.2	184.46
47	257.7	63.5	290.2	42.5	45.1	0.981	1.000	76.3	190.7	47.0	229.6	-10.4	51.71
48	257.3	63.9	290.3	42.9	44.6	0.967	1.000	75.5	191.0	48.0	230.8	-10.6	30.19
49	256.8	64.2	290.5	43.3	44.2	0.953	1.000	74.8	191.3	49.0	232.0	-10.9	21.38
50	256.4	64.6	290.6	43.7	43.7	0.940	1.000	74.1	191.6	50.0	233.2	-11.1	16.59
51	255.9	64.9	290.8	44.1	43.3	0.926	1.000	73.4	191.9	51.0	234.4	-11.4	13.58
52	255.4	65.3	290.9	44.5	42.8	0.913	1.000	72.7	192.1	52.0	235.7	-11.6	11.51
53	254.9	65.6	291.0	44.9	42.4	0.900	0.999	71.9	192.4	53.0	236.9	-11.8	10.00
54	254.3	66.0	291.1	45.3	41.9	0.887	0.999	71.2	192.7	54.0	238.2	-12.0	8.85
55	253.8	66.3	291.1	45.7	41.5	0.874	0.999	70.5	193.0	55.0	239.4	-12.2	7.94
56	253.3	66.6	291.2	46.1	41.0	0.861	0.999	69.8	193.3	56.0	240.7	-12.5	7.21
57	252.7	67.0	291.2	46.4	40.6	0.849	0.999	69.0	193.6	57.0	241.9	-12.7	6.61
58	252.1	67.3	291.3	46.8	40.1	0.836	0.998	68.3	193.9	58.0	243.2	-12.9	6.10
59	251.5	67.7	291.3	47.2	39.7	0.824	0.998	67.6	194.1	59.0	244.5	-13.1	5.67
60	250.9	68.0	291.3	47.6	39.2	0.812	0.998	66.9	194.4	60.0	245.8	-13.2	5.30

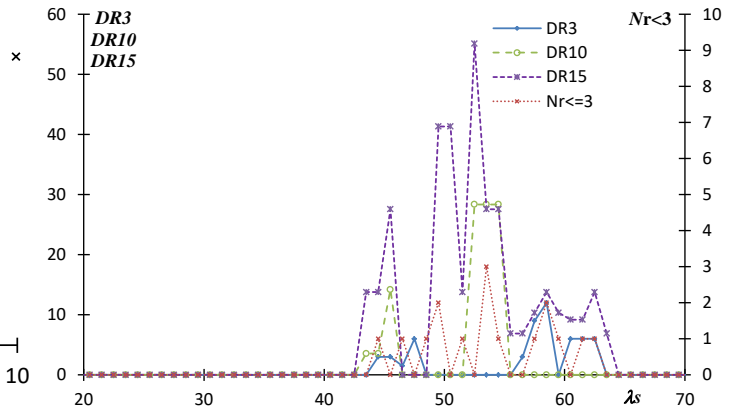
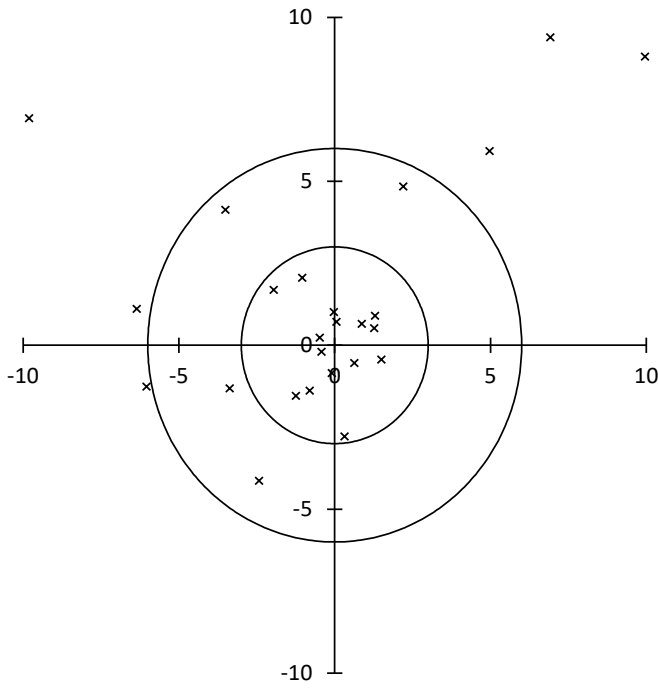
Year	N
2007	5
2008	4
2009	14
2010	14
2011	4
2012	9
2013	10
2014	16
2015	18
2016	9
2017	5
2018	20
Total	128



#0152NOC

Northern Daytime omega Cetids

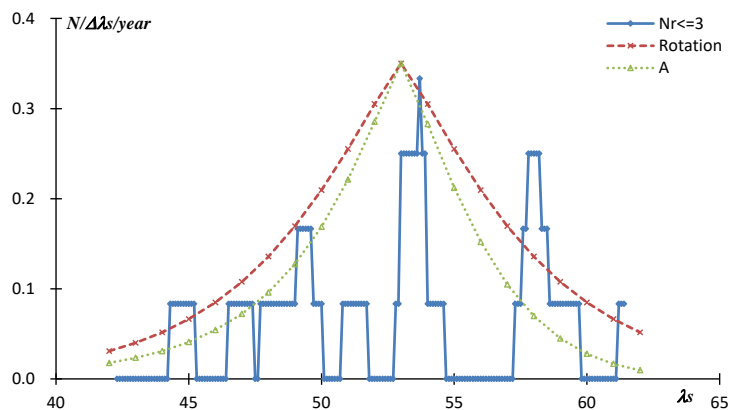
$\alpha=2.3, \delta=17.8, \lambda_s=47.8$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
NOC02	*52	329.6	12.3
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	53.5	3	
DR3	58.5	12.0	
DR10	52.5	28.4	
DR15	52.5	55.1	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
42	333.9	8.6	11.3	14.2	39.2	0.959	0.112	25.2	35.3	42.0	74.6	14.2	2.74
43	333.6	8.9	11.8	14.7	39.3	0.959	0.110	26.3	34.9	43.0	75.0	14.7	2.68
44	333.3	9.2	12.3	15.2	39.4	0.959	0.108	27.5	34.5	44.0	75.4	15.2	2.63
45	333.0	9.4	12.8	15.7	39.5	0.959	0.107	28.6	34.2	45.0	75.8	15.6	2.58
46	332.6	9.7	13.4	16.2	39.5	0.958	0.105	29.8	33.8	46.0	76.2	16.1	2.53
47	332.3	9.9	13.9	16.7	39.6	0.958	0.104	31.0	33.5	47.0	76.6	16.5	2.48
48	332.0	10.2	14.5	17.2	39.7	0.958	0.102	32.2	33.2	48.0	77.0	17.0	2.44
49	331.7	10.5	15.0	17.8	39.8	0.958	0.101	33.4	32.9	49.0	77.4	17.4	2.39
50	331.4	10.7	15.5	18.3	39.8	0.957	0.100	34.7	32.6	50.0	77.8	17.9	2.35
51	331.0	11.0	16.1	18.8	39.9	0.957	0.099	35.9	32.4	51.0	78.2	18.3	2.31
52	330.7	11.3	16.6	19.2	40.0	0.957	0.098	37.2	32.2	52.0	78.6	18.8	2.27
53	330.4	11.5	17.1	19.7	40.1	0.956	0.097	38.5	32.0	53.0	79.0	19.2	2.23
54	330.1	11.8	17.7	20.2	40.2	0.956	0.097	39.8	31.8	54.0	79.4	19.7	2.20
55	329.7	12.0	18.2	20.7	40.2	0.956	0.096	41.1	31.6	55.0	79.9	20.1	2.16
56	329.4	12.3	18.8	21.2	40.3	0.955	0.096	42.4	31.4	56.0	80.3	20.6	2.13
57	329.1	12.6	19.3	21.7	40.4	0.955	0.095	43.7	31.3	57.0	80.7	21.0	2.10
58	328.8	12.8	19.9	22.2	40.5	0.954	0.095	45.0	31.2	58.0	81.2	21.5	2.07
59	328.4	13.1	20.4	22.7	40.5	0.953	0.095	46.3	31.1	59.0	81.6	21.9	2.04
60	328.1	13.3	21.0	23.2	40.6	0.953	0.095	47.7	31.0	60.0	82.0	22.4	2.01
61	327.8	13.6	21.5	23.7	40.7	0.952	0.095	49.0	30.9	61.0	82.5	22.8	1.98
62	327.4	13.8	22.1	24.2	40.8	0.951	0.095	50.3	30.9	62.0	82.9	23.3	1.95

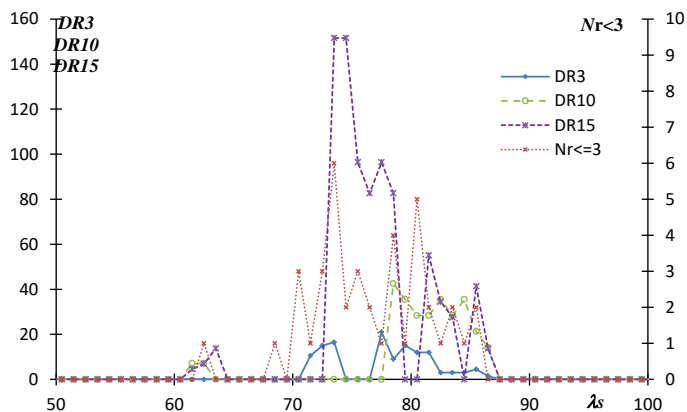
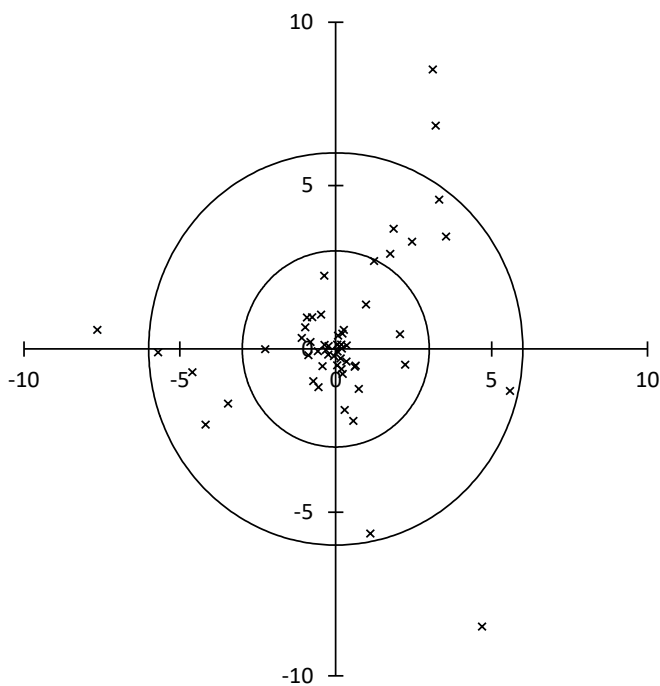
Year	N
2007	1
2008	0
2009	1
2010	0
2011	3
2012	2
2013	1
2014	1
2015	2
2016	2
2017	2
2018	0
Total	15



#0171ARI

Daytime Arietids

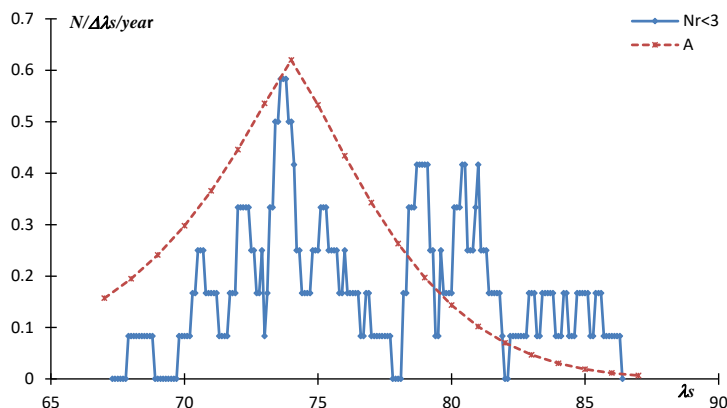
$\alpha=40.2, \delta=23.8, \lambda_s=76.7$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ARI03	77	331.6	7.3
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	73.5	6	
DR3	77.5	21.0	
DR10	78.5	42.5	
DR15	73.5	151.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
67	334.3	7.7	36.3	22.5	39.4	0.963	0.108	23.0	34.7	67.0	99.5	12.8	2.90
68	334.0	7.6	37.0	22.7	39.6	0.964	0.104	23.4	34.0	68.0	99.8	12.8	2.88
69	333.7	7.6	37.8	22.9	39.8	0.965	0.100	23.8	33.4	69.0	100.1	12.8	2.86
70	333.4	7.6	38.5	23.1	39.9	0.966	0.097	24.2	32.7	70.0	100.4	12.8	2.83
71	333.1	7.5	39.3	23.2	40.1	0.967	0.093	24.6	32.1	71.0	100.7	12.8	2.81
72	332.9	7.5	40.0	23.4	40.2	0.968	0.090	25.1	31.4	72.0	101.0	12.8	2.79
73	332.6	7.4	40.8	23.6	40.4	0.969	0.086	25.6	30.8	73.0	101.3	12.8	2.77
74	332.3	7.4	41.5	23.8	40.5	0.970	0.083	26.1	30.1	74.0	101.5	12.7	2.74
75	332.0	7.4	42.3	23.9	40.7	0.971	0.080	26.6	29.5	75.0	101.8	12.7	2.72
76	331.7	7.3	43.0	24.1	40.8	0.972	0.077	27.1	28.9	76.0	102.1	12.7	2.70
77	331.4	7.3	43.8	24.3	41.0	0.973	0.074	27.6	28.2	77.0	102.4	12.7	2.68
78	331.1	7.2	44.5	24.4	41.1	0.973	0.071	28.2	27.6	78.0	102.7	12.6	2.66
79	330.9	7.2	45.3	24.6	41.3	0.974	0.068	28.8	27.0	79.0	103.0	12.6	2.64
80	330.6	7.1	46.1	24.8	41.4	0.975	0.065	29.4	26.3	80.0	103.3	12.6	2.62
81	330.3	7.1	46.8	24.9	41.6	0.976	0.062	30.1	25.7	81.0	103.6	12.6	2.60
82	330.0	7.1	47.6	25.1	41.8	0.977	0.059	30.8	25.1	82.0	103.9	12.5	2.58
83	329.7	7.0	48.4	25.2	41.9	0.978	0.056	31.5	24.5	83.0	104.2	12.5	2.56
84	329.4	7.0	49.1	25.4	42.1	0.979	0.054	32.2	23.9	84.0	104.5	12.5	2.54
85	329.1	6.9	49.9	25.5	42.2	0.980	0.051	33.0	23.3	85.0	104.8	12.4	2.52
86	328.9	6.9	50.7	25.6	42.4	0.980	0.049	33.9	22.6	86.0	105.1	12.4	2.50
87	328.6	6.8	51.4	25.8	42.5	0.981	0.046	34.7	22.1	87.0	105.4	12.4	2.48

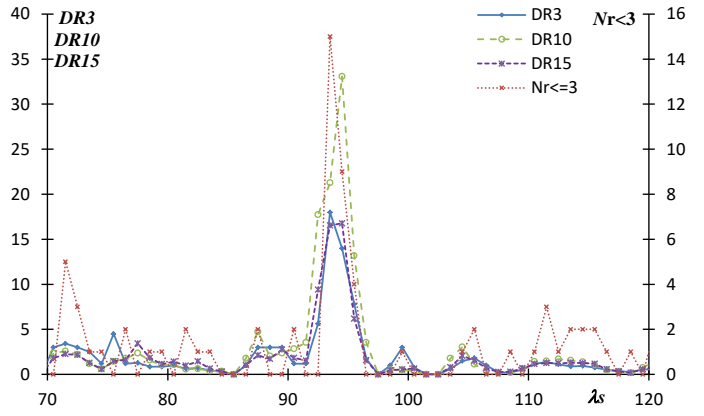
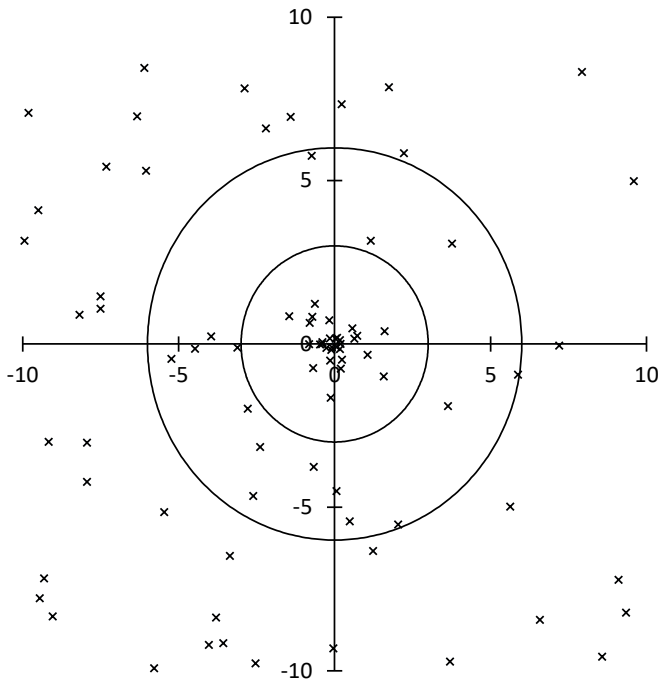
Year	N
2007	2
2008	2
2009	2
2010	5
2011	1
2012	1
2013	2
2014	3
2015	5
2016	7
2017	7
2018	3
Total	40



#0431JIP

June iota Pegasids

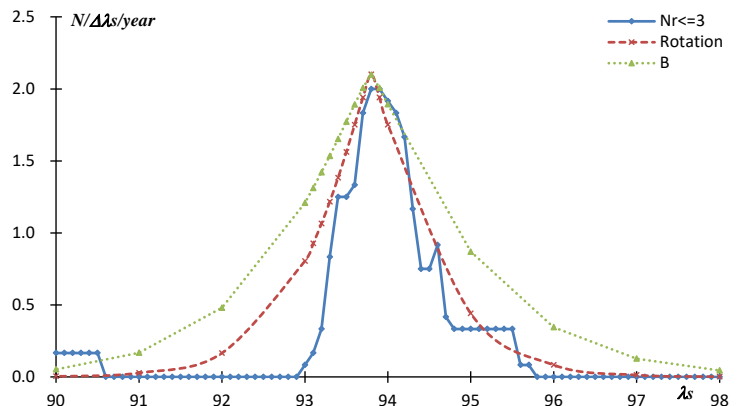
$\alpha=332.626, \delta=29.197, \lambda_s=94.456$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
JIP01	94	252.8	37.5
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
Nr<=3	93.5	15	
DR3	93.5	18.0	
DR10	94.5	33.1	
DR15	94.5	16.8	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
89	252.1	39.4	326.5	28.9	52.5	0.615	0.863	105.5	232.9	89.0	249.6	-50.2	2.24
90	252.1	39.1	327.6	29.0	53.7	0.679	0.873	107.0	229.4	90.0	251.2	-46.5	2.72
91	252.2	38.8	328.6	29.0	55.0	0.748	0.882	108.5	226.4	91.0	252.6	-43.3	3.49
92	252.3	38.5	329.6	29.1	56.3	0.821	0.889	109.9	223.8	92.0	253.9	-40.6	4.97
93	252.4	38.2	330.7	29.2	57.6	0.899	0.896	111.3	221.5	93.0	255.2	-38.1	8.83
93.1	252.4	38.1	330.8	29.2	57.7	0.907	0.896	111.4	221.3	93.1	255.3	-37.9	9.59
93.2	252.4	38.1	330.9	29.2	57.8	0.915	0.897	111.6	221.1	93.2	255.4	-37.7	10.50
93.3	252.5	38.1	331.0	29.2	58.0	0.923	0.898	111.7	220.9	93.3	255.6	-37.4	11.60
93.4	252.5	38.0	331.1	29.3	58.1	0.931	0.898	111.8	220.7	93.4	255.7	-37.2	12.97
93.5	252.5	38.0	331.2	29.3	58.2	0.939	0.899	112.0	220.5	93.5	255.8	-37.0	14.71
93.6	252.5	38.0	331.3	29.3	58.4	0.947	0.899	112.1	220.3	93.6	255.9	-36.8	16.99
93.7	252.5	37.9	331.4	29.3	58.5	0.955	0.900	112.2	220.1	93.7	256.0	-36.6	20.13
93.8	252.5	37.9	331.5	29.3	58.6	0.964	0.900	112.4	219.9	93.8	256.2	-36.4	24.71
93.9	252.5	37.9	331.6	29.3	58.7	0.972	0.901	112.5	219.7	93.9	256.3	-36.2	32.02
94	252.5	37.8	331.7	29.3	58.9	0.980	0.902	112.6	219.5	94.0	256.4	-36.0	45.55
95	252.6	37.5	332.8	29.4	60.2	1.066	0.907	113.9	217.8	95.0	257.6	-34.1	-13.79
96	252.7	37.2	333.8	29.5	61.4	1.155	0.911	115.1	216.2	96.0	258.7	-32.4	-5.87
97	252.8	36.9	334.9	29.6	62.7	1.248	0.915	116.3	214.9	97.0	259.8	-30.8	-3.69
98	252.9	36.6	335.9	29.7	64.0	1.345	0.919	117.5	213.6	98.0	260.9	-29.4	-2.66
99	252.9	36.2	337.0	29.8	65.3	1.445	0.922	118.6	212.5	99.0	262.0	-28.2	-2.07

Year	N
2007	0
2008	0
2009	10
2010	3
2011	2
2012	1
2013	0
2014	7
2015	1
2016	1
2017	1
2018	4
Total	30

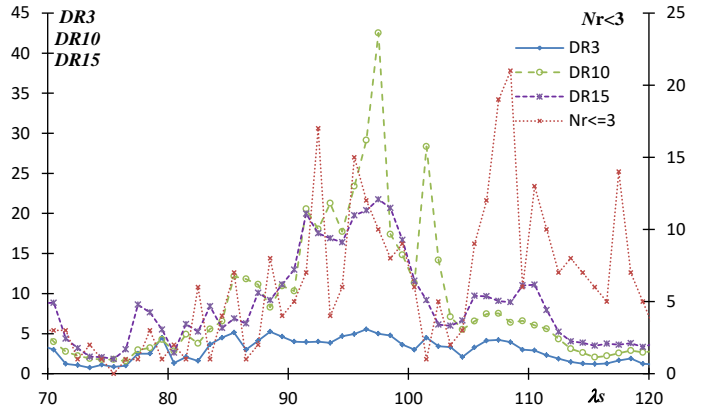
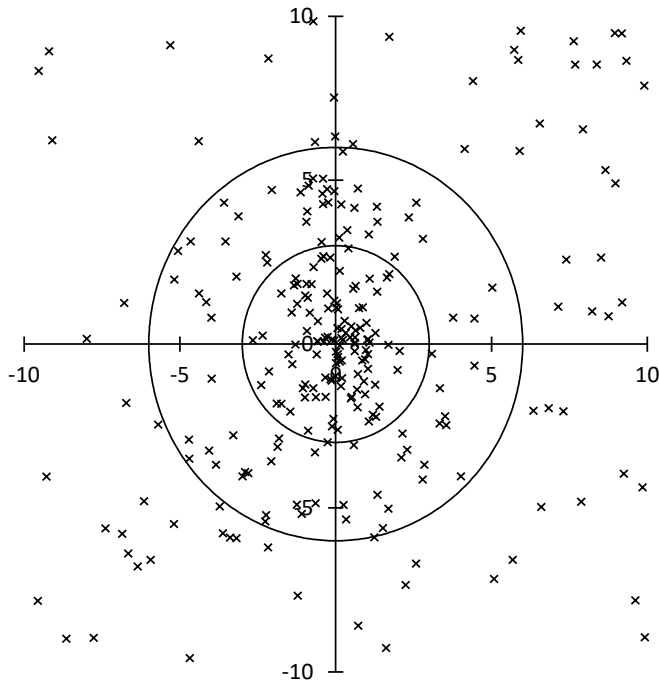


#0372PPS\_0

phi Piscids

$\alpha=20.1, \delta=24.1, \lambda_s=106.0$

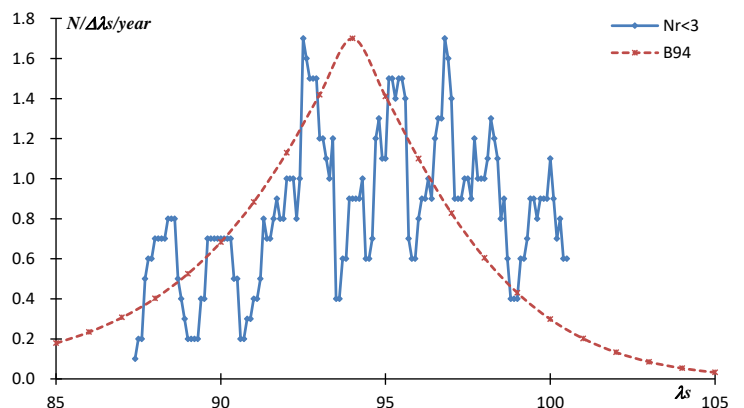
[注釈を読む](#)

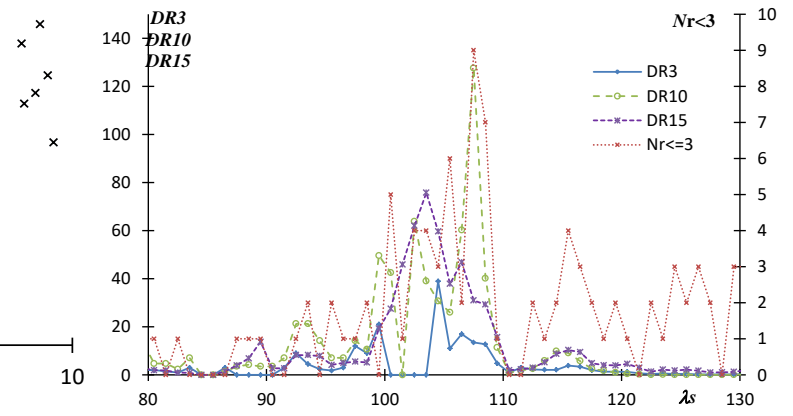
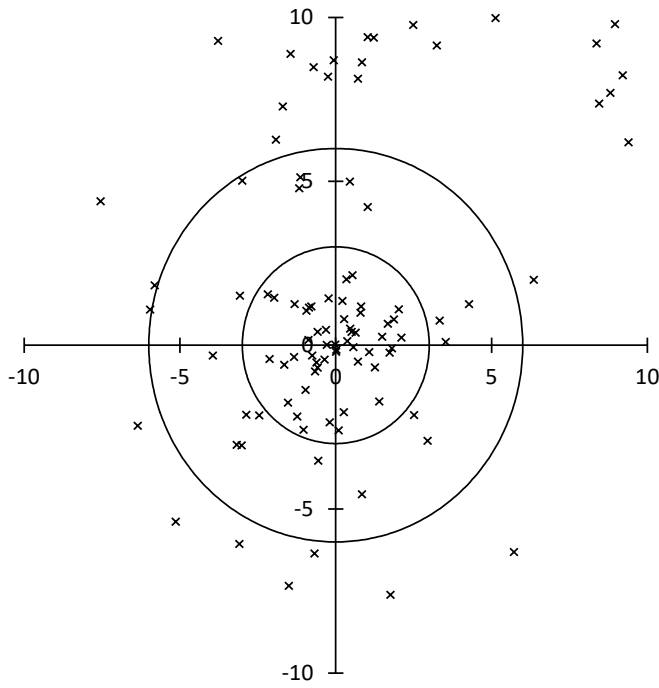


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
PPS02	*94	282.4	16.4
$\Delta r=$	3		
$\Delta \lambda_s=$	7		
	$\lambda_s$	max	
$N_{r \leq 3}$	92.5	17	
DR3	96.5	5.5	
DR10	97.5	42.5	
DR15	97.5	21.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
85	284.9	14.2	3.4	16.9	66.3	0.880	0.828	153.6	127.2	85.0	314.7	20.7	6.89
86	284.8	14.4	4.1	17.4	66.3	0.881	0.832	153.4	127.9	86.0	315.0	20.7	7.01
87	284.7	14.5	4.8	17.9	66.3	0.883	0.836	153.1	128.5	87.0	315.3	20.7	7.13
88	284.5	14.7	5.5	18.4	66.3	0.884	0.840	152.8	129.2	88.0	315.5	20.7	7.27
89	284.4	14.9	6.3	18.9	66.3	0.886	0.845	152.6	129.8	89.0	315.8	20.7	7.41
90	284.2	15.1	7.0	19.4	66.4	0.888	0.849	152.3	130.5	90.0	316.1	20.7	7.56
91	284.1	15.2	7.7	19.9	66.4	0.889	0.853	152.0	131.1	91.0	316.3	20.7	7.71
92	284.0	15.4	8.4	20.4	66.4	0.891	0.857	151.8	131.8	92.0	316.6	20.7	7.88
93	283.8	15.6	9.2	20.9	66.4	0.893	0.861	151.5	132.4	93.0	316.9	20.6	8.06
94	283.7	15.7	9.9	21.4	66.5	0.895	0.864	151.2	133.1	94.0	317.1	20.6	8.25
95	283.5	15.9	10.6	21.9	66.5	0.834	0.856	29.8	130.7	95.0	229.7	22.1	5.15
96	283.4	16.1	11.4	22.4	66.5	0.899	0.872	150.7	134.4	96.0	317.7	20.5	8.66
97	283.2	16.3	12.1	22.9	66.5	0.902	0.876	150.5	135.1	97.0	318.0	20.4	8.89
98	283.1	16.4	12.9	23.4	66.6	0.904	0.880	150.2	135.7	98.0	318.2	20.3	9.14
99	283.0	16.6	13.6	23.9	66.6	0.906	0.883	149.9	136.4	99.0	318.5	20.2	9.40
100	282.8	16.8	14.4	24.4	66.6	0.908	0.887	149.7	137.0	100.0	318.8	20.1	9.69
101	282.7	17.0	15.1	24.9	66.6	0.911	0.890	149.4	137.7	101.0	319.1	20.0	10.00
102	282.5	17.1	15.9	25.3	66.6	0.913	0.894	149.2	138.3	102.0	319.4	19.9	10.33
103	282.4	17.3	16.6	25.8	66.7	0.916	0.897	148.9	139.0	103.0	319.7	19.8	10.69
104	282.2	17.5	17.4	26.3	66.7	0.919	0.901	148.7	139.6	104.0	320.0	19.7	11.09
105	282.1	17.6	18.1	26.8	66.7	0.922	0.904	148.4	140.3	105.0	320.3	19.6	11.52

Year	N
2007	3
2008	2
2009	15
2010	8
2011	9
2012	17
2013	6
2014	17
2015	11
2016	2
2017	7
2018	16
Total	113

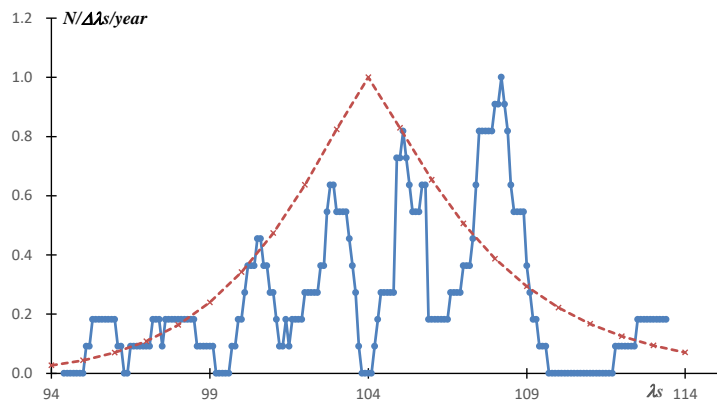




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
SZC02	104	209.2	-11.3
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	107.5	9	
DR3	-	-	
DR10	107.5	127.6	
DR15	103.5	75.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
94	209.5	-8.8	308.1	-27.9	40.2	0.963	0.079	32.3	151.8	274.0	69.6	14.7	2.11
95	209.4	-9.0	309.2	-27.8	40.2	0.962	0.081	32.5	151.4	275.0	70.3	14.9	2.12
96	209.3	-9.1	310.2	-27.8	40.1	0.961	0.082	32.7	151.0	276.0	71.0	15.2	2.13
97	209.2	-9.3	311.2	-27.7	40.1	0.961	0.084	32.9	150.7	277.0	71.7	15.4	2.14
98	209.1	-9.4	312.2	-27.6	40.0	0.960	0.086	33.0	150.3	278.0	72.5	15.7	2.15
99	209.0	-9.6	313.2	-27.5	40.0	0.959	0.088	33.2	150.0	279.0	73.2	15.9	2.16
100	208.9	-9.8	314.2	-27.4	39.9	0.958	0.090	33.4	149.6	280.0	73.9	16.2	2.17
101	208.8	-9.9	315.3	-27.3	39.9	0.958	0.092	33.5	149.2	281.0	74.6	16.4	2.18
102	208.7	-10.1	316.3	-27.2	39.8	0.957	0.094	33.7	148.9	282.0	75.3	16.7	2.19
103	208.6	-10.2	317.3	-27.1	39.7	0.956	0.096	33.8	148.5	283.0	76.0	16.9	2.20
104	208.5	-10.4	318.3	-27.0	39.7	0.956	0.098	33.9	148.1	284.0	76.7	17.1	2.21
105	208.4	-10.5	319.3	-26.9	39.6	0.955	0.100	34.1	147.8	285.0	77.4	17.4	2.22
106	208.4	-10.7	320.3	-26.7	39.6	0.954	0.102	34.2	147.4	286.0	78.1	17.6	2.23
107	208.3	-10.9	321.3	-26.6	39.5	0.953	0.104	34.3	147.0	287.0	78.8	17.9	2.24
108	208.2	-11.0	322.3	-26.5	39.5	0.953	0.106	34.4	146.6	288.0	79.5	18.1	2.25
109	208.1	-11.2	323.3	-26.3	39.4	0.952	0.108	34.6	146.3	289.0	80.2	18.4	2.26
110	208.0	-11.3	324.2	-26.2	39.4	0.951	0.111	34.7	145.9	290.0	80.9	18.6	2.27
111	207.9	-11.5	325.2	-26.0	39.3	0.951	0.113	34.8	145.5	291.0	81.6	18.8	2.28
112	207.8	-11.6	326.2	-25.9	39.3	0.950	0.115	34.9	145.1	292.0	82.3	19.1	2.29
113	207.7	-11.8	327.2	-25.7	39.2	0.949	0.117	35.0	144.8	293.0	82.9	19.3	2.31
114	207.6	-12.0	328.2	-25.6	39.2	0.948	0.119	35.1	144.4	294.0	83.6	19.6	2.32

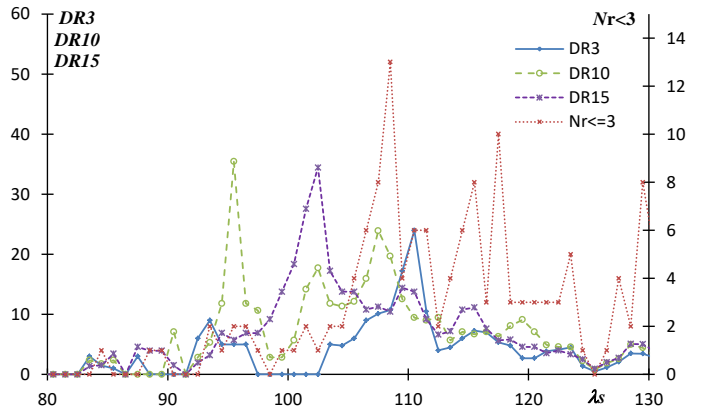
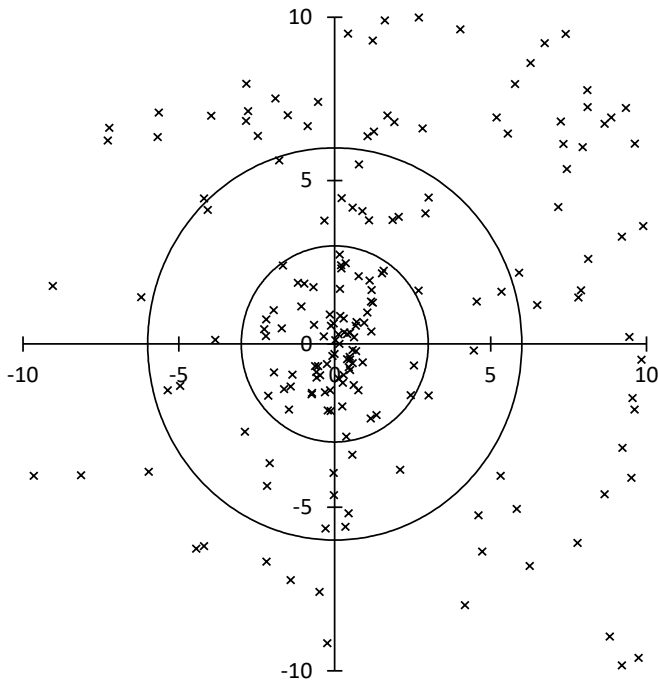
Year	N
2007	2
2008	2
2009	4
2010	3
2011	7
2012	1
2013	2
2014	6
2015	3
2016	11
2017	2
2018	8
Total	51



#0533JXA

July xi Arietids

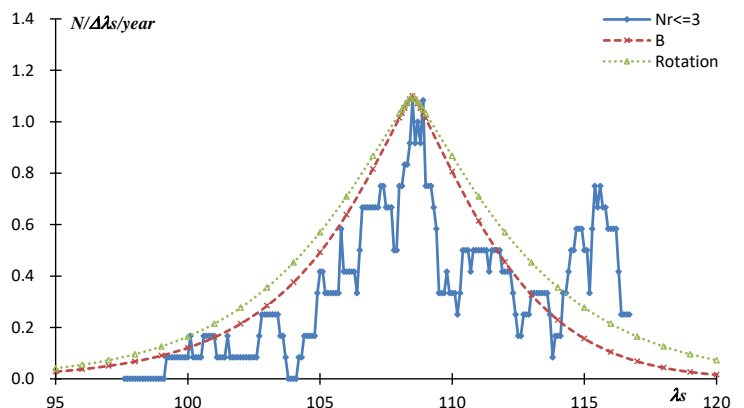
$\alpha=40.1, \delta=10.6, \lambda_s=119$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
JXA03	107.3	284.8	-5.1
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	108.5	13	
DR3	110.5	24.0	
DR10	95.5	35.4	
DR15	102.5	34.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
95	287.6	-6.2	23.2	3.0	67.9	0.963	0.762	168.2	299.3	275.0	335.2	-10.3	20.34
100	286.5	-5.8	26.7	4.8	68.1	0.953	0.788	169.1	302.6	280.0	336.9	-9.2	16.88
102	286.1	-5.6	28.1	5.5	68.2	0.950	0.798	169.5	304.0	282.0	337.6	-8.7	15.89
103	285.9	-5.5	28.8	5.9	68.2	0.948	0.803	169.6	304.6	283.0	337.9	-8.5	15.46
104	285.7	-5.5	29.5	6.2	68.3	0.946	0.808	169.8	305.3	284.0	338.2	-8.3	15.06
105	285.4	-5.4	30.2	6.6	68.3	0.945	0.813	170.0	306.0	285.0	338.6	-8.1	14.69
106	285.2	-5.3	30.9	6.9	68.3	0.943	0.818	170.2	306.7	286.0	338.9	-7.9	14.36
107	285.0	-5.2	31.7	7.3	68.4	0.941	0.823	170.4	307.4	287.0	339.2	-7.7	14.04
108	284.8	-5.1	32.4	7.6	68.4	0.940	0.828	170.5	308.1	288.0	339.5	-7.4	13.75
108.2	284.8	-5.1	32.5	7.7	68.4	0.939	0.829	170.6	308.2	288.2	339.6	-7.4	13.70
108.4	284.7	-5.1	32.7	7.8	68.4	0.939	0.830	170.6	308.4	288.4	339.6	-7.4	13.65
108.6	284.7	-5.1	32.8	7.8	68.5	0.939	0.831	170.6	308.5	288.6	339.7	-7.3	13.59
108.8	284.6	-5.1	32.9	7.9	68.5	0.939	0.832	170.7	308.7	288.8	339.8	-7.3	13.54
109	284.6	-5.0	33.1	8.0	68.5	0.938	0.833	170.7	308.8	289.0	339.8	-7.2	13.49
110	284.4	-5.0	33.8	8.3	68.5	0.937	0.838	170.9	309.5	290.0	340.1	-7.0	13.24
111	284.2	-4.9	34.5	8.7	68.6	0.935	0.842	171.1	310.2	291.0	340.4	-6.8	13.01
112	284.0	-4.8	35.2	9.0	68.6	0.934	0.847	171.2	310.9	292.0	340.7	-6.6	12.80
113	283.7	-4.7	36.0	9.3	68.6	0.932	0.852	171.4	311.6	293.0	341.0	-6.4	12.60
114	283.5	-4.6	36.7	9.7	68.7	0.931	0.856	171.6	312.4	294.0	341.3	-6.2	12.41
115	283.3	-4.5	37.4	10.0	68.7	0.930	0.861	171.7	313.1	295.0	341.6	-6.0	12.24
120	282.3	-4.1	41.1	11.6	68.9	0.924	0.883	172.6	316.7	300.0	343.0	-5.1	11.57

Year	N
2007	2
2008	2
2009	7
2010	11
2011	14
2012	6
2013	7
2014	3
2015	4
2016	6
2017	9
2018	10
Total	81

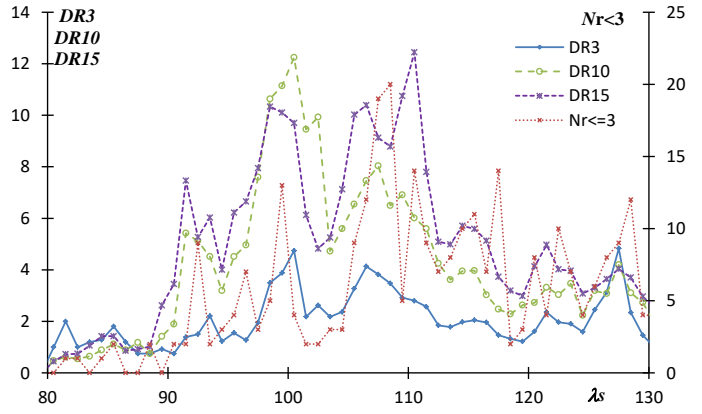
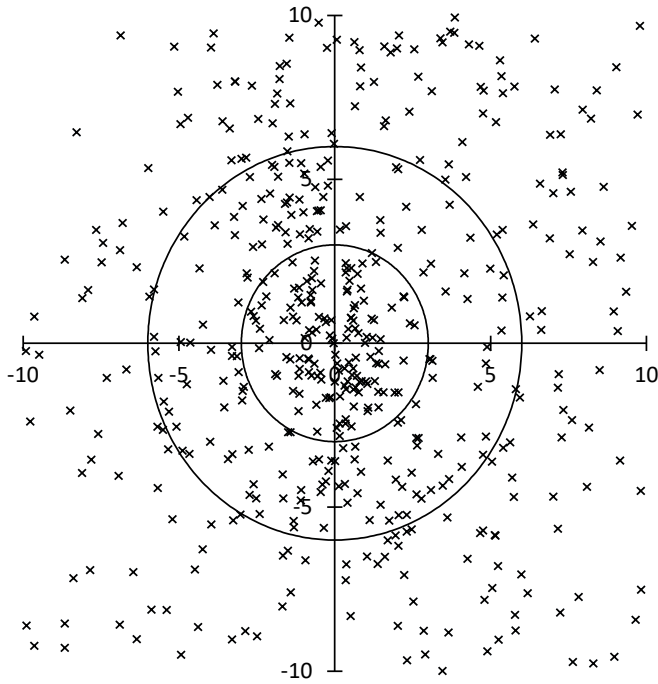




#0372PPS\_1

phi Piscids

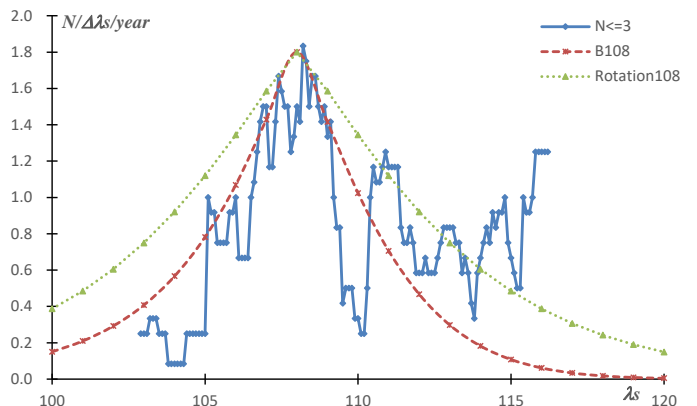
$\alpha=20.1, \delta=24.1, \lambda_s=106.0$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
PPS03	109.6	281.9	19.6
$\Delta r=$	3		
$\Delta \lambda_s=$	7		
	$\lambda_s$	max	
$N_{r \leq 3}$	108.5	20	
DR3	106.5	4.1	
DR10	102.5	9.9	
DR15	110.5	12.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
100	283.6	18.9	14.1	26.6	65.1	0.852	0.871	145.4	133.5	100.0	321.0	24.3	5.87
101	283.3	18.8	14.9	26.8	65.2	0.852	0.875	145.7	134.2	101.0	321.3	23.8	5.91
102	283.1	18.6	15.7	26.9	65.3	0.852	0.880	146.1	135.0	102.0	321.7	23.2	5.95
103	282.9	18.5	16.6	27.1	65.4	0.853	0.884	146.4	135.8	103.0	322.0	22.7	5.99
104	282.6	18.3	17.4	27.2	65.5	0.853	0.889	146.7	136.6	104.0	322.4	22.2	6.04
105	282.4	18.2	18.2	27.4	65.6	0.854	0.893	147.1	137.3	105.0	322.7	21.6	6.10
106	282.2	18.0	19.0	27.6	65.7	0.854	0.897	147.4	138.1	106.0	323.0	21.1	6.15
107	281.9	17.9	19.8	27.7	65.8	0.855	0.901	147.7	138.9	107.0	323.4	20.6	6.21
108	281.7	17.7	20.7	27.9	65.9	0.856	0.906	148.0	139.7	108.0	323.7	20.0	6.28
109	281.5	17.6	21.5	28.0	66.0	0.857	0.910	148.3	140.5	109.0	324.0	19.5	6.35
110	281.2	17.5	22.3	28.2	66.1	0.858	0.914	148.7	141.3	110.0	324.4	19.0	6.42
111	281.0	17.3	23.1	28.3	66.2	0.859	0.918	149.0	142.1	111.0	324.7	18.4	6.50
112	280.8	17.2	24.0	28.5	66.3	0.860	0.922	149.3	142.9	112.0	325.0	17.9	6.58
113	280.6	17.0	24.8	28.6	66.4	0.861	0.925	149.6	143.7	113.0	325.3	17.4	6.67
114	280.3	16.9	25.7	28.7	66.5	0.863	0.929	149.9	144.6	114.0	325.6	16.9	6.77
115	280.1	16.7	26.5	28.9	66.6	0.864	0.933	150.2	145.4	115.0	325.9	16.4	6.87
116	279.9	16.6	27.4	29.0	66.7	0.866	0.936	150.6	146.2	116.0	326.3	15.9	6.98
117	279.6	16.4	28.2	29.1	66.8	0.868	0.940	150.9	147.0	117.0	326.6	15.4	7.10
118	279.4	16.3	29.1	29.3	66.9	0.869	0.944	151.2	147.8	118.0	326.9	14.9	7.22
119	279.2	16.1	29.9	29.4	67.0	0.871	0.947	151.5	148.6	119.0	327.2	14.4	7.35
120	279.0	16.0	30.8	29.5	67.1	0.873	0.950	151.8	149.5	120.0	327.5	13.9	7.50

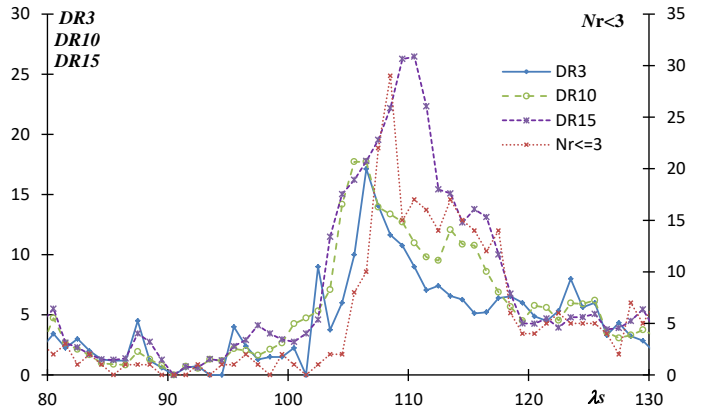
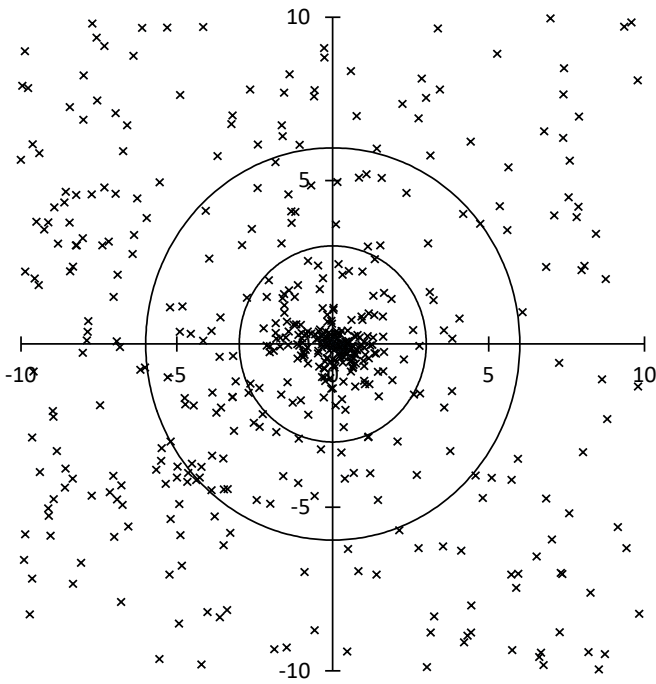
Year	N
2007	1
2008	2
2009	8
2010	17
2011	25
2012	10
2013	18
2014	3
2015	12
2016	10
2017	15
2018	16
Total	137



#0175JPE

July Pegasids

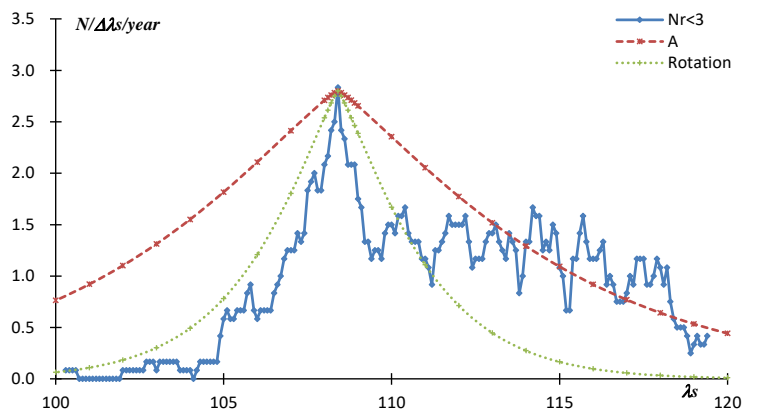
$\alpha=340, \delta=15, \lambda_s=107.5$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
JPE06	*110	244.2	14.2
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	108.5	29	
DR3	106.5	17.1	
DR10	105.5	17.7	
DR15	110.5	26.5	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
90	246.7	16.1	332.5	5.9	65.1	0.984	0.654	147.3	253.6	90.0	199.2	-31.2	40.10
95	246.1	15.7	336.6	7.2	64.8	0.977	0.635	147.7	256.1	95.0	201.4	-31.3	27.18
100	245.6	15.4	340.8	8.5	64.5	0.970	0.616	148.0	258.5	100.0	203.5	-31.3	20.62
105	245.0	15.0	344.9	9.9	64.2	0.964	0.596	148.3	260.9	105.0	205.6	-31.2	16.66
106	244.9	14.9	345.8	10.1	64.2	0.963	0.592	148.4	261.4	106.0	206.0	-31.2	16.05
107	244.8	14.9	346.6	10.4	64.1	0.962	0.588	148.5	261.9	107.0	206.5	-31.2	15.48
108	244.7	14.8	347.4	10.7	64.1	0.961	0.584	148.5	262.4	108.0	206.9	-31.2	14.95
108.2	244.7	14.8	347.6	10.8	64.1	0.961	0.583	148.5	262.5	108.2	207.0	-31.2	14.85
108.4	244.7	14.8	347.8	10.8	64.1	0.961	0.583	148.5	262.6	108.4	207.0	-31.2	14.75
108.6	244.7	14.8	347.9	10.9	64.0	0.960	0.582	148.6	262.7	108.6	207.1	-31.2	14.65
108.8	244.6	14.7	348.1	10.9	64.0	0.960	0.581	148.6	262.8	108.8	207.2	-31.2	14.56
109	244.6	14.7	348.3	11.0	64.0	0.960	0.580	148.6	262.9	109.0	207.3	-31.1	14.46
110	244.5	14.7	349.1	11.3	64.0	0.959	0.576	148.7	263.4	110.0	207.7	-31.1	14.00
111	244.4	14.6	349.9	11.5	63.9	0.958	0.572	148.7	263.9	111.0	208.1	-31.1	13.57
112	244.3	14.5	350.8	11.8	63.9	0.957	0.568	148.8	264.4	112.0	208.6	-31.0	13.16
113	244.2	14.4	351.6	12.1	63.8	0.956	0.564	148.8	264.9	113.0	209.0	-31.0	12.78
114	244.1	14.4	352.4	12.4	63.7	0.955	0.560	148.9	265.4	114.0	209.4	-31.0	12.43
115	244.0	14.3	353.3	12.7	63.7	0.954	0.556	149.0	265.9	115.0	209.8	-30.9	12.09
116	243.9	14.2	354.1	13.0	63.6	0.953	0.552	149.0	266.4	116.0	210.3	-30.9	11.77
120	243.5	13.9	357.5	14.1	63.4	0.950	0.536	149.3	268.3	120.0	211.9	-30.7	10.65
125	242.9	13.6	1.8	15.6	63.1	0.946	0.515	149.6	270.8	125.0	214.1	-30.4	9.52

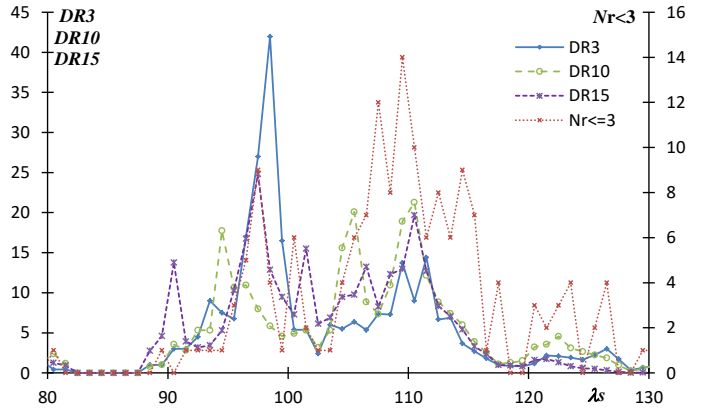
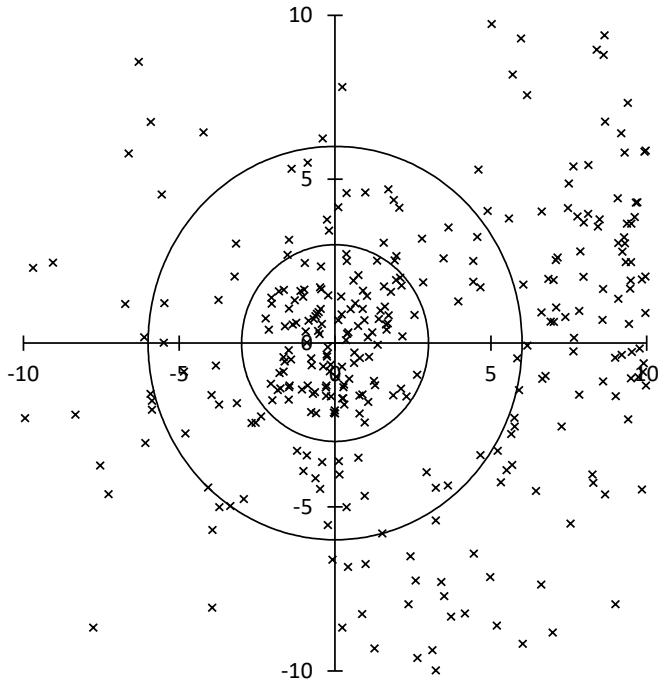
Year	N
2007	0
2008	6
2009	18
2010	22
2011	45
2012	19
2013	22
2014	12
2015	17
2016	8
2017	23
2018	27
Total	219



#0411CAN

c Andromedids

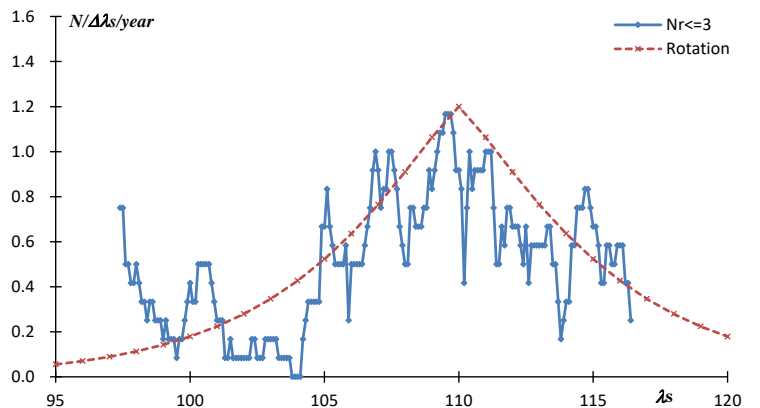
$\alpha=32.4, \delta=48.4, \lambda_s=110$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
CAN01	107	298.1	32.9
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$Nr \leq 3$	109.5	14	
DR3	98.5	42.0	
DR10	110.5	21.3	
DR15	97.5	24.8	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
95	297.9	33.1	15.9	43.0	56.5	0.893	0.684	112.2	107.9	95.0	324.5	61.8	6.42
96	297.9	33.1	17.0	43.4	56.6	0.895	0.684	112.2	107.9	96.0	325.5	61.8	6.49
97	297.9	33.0	18.0	43.7	56.6	0.896	0.684	112.2	107.9	97.0	326.5	61.7	6.56
98	298.0	33.0	19.1	44.1	56.6	0.897	0.684	112.3	108.0	98.0	327.5	61.7	6.63
99	298.0	33.0	20.2	44.5	56.6	0.898	0.684	112.3	108.0	99.0	328.4	61.6	6.71
100	298.0	33.0	21.2	44.8	56.7	0.899	0.684	112.3	108.0	100.0	329.4	61.6	6.79
101	298.0	33.0	22.3	45.2	56.7	0.900	0.684	112.4	108.0	101.0	330.4	61.6	6.86
102	298.0	33.0	23.4	45.6	56.7	0.901	0.684	112.4	108.1	102.0	331.4	61.5	6.94
103	298.0	33.0	24.5	45.9	56.8	0.903	0.684	112.4	108.1	103.0	332.4	61.5	7.02
104	298.1	33.0	25.7	46.3	56.8	0.904	0.684	112.4	108.1	104.0	333.4	61.5	7.10
105	298.1	32.9	26.8	46.6	56.8	0.824	0.637	78.3	99.9	105.0	235.7	74.7	3.61
106	298.1	32.9	27.9	47.0	56.8	0.906	0.684	112.5	108.2	106.0	335.4	61.4	7.26
107	298.1	32.9	29.1	47.3	56.9	0.907	0.684	112.5	108.2	107.0	336.4	61.3	7.35
108	298.1	32.9	30.2	47.7	56.9	0.908	0.684	112.5	108.2	108.0	337.3	61.3	7.43
109	298.1	32.9	31.4	48.0	56.9	0.909	0.684	112.6	108.2	109.0	338.3	61.3	7.52
110	298.2	32.9	32.6	48.3	56.9	0.910	0.684	112.6	108.3	110.0	339.3	61.2	7.60
111	298.2	32.9	33.8	48.6	57.0	0.911	0.684	112.6	108.3	111.0	340.3	61.2	7.69
112	298.2	32.8	35.0	49.0	57.0	0.912	0.684	112.6	108.3	112.0	341.3	61.2	7.78
113	298.2	32.8	36.2	49.3	57.0	0.913	0.684	112.7	108.3	113.0	342.3	61.2	7.87
114	298.2	32.8	37.4	49.6	57.0	0.914	0.684	112.7	108.4	114.0	343.3	61.1	7.97
115	298.2	32.8	38.7	49.9	57.1	0.915	0.684	112.7	108.4	115.0	344.3	61.1	8.06

Year	N
2007	4
2008	4
2009	8
2010	8
2011	18
2012	9
2013	10
2014	9
2015	11
2016	10
2017	16
2018	15
Total	122

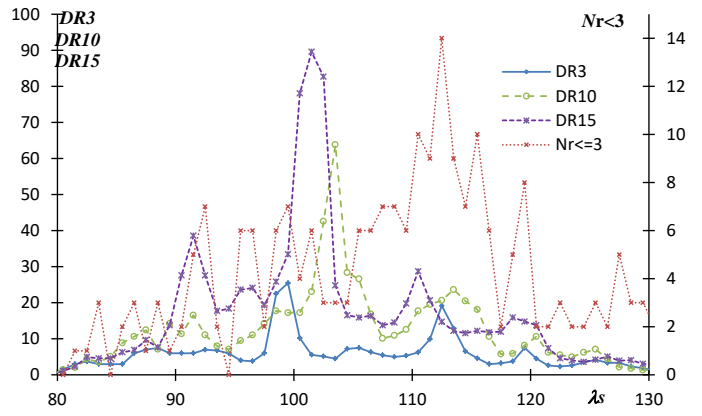
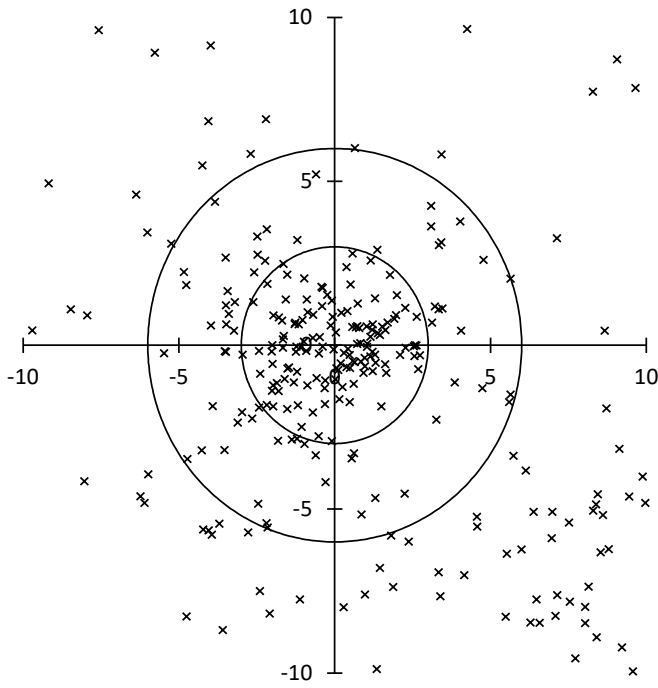


#0164Nzc

Northern June Aquilids

$\alpha=298.3, \delta=-7.1, \lambda_s=86$

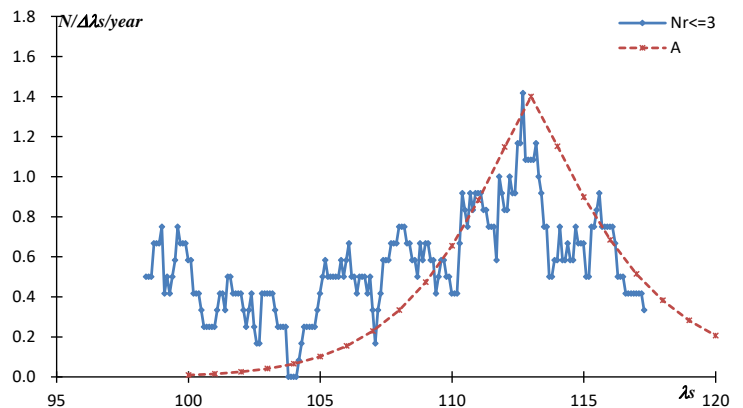
[注釈を読む](#)



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
Nzc02	108.09	208.8	13.3
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
Nr<=3	112.5	14	
DR3	99.5	25.5	
DR10	103.5	63.8	
DR15	101.5	89.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
95	210.0	12.2	304.4	-7.2	40.0	0.951	0.099	40.9	328.3	95.0	70.0	-20.1	2.03
100	209.5	12.3	308.6	-6.0	39.3	0.946	0.107	39.0	327.2	100.0	73.4	-19.9	1.98
101	209.4	12.4	309.5	-5.7	39.2	0.945	0.109	38.6	327.0	101.0	74.1	-19.9	1.97
102	209.3	12.4	310.3	-5.5	39.1	0.944	0.110	38.2	326.8	102.0	74.8	-19.8	1.97
103	209.1	12.4	311.1	-5.2	39.0	0.943	0.112	37.9	326.5	103.0	75.4	-19.8	1.96
104	209.0	12.4	312.0	-4.9	38.8	0.942	0.113	37.5	326.3	104.0	76.1	-19.8	1.95
105	208.9	12.5	312.8	-4.7	38.7	0.941	0.115	37.2	326.1	105.0	76.8	-19.7	1.94
106	208.8	12.5	313.6	-4.4	38.6	0.940	0.117	36.8	325.8	106.0	77.5	-19.7	1.93
107	208.7	12.5	314.5	-4.1	38.5	0.939	0.118	36.5	325.6	107.0	78.2	-19.6	1.93
108	208.6	12.5	315.3	-3.9	38.3	0.937	0.120	36.2	325.4	108.0	78.9	-19.6	1.92
109	208.5	12.6	316.1	-3.6	38.2	0.936	0.122	35.8	325.1	109.0	79.5	-19.5	1.91
110	208.4	12.6	316.9	-3.3	38.1	0.935	0.123	35.5	324.9	110.0	80.2	-19.5	1.90
111	208.2	12.6	317.8	-3.0	37.9	0.934	0.125	35.2	324.7	111.0	80.9	-19.5	1.90
112	208.1	12.7	318.6	-2.7	37.8	0.933	0.127	34.9	324.4	112.0	81.6	-19.4	1.89
113	208.0	12.7	319.4	-2.4	37.7	0.932	0.129	34.5	324.2	113.0	82.3	-19.4	1.88
114	207.9	12.7	320.2	-2.2	37.6	0.930	0.130	34.2	324.0	114.0	83.0	-19.3	1.87
115	207.8	12.7	321.0	-1.9	37.4	0.929	0.132	33.9	323.7	115.0	83.7	-19.3	1.87
116	207.7	12.8	321.8	-1.6	37.3	0.928	0.134	33.6	323.5	116.0	84.4	-19.2	1.86
117	207.6	12.8	322.6	-1.2	37.2	0.927	0.136	33.3	323.3	117.0	85.0	-19.2	1.85
118	207.5	12.8	323.5	-0.9	37.1	0.925	0.138	33.0	323.0	118.0	85.7	-19.1	1.84
120	207.2	12.9	325.1	-0.3	36.8	0.923	0.141	32.4	322.5	120.0	87.1	-19.0	1.83

Year	N
2007	0
2008	8
2009	14
2010	8
2011	28
2012	7
2013	9
2014	4
2015	7
2016	15
2017	12
2018	19
Total	131

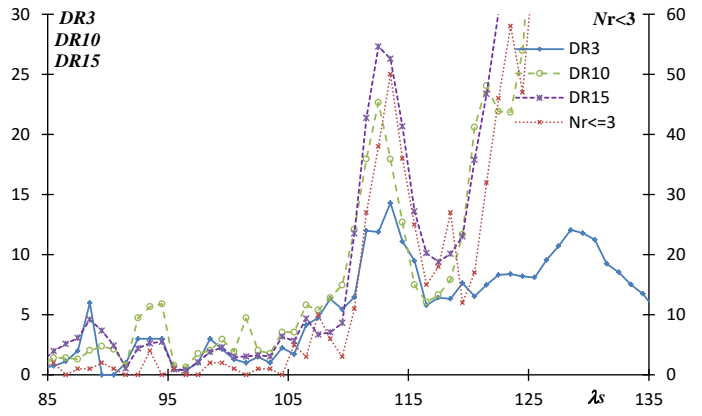
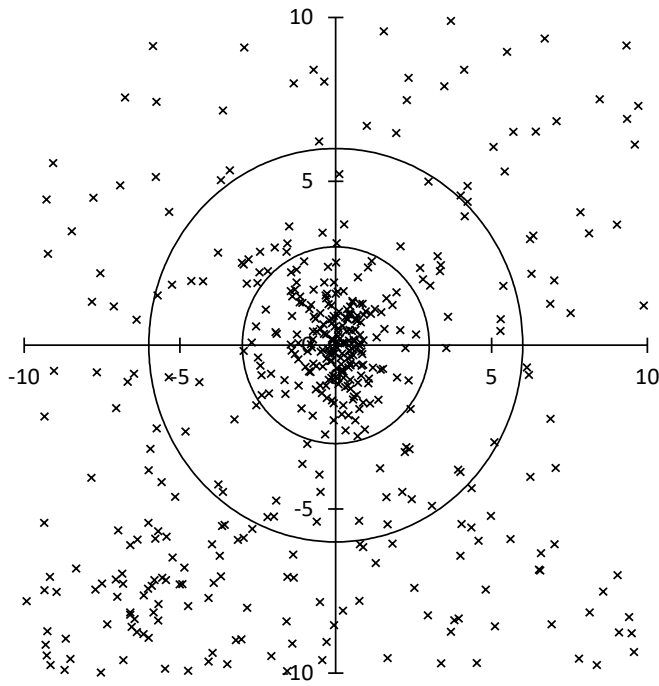


#0444ZCS

zeta Cassiopeids

$\alpha=6.9, \delta=50.7, \lambda_s=113.2$

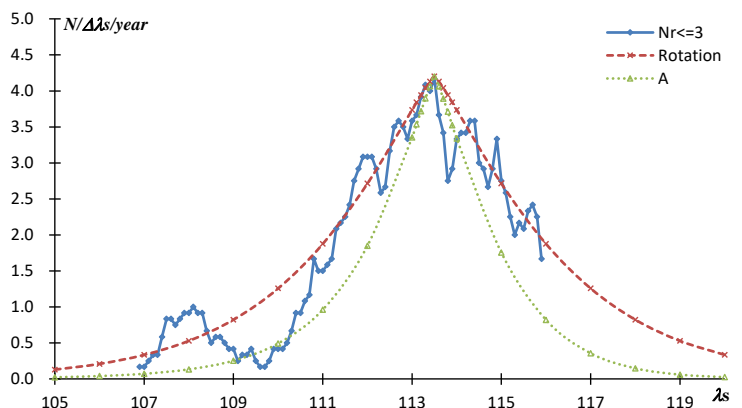
[注釈を読む](#)



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
ZCS03	111.5	277.8	43.0
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	113.5	50	
DR3	113.5	14.3	
DR10	112.5	22.6	
DR15	112.5	27.3	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
105	275.4	45.2	355.1	48.4	54.1	0.790	1.007	102.7	168.2	105.0	287.6	11.5	4.79
106	275.7	44.9	356.5	48.7	54.4	0.807	1.006	103.3	167.6	106.0	288.9	12.0	5.22
107	276.0	44.6	357.9	49.0	54.8	0.825	1.005	103.9	167.0	107.0	290.2	12.6	5.75
108	276.4	44.3	359.3	49.3	55.2	0.843	1.004	104.4	166.4	108.0	291.4	13.1	6.40
109	276.7	44.1	0.8	49.6	55.5	0.862	1.002	105.0	165.9	109.0	292.7	13.6	7.24
110	277.0	43.8	2.2	49.9	55.9	0.880	1.001	105.5	165.3	110.0	294.0	14.2	8.34
111	277.3	43.5	3.7	50.2	56.3	0.899	1.000	106.1	164.7	111.0	295.3	14.7	9.87
112	277.6	43.2	5.2	50.5	56.6	0.918	0.998	106.6	164.2	112.0	296.6	15.1	12.11
113	277.9	43.0	6.7	50.8	57.0	0.937	0.997	107.2	163.6	113.0	298.0	15.6	15.73
113.1	277.9	42.9	6.8	50.8	57.1	0.939	0.996	107.2	163.6	113.1	298.1	15.7	16.22
113.2	278.0	42.9	7.0	50.9	57.1	0.941	0.996	107.3	163.5	113.2	298.2	15.7	16.74
113.3	278.0	42.9	7.1	50.9	57.1	0.942	0.996	107.4	163.5	113.3	298.4	15.7	17.30
113.4	278.0	42.9	7.3	50.9	57.2	0.944	0.996	107.4	163.4	113.4	298.5	15.8	17.90
113.5	278.1	42.8	7.4	50.9	57.2	0.946	0.996	107.5	163.4	113.5	298.6	15.8	18.53
113.6	278.1	42.8	7.6	51.0	57.2	0.948	0.996	107.5	163.3	113.6	298.8	15.9	19.22
113.7	278.1	42.8	7.8	51.0	57.3	0.950	0.995	107.6	163.3	113.7	298.9	15.9	19.96
113.8	278.1	42.8	7.9	51.0	57.3	0.952	0.995	107.6	163.2	113.8	299.0	16.0	20.76
113.9	278.2	42.7	8.1	51.0	57.3	0.954	0.995	107.7	163.2	113.9	299.2	16.0	21.63
114	278.2	42.7	8.2	51.1	57.4	0.956	0.995	107.7	163.1	114.0	299.3	16.1	22.58
115	278.5	42.4	9.7	51.4	57.8	0.975	0.993	108.3	162.6	115.0	300.6	16.5	40.38
116	278.8	42.1	11.3	51.6	58.1	0.995	0.992	108.8	162.1	116.0	302.0	16.9	200.37

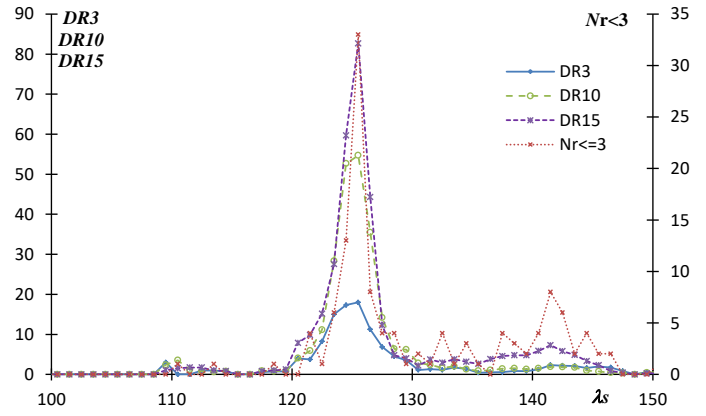
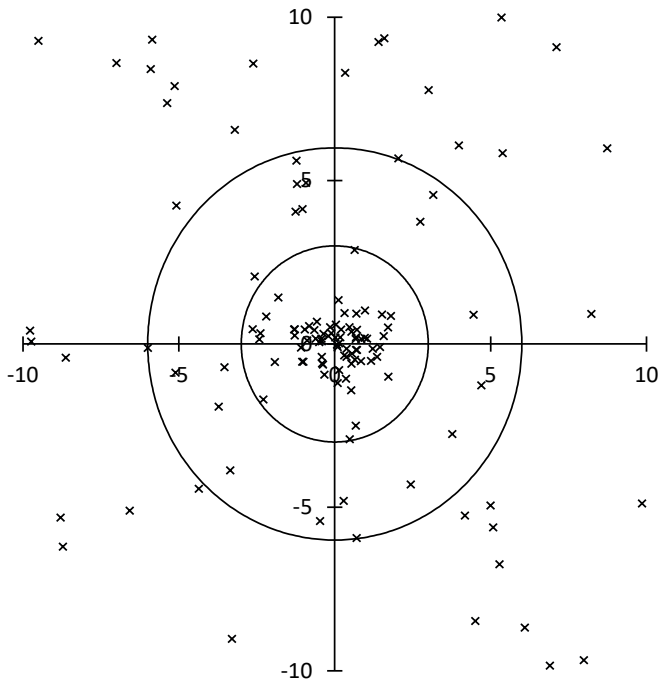
Year	N
2007	0
2008	3
2009	30
2010	34
2011	45
2012	17
2013	9
2014	7
2015	16
2016	5
2017	22
2018	25
Total	213



#0184GDR

July gamma Draconids

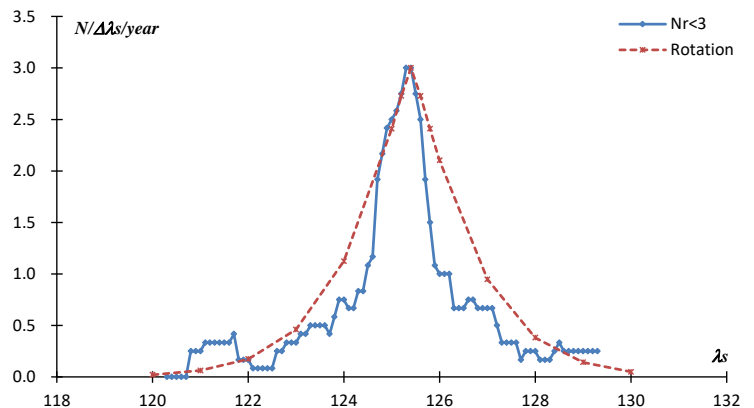
$\alpha=280.1, \delta=51.1, \lambda_s=125.3$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
GDR06	124.6	167.9	73.0
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	125.5	33	
DR3	125.5	18.0	
DR10	125.5	54.7	
DR15	125.5	82.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
120	175.1	72.1	281.6	49.7	29.2	1.018	0.969	42.8	204.8	120.0	318.7	-16.5	-53.76
121	173.8	72.4	281.4	49.9	28.9	1.006	0.971	42.3	204.4	121.0	319.5	-16.1	-165.49
122	172.5	72.6	281.2	50.1	28.5	0.994	0.972	41.8	204.0	122.0	320.3	-15.7	153.16
123	171.2	72.8	281.0	50.2	28.1	0.981	0.974	41.3	203.6	123.0	321.2	-15.3	52.32
124	169.9	72.9	280.7	50.4	27.8	0.969	0.975	40.8	203.2	124.0	322.0	-14.9	31.54
125	168.5	73.1	280.5	50.5	27.4	0.957	0.977	40.3	202.8	125.0	322.8	-14.5	22.56
125.1	168.4	73.1	280.5	50.6	27.3	0.955	0.977	40.2	202.8	125.1	322.9	-14.5	21.94
125.2	168.2	73.2	280.5	50.6	27.3	0.954	0.977	40.2	202.7	125.2	322.9	-14.4	21.35
125.3	168.1	73.2	280.4	50.6	27.3	0.953	0.977	40.1	202.7	125.3	323.0	-14.4	20.79
125.4	168.0	73.2	280.4	50.6	27.2	0.952	0.977	40.1	202.6	125.4	323.1	-14.4	20.26
125.5	167.8	73.2	280.4	50.6	27.2	0.951	0.977	40.0	202.6	125.5	323.2	-14.3	19.75
125.6	167.7	73.2	280.4	50.6	27.2	0.949	0.978	40.0	202.6	125.6	323.3	-14.3	19.27
125.7	167.5	73.2	280.3	50.6	27.1	0.948	0.978	39.9	202.5	125.7	323.3	-14.2	18.81
125.8	167.4	73.3	280.3	50.6	27.1	0.947	0.978	39.9	202.5	125.8	323.4	-14.2	18.38
125.9	167.3	73.3	280.3	50.7	27.1	0.946	0.978	39.8	202.4	125.9	323.5	-14.2	17.96
126	167.1	73.3	280.3	50.7	27.0	0.944	0.978	39.8	202.4	126.0	323.6	-14.1	17.56
127	165.7	73.5	280.0	50.8	26.7	0.932	0.979	39.3	202.0	127.0	324.4	-13.7	14.37
128	164.3	73.6	279.8	50.9	26.3	0.919	0.981	38.8	201.6	128.0	325.2	-13.4	12.16
129	162.8	73.7	279.5	51.0	25.9	0.907	0.982	38.3	201.3	129.0	326.0	-13.0	10.54
130	161.3	73.9	279.2	51.1	25.6	0.894	0.983	37.8	200.9	130.0	326.8	-12.6	9.30

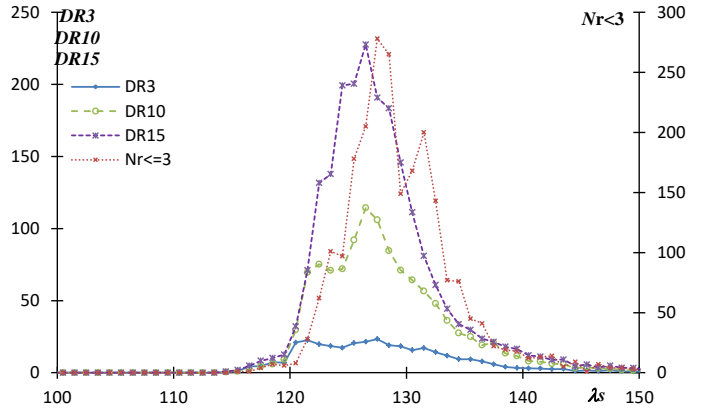
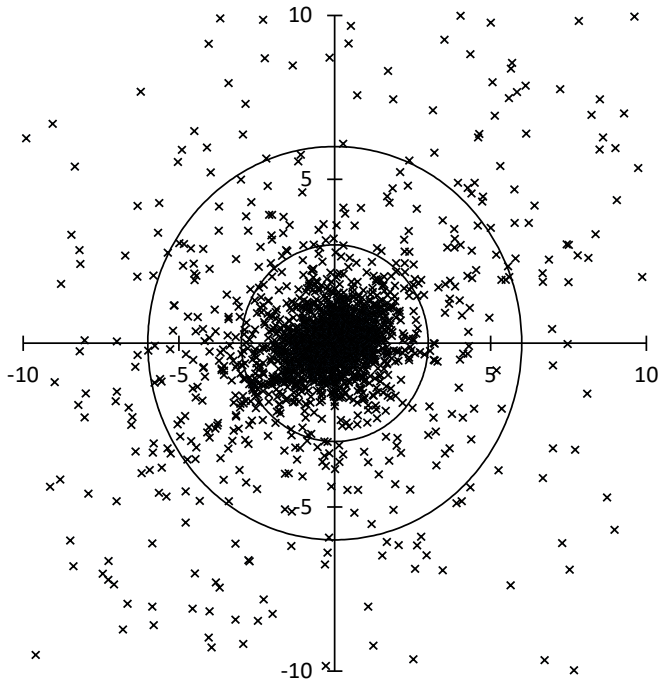
Year	N
2007	11
2008	11
2009	5
2010	8
2011	0
2012	2
2013	0
2014	18
2015	6
2016	5
2017	1
2018	7
Total	74



#0005SDA

Southern delta Aquariids

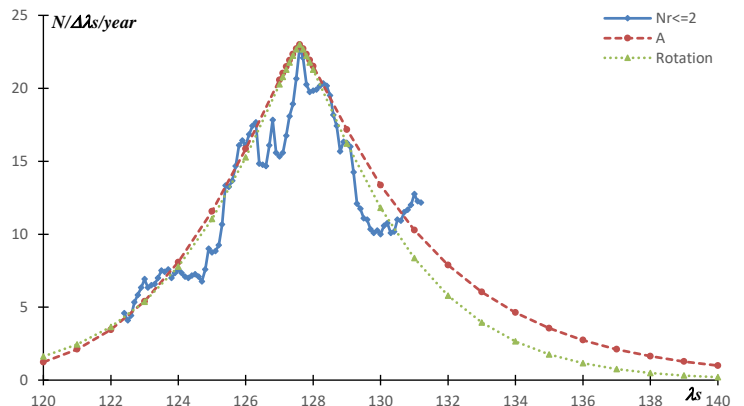
$\alpha=342.1, \delta=-15.4, \lambda_s=125.6$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
SDA09	126.8	208.8	-7.4
$\Delta r=$	2		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$Nr \leq 3$	127.5	278	
DR3	127.5	23.4	
DR10	126.5	114.3	
DR15	126.5	227.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
115	211.8	-6.0	331.1	-18.2	42.2	0.982	0.042	31.5	159.4	295.0	97.2	10.6	2.28
120	210.3	-6.6	334.8	-17.5	41.5	0.976	0.056	29.1	155.9	300.0	98.6	11.5	2.37
121	210.0	-6.7	335.5	-17.3	41.3	0.975	0.059	28.7	155.2	301.0	98.9	11.6	2.39
122	209.7	-6.8	336.3	-17.2	41.2	0.974	0.062	28.3	154.5	302.0	99.2	11.8	2.41
123	209.4	-6.9	337.0	-17.0	41.0	0.973	0.065	27.9	153.8	303.0	99.5	11.9	2.43
124	209.1	-7.0	337.7	-16.9	40.9	0.972	0.069	27.5	153.1	304.0	99.7	12.1	2.46
125	208.9	-7.1	338.5	-16.7	40.7	0.971	0.072	27.2	152.3	305.0	100.0	12.3	2.48
126	208.6	-7.2	339.2	-16.6	40.6	0.970	0.076	26.9	151.6	306.0	100.3	12.4	2.50
127	208.3	-7.4	339.9	-16.4	40.4	0.969	0.079	26.6	150.9	307.0	100.6	12.6	2.52
128	208.0	-7.5	340.6	-16.3	40.3	0.967	0.083	26.3	150.2	308.0	100.8	12.7	2.54
129	207.7	-7.6	341.3	-16.1	40.1	0.966	0.086	26.0	149.5	309.0	101.1	12.8	2.56
130	207.4	-7.7	342.1	-15.9	39.9	0.965	0.090	25.7	148.8	310.0	101.3	13.0	2.59
131	207.1	-7.8	342.8	-15.8	39.8	0.964	0.094	25.4	148.0	311.0	101.6	13.1	2.61
132	206.8	-7.9	343.5	-15.6	39.6	0.963	0.098	25.2	147.3	312.0	101.9	13.3	2.63
133	206.5	-8.0	344.2	-15.4	39.5	0.962	0.102	24.9	146.6	313.0	102.1	13.4	2.66
134	206.2	-8.2	344.9	-15.3	39.3	0.960	0.106	24.7	145.9	314.0	102.4	13.5	2.68
135	205.9	-8.3	345.6	-15.1	39.2	0.959	0.110	24.4	145.2	315.0	102.6	13.7	2.71
136	205.6	-8.4	346.4	-14.9	39.0	0.958	0.114	24.2	144.4	316.0	102.9	13.8	2.73
137	205.3	-8.5	347.1	-14.8	38.9	0.957	0.118	24.0	143.7	317.0	103.1	13.9	2.76
138	205.1	-8.6	347.8	-14.6	38.7	0.956	0.123	23.7	143.0	318.0	103.4	14.0	2.78
140	204.5	-8.8	349.2	-14.2	38.4	0.954	0.131	23.3	141.5	320.0	103.9	14.3	2.83

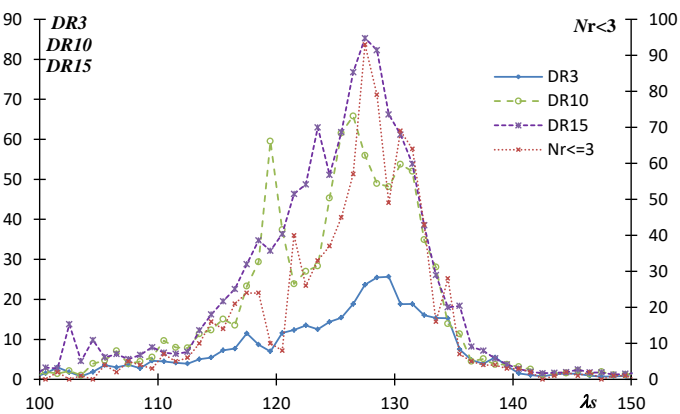
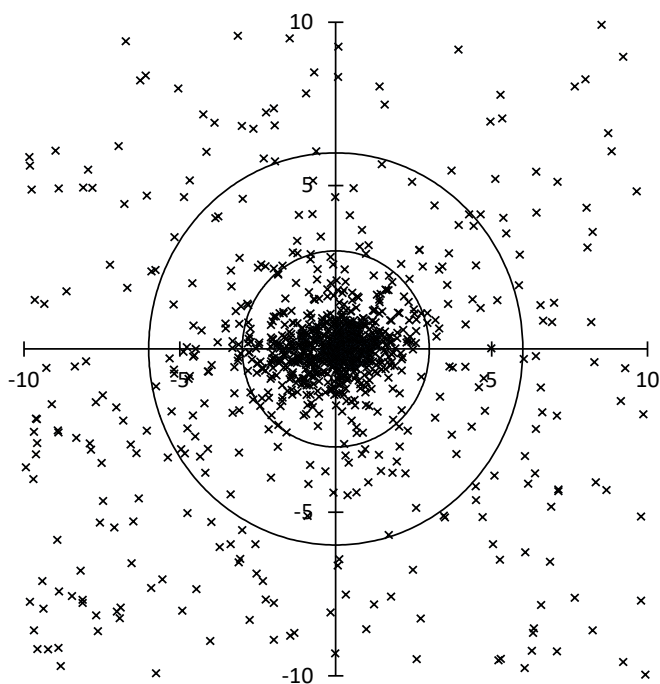
Year	N
2007	90
2008	90
2009	58
2010	100
2011	50
2012	198
2013	40
2014	234
2015	116
2016	177
2017	57
2018	224
Total	1434



#0001CAP

alpha Capricornids

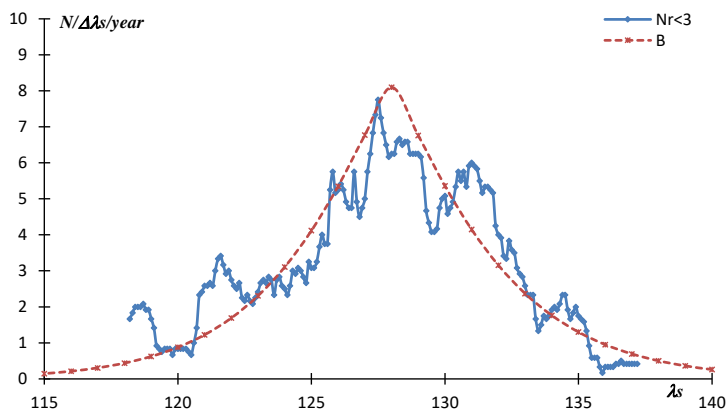
$\alpha=306.6, \delta=-8.2, \lambda_s=128.9$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
CAP04	127.9	179.3	9.9
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$Nr \leq 3$	127.5	93	
DR3	129.5	25.7	
DR10	126.5	65.8	
DR15	127.5	85.3	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
110	186.0	7.7	296.5	-13.3	25.5	0.795	0.469	7.3	282.5	110.0	32.6	-7.2	2.29
112	185.2	8.0	297.7	-12.9	25.1	0.791	0.484	7.3	280.7	112.0	32.8	-7.2	2.31
114	184.4	8.2	298.8	-12.4	24.7	0.786	0.500	7.3	278.9	114.0	33.0	-7.2	2.34
116	183.5	8.5	299.9	-12.0	24.3	0.782	0.515	7.3	277.1	116.0	33.2	-7.3	2.36
118	182.7	8.7	301.0	-11.5	23.9	0.778	0.530	7.3	275.4	118.0	33.4	-7.3	2.38
120	181.9	9.0	302.1	-11.0	23.5	0.773	0.545	7.3	273.7	120.0	33.7	-7.3	2.40
121	181.4	9.1	302.6	-10.8	23.3	0.771	0.552	7.3	272.8	121.0	33.8	-7.3	2.41
122	181.0	9.2	303.2	-10.5	23.1	0.769	0.559	7.3	272.0	122.0	34.0	-7.3	2.42
123	180.6	9.3	303.7	-10.3	22.9	0.767	0.566	7.3	271.1	123.0	34.1	-7.3	2.43
124	180.2	9.4	304.3	-10.0	22.8	0.765	0.574	7.3	270.3	124.0	34.3	-7.3	2.44
125	179.8	9.5	304.8	-9.8	22.6	0.762	0.581	7.2	269.4	125.0	34.4	-7.2	2.44
126	179.4	9.7	305.3	-9.5	22.4	0.760	0.588	7.2	268.6	126.0	34.6	-7.2	2.45
127	178.9	9.8	305.9	-9.3	22.2	0.758	0.595	7.2	267.8	127.0	34.7	-7.2	2.45
128	178.5	9.9	306.4	-9.1	22.0	0.755	0.602	7.2	266.9	128.0	34.9	-7.2	2.46
129	178.1	10.0	306.9	-8.8	21.8	0.753	0.609	7.2	266.1	129.0	35.1	-7.2	2.46
130	177.7	10.1	307.5	-8.5	21.6	0.750	0.615	7.2	265.3	130.0	35.3	-7.1	2.47
132	176.8	10.4	308.5	-8.0	21.2	0.745	0.629	7.1	263.7	132.0	35.6	-7.1	2.47
134	176.0	10.6	309.6	-7.5	20.8	0.740	0.642	7.1	262.1	134.0	36.0	-7.0	2.47
136	175.2	10.8	310.6	-7.0	20.4	0.735	0.655	7.0	260.5	136.0	36.4	-6.9	2.47
138	174.3	11.0	311.7	-6.5	20.0	0.730	0.668	7.0	259.0	138.0	36.9	-6.8	2.47
140	173.5	11.2	312.7	-6.0	19.6	0.724	0.680	6.9	257.4	140.0	37.3	-6.7	2.46

Year	N
2007	56
2008	42
2009	21
2010	70
2011	30
2012	88
2013	43
2014	63
2015	74
2016	81
2017	42
2018	127
Total	737

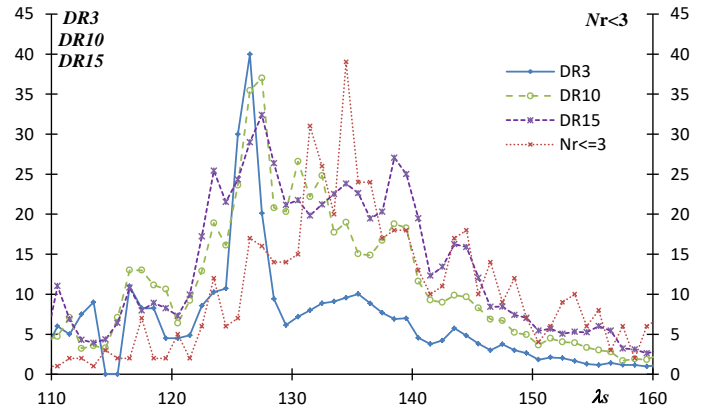
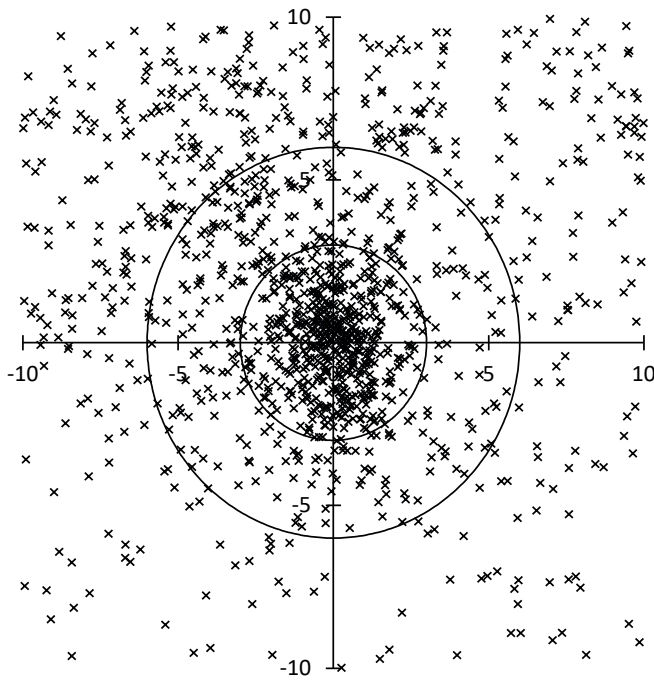




#0191ERI

eta Eridanids

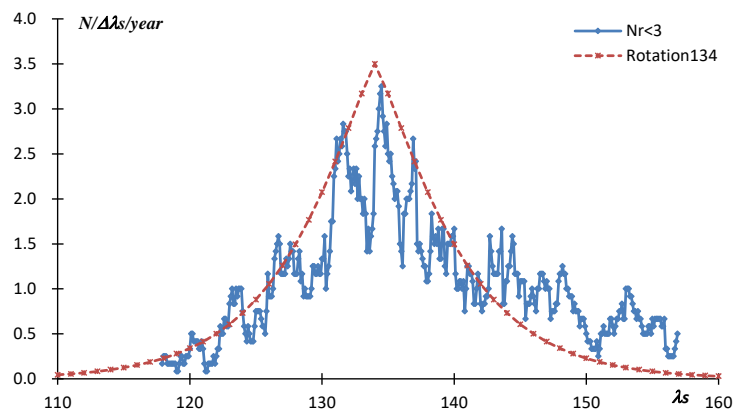
$\alpha=45, \delta=-12.9, \lambda_s=137.5$

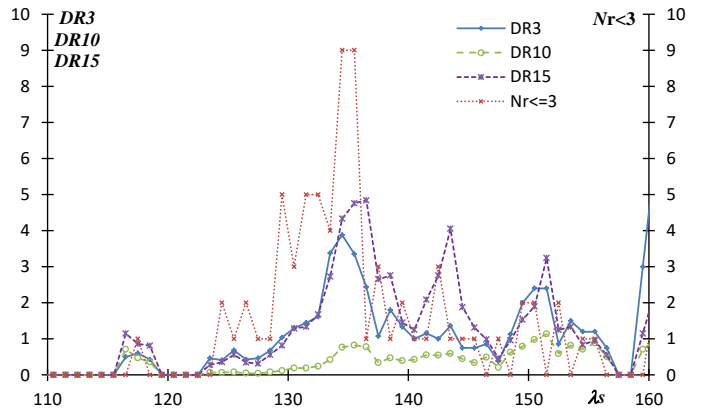
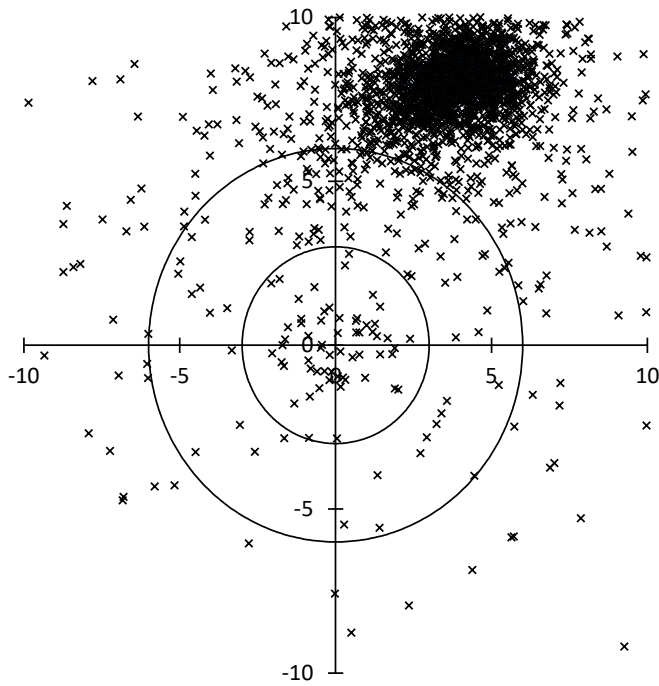


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ERI01	137.6	260.6	-27.3
$\Delta r =$	3		
$\Delta \lambda_s =$	20		
	$\lambda_s$	max	
Nr<=3	134.5	39	
DR3	126.5	40.0	
DR10	127.5	37.0	
DR15	127.5	32.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
120	259.8	-28.0	29.0	-18.2	63.8	0.935	0.951	131.1	29.7	300.0	279.4	21.9	14.62
125	259.8	-27.8	33.3	-16.2	63.9	0.931	0.951	131.5	29.8	305.0	284.3	21.8	13.70
126	259.9	-27.7	34.1	-15.9	63.9	0.930	0.951	131.5	29.8	306.0	285.2	21.8	13.51
127	259.9	-27.7	35.0	-15.5	63.9	0.929	0.951	131.6	29.8	307.0	286.2	21.8	13.33
128	259.9	-27.7	35.8	-15.1	63.9	0.928	0.950	131.6	29.8	308.0	287.1	21.8	13.16
129	259.9	-27.6	36.7	-14.8	63.9	0.927	0.950	131.7	29.8	309.0	288.1	21.8	12.98
130	259.9	-27.6	37.5	-14.4	63.9	0.926	0.950	131.8	29.9	310.0	289.1	21.8	12.81
131	259.9	-27.5	38.4	-14.1	63.9	0.925	0.950	131.8	29.9	311.0	290.0	21.8	12.63
132	260.0	-27.5	39.2	-13.7	63.9	0.924	0.950	131.9	29.9	312.0	291.0	21.8	12.46
133	260.0	-27.5	40.1	-13.4	63.9	0.923	0.950	132.0	29.9	313.0	292.0	21.8	12.29
134	260.0	-27.4	40.9	-13.0	63.9	0.922	0.949	132.0	29.9	314.0	292.9	21.7	12.13
135	260.0	-27.4	41.8	-12.7	64.0	0.921	0.949	132.1	29.9	315.0	293.9	21.7	11.96
136	260.0	-27.3	42.7	-12.3	64.0	0.920	0.949	132.1	30.0	316.0	294.9	21.7	11.80
137	260.0	-27.3	43.5	-12.0	64.0	0.918	0.949	132.2	30.0	317.0	295.8	21.7	11.64
138	260.0	-27.3	44.4	-11.7	64.0	0.917	0.949	132.3	30.0	318.0	296.8	21.7	11.48
139	260.1	-27.2	45.2	-11.4	64.0	0.916	0.948	132.3	30.0	319.0	297.8	21.7	11.32
140	260.1	-27.2	46.1	-11.0	64.0	0.915	0.948	132.4	30.0	320.0	298.7	21.7	11.17
145	260.2	-27.0	50.4	-9.5	64.0	0.909	0.947	132.7	30.1	325.0	303.5	21.6	10.43
150	260.2	-26.8	54.8	-8.1	64.1	0.903	0.946	133.0	30.2	330.0	308.4	21.6	9.74
155	260.3	-26.6	59.2	-6.8	64.1	0.896	0.945	133.3	30.3	335.0	313.2	21.5	9.11
160	260.4	-26.4	63.6	-5.6	64.2	0.889	0.944	133.6	30.4	340.0	318.0	21.5	8.53

Year	N
2007	37
2008	35
2009	30
2010	57
2011	35
2012	78
2013	43
2014	29
2015	35
2016	47
2017	30
2018	54
Total	510

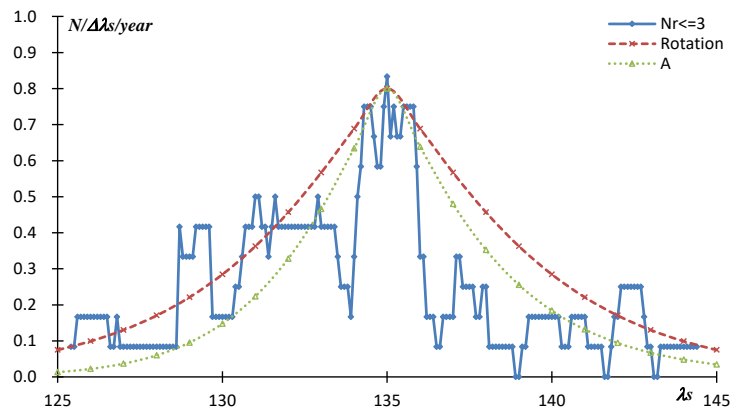




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
PAU05	135.1	210.8	-16.7
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$Nr \leq 3$	134.5	9	
DR3	134.5	3.9	
DR10	135.5	0.8	
DR15	136.5	4.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
125	212.4	-15.7	345.4	-23.3	42.9	0.959	0.111	58.2	145.1	305.0	104.8	29.1	2.70
126	212.2	-15.7	346.2	-23.0	42.9	0.959	0.112	57.9	144.8	306.0	105.4	29.2	2.76
127	212.0	-15.7	347.0	-22.7	42.9	0.960	0.113	57.6	144.5	307.0	106.1	29.3	2.83
128	211.9	-15.8	347.8	-22.4	42.9	0.961	0.114	57.2	144.2	308.0	106.7	29.4	2.89
129	211.7	-15.8	348.6	-22.1	43.0	0.961	0.115	56.9	144.0	309.0	107.3	29.5	2.96
130	211.5	-15.8	349.4	-21.8	43.0	0.962	0.116	56.6	143.7	310.0	108.0	29.6	3.03
131	211.4	-15.8	350.2	-21.5	43.0	0.962	0.118	56.3	143.4	311.0	108.6	29.7	3.11
132	211.2	-15.8	351.0	-21.2	43.0	0.963	0.119	55.9	143.1	312.0	109.2	29.8	3.19
133	211.0	-15.9	351.8	-20.9	43.0	0.963	0.120	55.6	142.9	313.0	109.8	29.9	3.27
134	210.9	-15.9	352.5	-20.5	43.0	0.964	0.121	55.3	142.6	314.0	110.5	30.0	3.36
135	210.7	-15.9	353.3	-20.2	43.0	0.965	0.122	55.0	142.3	315.0	111.1	30.1	3.45
136	210.5	-15.9	354.1	-19.9	43.0	0.965	0.124	54.7	142.0	316.0	111.7	30.1	3.55
137	210.4	-15.9	354.9	-19.6	43.0	0.966	0.125	54.4	141.7	317.0	112.3	30.2	3.65
138	210.2	-16.0	355.7	-19.3	43.0	0.967	0.126	54.0	141.4	318.0	112.9	30.3	3.77
139	210.0	-16.0	356.4	-19.0	43.0	0.967	0.127	53.7	141.1	319.0	113.5	30.4	3.88
140	209.8	-16.0	357.2	-18.7	43.0	0.968	0.128	53.4	140.8	320.0	114.1	30.5	4.01
141	209.7	-16.0	358.0	-18.4	43.1	0.969	0.130	53.1	140.5	321.0	114.7	30.6	4.14
142	209.5	-16.0	358.8	-18.1	43.1	0.969	0.131	52.8	140.2	322.0	115.3	30.6	4.29
143	209.3	-16.1	359.5	-17.7	43.1	0.970	0.132	52.5	139.9	323.0	115.9	30.7	4.44
144	209.2	-16.1	0.3	-17.4	43.1	0.971	0.134	52.2	139.6	324.0	116.5	30.8	4.60
145	209.0	-16.1	1.1	-17.1	43.1	0.972	0.135	51.9	139.3	325.0	117.1	30.9	4.78

Year	N
2007	6
2008	6
2009	1
2010	11
2011	4
2012	3
2013	3
2014	4
2015	4
2016	5
2017	3
2018	9
Total	59

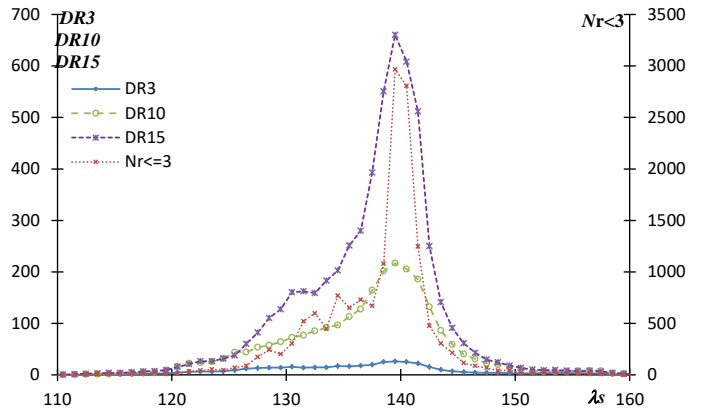
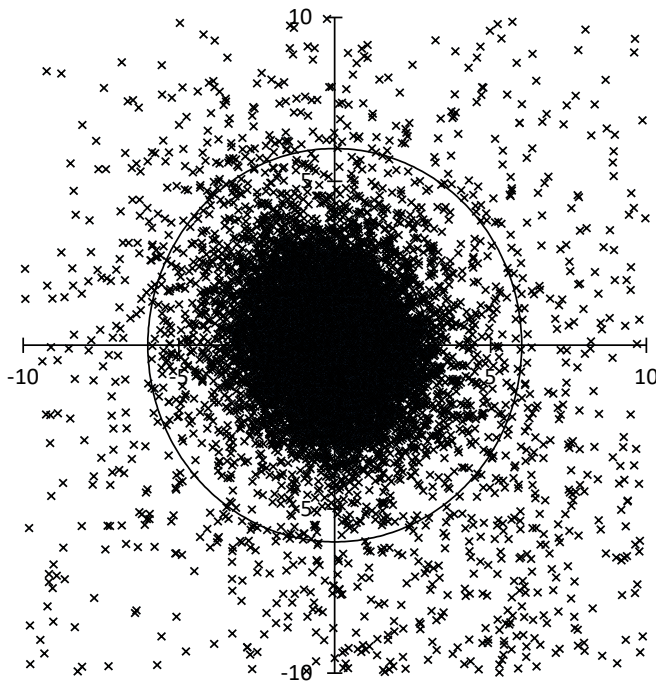


#0007PER

Perseids

$\alpha=46.8, \delta=57.77, \lambda_s=140.19$

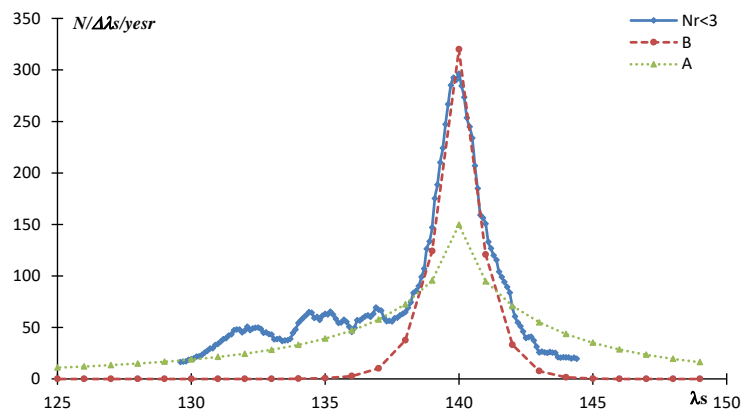
[注釈を読む](#)



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
PER04	137	283.3	38.3
$\Delta r=$	3		
$\Delta \lambda_s=$	8		
	$\lambda_s$	max	
$Nr_{\leq 3}$	139.5	2967	
DR3	139.5	26.3	
DR10	139.5	216.9	
DR15	139.5	660.3	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
120	282.9	39.7	21.9	52.6	58.6	0.962	0.957	111.4	151.7	120.0	311.1	26.2	25.16
125	282.9	39.3	27.9	54.1	58.6	0.953	0.955	111.8	151.3	125.0	316.5	26.5	20.21
128	283.0	39.2	31.7	55.0	58.7	0.947	0.953	112.0	151.1	128.0	319.7	26.6	18.03
129	283.0	39.1	33.0	55.3	58.7	0.945	0.953	112.1	151.0	129.0	320.8	26.7	17.40
130	283.0	39.0	34.3	55.5	58.7	0.943	0.953	112.2	150.9	130.0	321.9	26.8	16.80
131	283.0	39.0	35.6	55.8	58.7	0.941	0.952	112.3	150.8	131.0	323.0	26.8	16.25
132	283.0	38.9	36.9	56.1	58.7	0.939	0.952	112.4	150.7	132.0	324.0	26.9	15.72
133	283.0	38.8	38.3	56.3	58.7	0.938	0.951	112.4	150.6	133.0	325.1	26.9	15.23
134	283.1	38.8	39.6	56.6	58.7	0.936	0.951	112.5	150.6	134.0	326.2	27.0	14.77
135	283.1	38.7	41.0	56.8	58.8	0.934	0.950	112.6	150.5	135.0	327.3	27.1	14.33
136	283.1	38.6	42.4	57.1	58.8	0.932	0.950	112.7	150.4	136.0	328.4	27.1	13.91
137	283.1	38.6	43.8	57.3	58.8	0.930	0.950	112.8	150.3	137.0	329.5	27.2	13.52
138	283.1	38.5	45.2	57.5	58.8	0.928	0.949	112.9	150.2	138.0	330.5	27.3	13.14
139	283.1	38.4	46.6	57.8	58.8	0.926	0.949	112.9	150.1	139.0	331.6	27.3	12.79
140	283.1	38.4	48.1	58.0	58.8	0.924	0.948	113.0	150.0	140.0	332.7	27.4	12.45
141	283.1	38.3	49.5	58.2	58.8	0.922	0.948	113.1	149.9	141.0	333.8	27.5	12.13
142	283.2	38.2	51.0	58.4	58.8	0.920	0.947	113.2	149.8	142.0	334.9	27.5	11.82
143	283.2	38.2	52.5	58.6	58.9	0.918	0.947	113.3	149.7	143.0	336.0	27.6	11.53
144	283.2	38.1	54.0	58.7	58.9	0.916	0.946	113.3	149.6	144.0	337.1	27.7	11.25
145	283.2	38.1	55.5	58.9	58.9	0.914	0.946	113.4	149.5	145.0	338.2	27.7	10.98
150	283.3	37.7	63.2	59.6	59.0	0.904	0.943	113.8	149.1	150.0	343.6	28.1	9.80

Year	N
2007	2067
2008	929
2009	604
2010	1151
2011	1232
2012	1063
2013	1627
2014	494
2015	697
2016	1950
2017	660
2018	1519
Total	13993

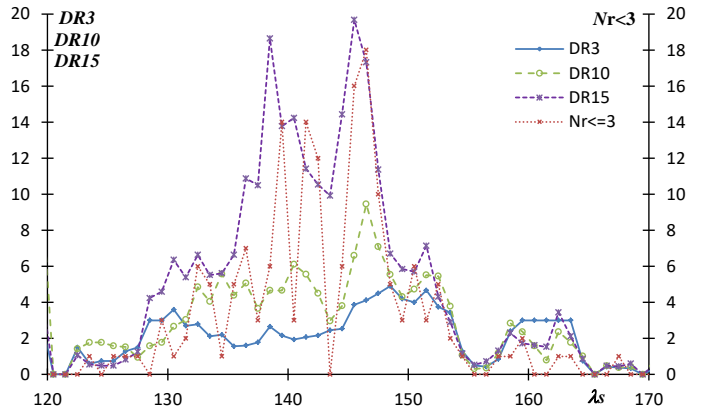
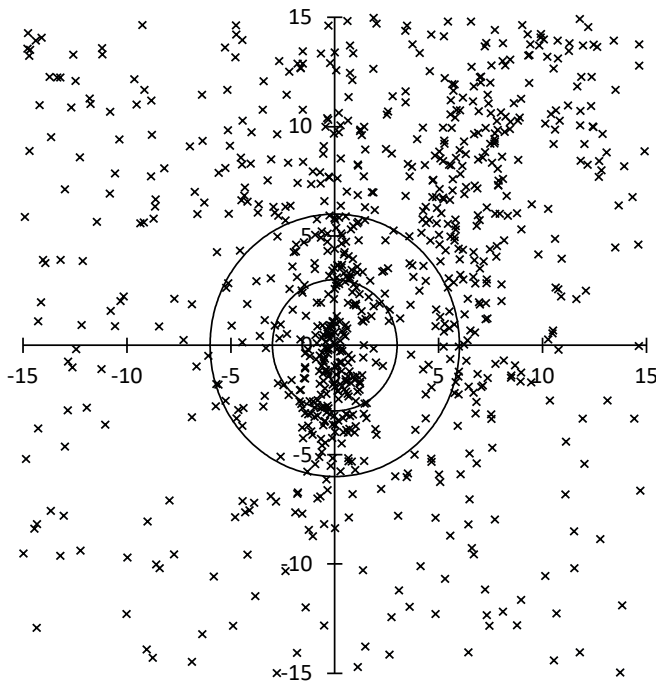


#0012KCG

kappa Cygnids

$\alpha=286.2, \delta=59.1, \lambda_s=145.2$

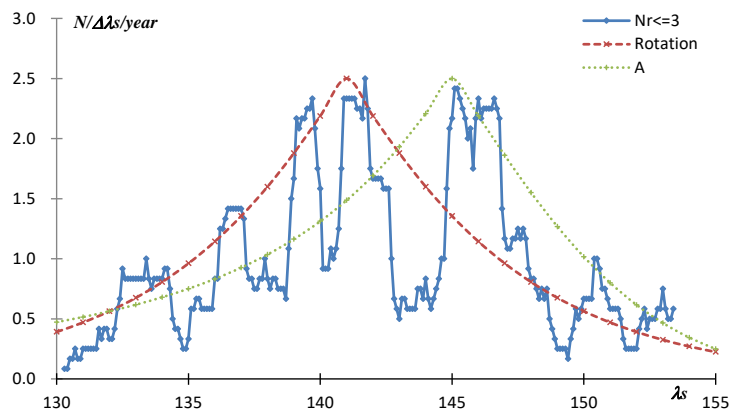
[注釈を読む](#)



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
*KCG04	142	168.0	74.0
$\Delta x =$	3	$\Delta y =$	6
$\Delta \lambda_s =$	12	$\theta =$	-20
	$\lambda_s$	max	
Nr<=3	146.5	18	
DR3	148.5	4.9	
DR10	146.5	9.5	
DR15	145.5	19.7	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
125	153.2	61.7	275.0	38.4	19.4	0.719	0.957	27.1	210.3	125.0	332.5	-13.3	3.40
130	155.6	64.9	278.8	41.9	20.3	0.718	0.961	29.2	209.1	130.0	335.9	-13.7	3.41
134	158.0	67.4	281.7	44.9	21.0	0.714	0.965	30.9	207.9	134.0	338.4	-13.9	3.38
135	158.7	68.0	282.4	45.6	21.2	0.713	0.966	31.3	207.6	135.0	339.1	-13.9	3.37
136	159.4	68.7	283.1	46.4	21.4	0.712	0.967	31.8	207.3	136.0	339.7	-14.0	3.36
137	160.1	69.3	283.7	47.1	21.5	0.710	0.968	32.2	206.9	137.0	340.3	-14.0	3.34
138	160.9	69.9	284.4	47.9	21.7	0.709	0.969	32.6	206.6	138.0	340.9	-14.0	3.33
139	161.7	70.5	285.0	48.7	21.9	0.707	0.970	33.1	206.2	139.0	341.4	-14.0	3.31
140	162.6	71.1	285.6	49.4	22.1	0.705	0.971	33.5	205.9	140.0	342.0	-13.9	3.29
141	163.6	71.7	286.2	50.2	22.2	0.703	0.972	33.9	205.5	141.0	342.6	-13.9	3.27
142	164.6	72.3	286.7	51.0	22.4	0.700	0.973	34.4	205.1	142.0	343.2	-13.9	3.25
143	165.7	72.9	287.3	51.8	22.6	0.698	0.975	34.8	204.7	143.0	343.7	-13.8	3.23
144	166.8	73.5	287.8	52.6	22.7	0.695	0.976	35.2	204.3	144.0	344.3	-13.7	3.20
145	168.1	74.1	288.3	53.4	22.9	0.693	0.977	35.7	203.9	145.0	344.8	-13.7	3.18
146	169.4	74.6	288.8	54.2	23.1	0.690	0.978	36.1	203.5	146.0	345.3	-13.6	3.15
147	170.8	75.2	289.3	55.0	23.3	0.687	0.979	36.5	203.0	147.0	345.8	-13.5	3.12
148	172.3	75.7	289.7	55.8	23.4	0.683	0.980	37.0	202.6	148.0	346.4	-13.3	3.10
149	174.0	76.3	290.1	56.6	23.6	0.680	0.981	37.4	202.1	149.0	346.9	-13.2	3.07
150	175.8	76.8	290.5	57.4	23.8	0.677	0.983	37.8	201.6	150.0	347.4	-13.0	3.04
155	187.2	79.2	291.9	61.5	24.7	0.657	0.988	40.0	198.9	155.0	349.7	-12.0	2.88
160	203.9	81.0	292.1	65.6	25.5	0.635	0.994	42.1	195.9	160.0	351.9	-10.6	2.72

Year	N
2007	135
2008	2
2009	5
2010	8
2011	2
2012	7
2013	20
2014	93
2015	4
2016	5
2017	0
2018	2
Total	283

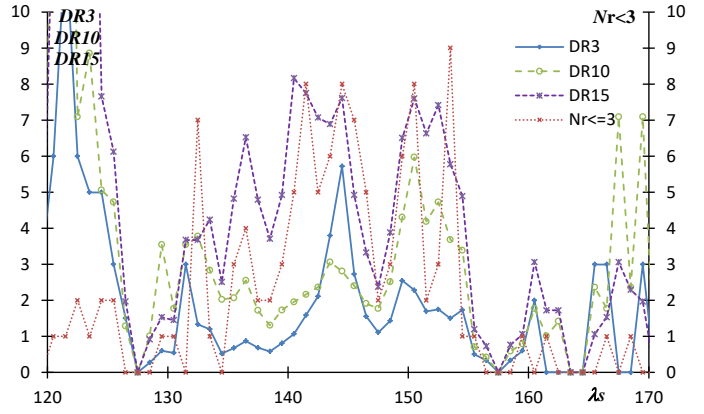
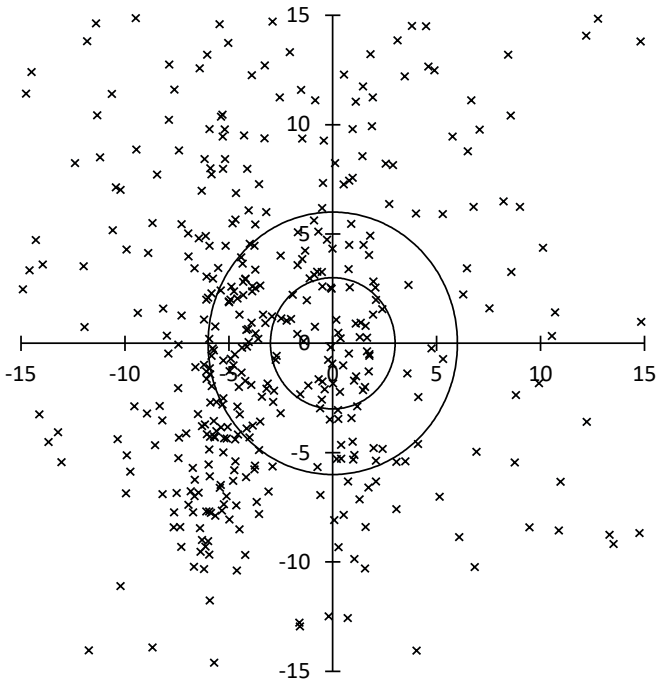


\*AXD

August xi Draconids

$\alpha=277.1, \delta=51.2, \lambda_s=140$

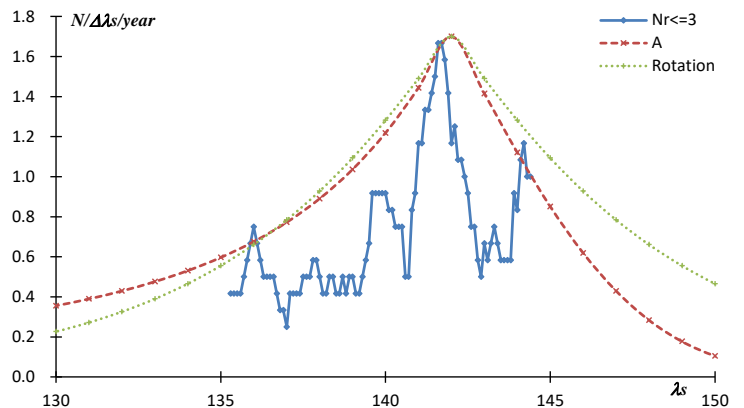
[注釈を読む](#)

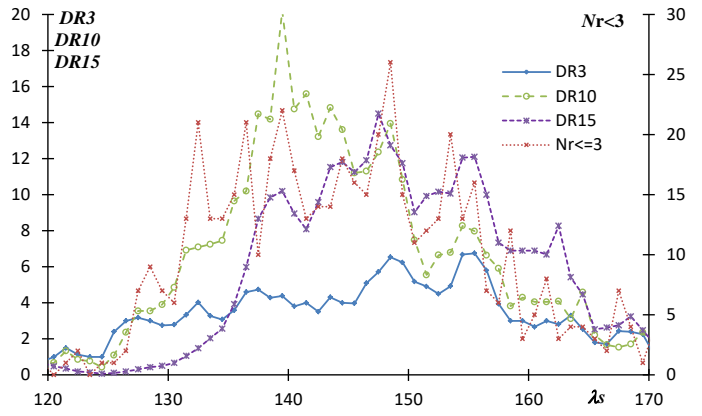
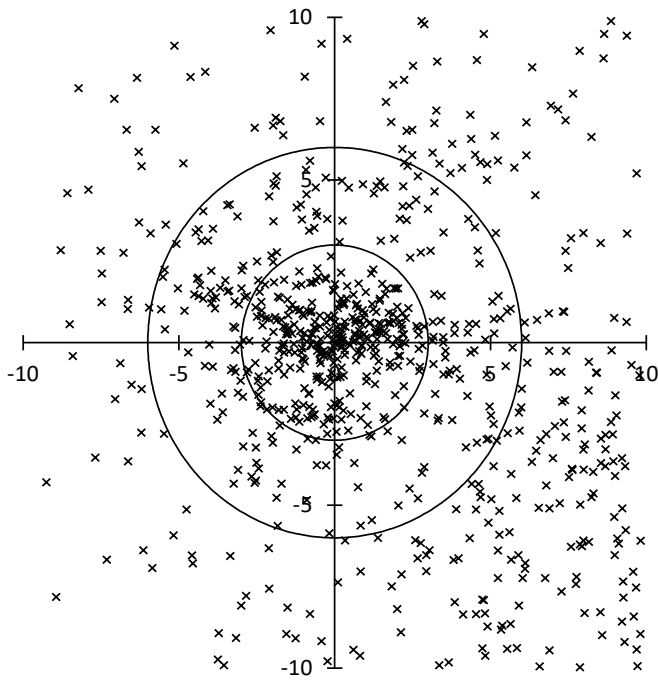


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
*AXD	140	146.6	77.2
$\Delta x =$	3	$\Delta y =$	6
$\Delta \lambda_s =$	5	$\theta =$	0
	$\lambda_s$	max	
Nr<=3	141.5	8	
DR3	143.5	3.8	
DR10	143.5	3.1	
DR15	140.5	8.2	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
125	152.3	55.8	274.9	32.5	17.6	0.676	0.946	23.2	214.0	125.0	336.8	-12.7	2.92
130	151.2	62.0	276.7	38.8	18.4	0.675	0.962	25.8	209.5	130.0	337.0	-12.4	2.96
134	149.9	66.9	277.5	43.8	19.0	0.671	0.975	27.9	205.4	134.0	336.8	-11.6	2.96
135	149.5	68.1	277.6	45.0	19.2	0.669	0.978	28.4	204.4	135.0	336.7	-11.3	2.95
136	149.0	69.3	277.6	46.3	19.4	0.667	0.981	28.8	203.3	136.0	336.6	-11.0	2.95
137	148.5	70.6	277.6	47.5	19.5	0.665	0.984	29.3	202.1	137.0	336.5	-10.6	2.94
138	148.0	71.8	277.5	48.7	19.7	0.663	0.987	29.8	200.9	138.0	336.4	-10.2	2.93
139	147.3	73.0	277.3	50.0	19.8	0.660	0.990	30.3	199.7	139.0	336.2	-9.8	2.91
140	146.5	74.2	277.1	51.2	20.0	0.657	0.992	30.7	198.5	140.0	336.0	-9.3	2.90
141	145.7	75.4	276.8	52.4	20.2	0.654	0.995	31.2	197.2	141.0	335.9	-8.8	2.88
142	144.6	76.6	276.4	53.6	20.3	0.651	0.998	31.6	195.9	142.0	335.7	-8.3	2.86
143	143.4	77.8	275.9	54.7	20.5	0.648	1.000	32.0	194.6	143.0	335.4	-7.7	2.84
144	141.9	79.0	275.3	55.9	20.6	0.645	1.002	32.5	193.2	144.0	335.2	-7.0	2.82
145	140.0	80.2	274.6	57.0	20.8	0.641	1.004	32.9	191.8	145.0	334.9	-6.4	2.80
146	137.6	81.4	273.8	58.1	21.0	0.637	1.006	33.3	190.3	146.0	334.7	-5.7	2.77
147	134.5	82.6	272.9	59.2	21.1	0.633	1.007	33.7	188.9	147.0	334.4	-4.9	2.75
148	130.3	83.7	271.8	60.3	21.3	0.629	1.008	34.1	187.3	148.0	334.1	-4.1	2.72
149	124.3	84.8	270.6	61.3	21.4	0.625	1.009	34.5	185.8	149.0	333.8	-3.3	2.69
150	115.3	85.8	269.2	62.3	21.6	0.621	1.010	34.9	184.2	150.0	333.4	-2.4	2.67
155	19.6	85.9	259.7	66.6	22.4	0.599	1.009	36.7	175.4	155.0	331.3	2.7	2.52
160	353.4	80.4	245.3	69.1	23.2	0.578	0.997	38.2	165.5	160.0	328.5	8.9	2.36

Year	N
2007	21
2008	2
2009	7
2010	7
2011	7
2012	9
2013	8
2014	2
2015	6
2016	7
2017	3
2018	9
Total	88

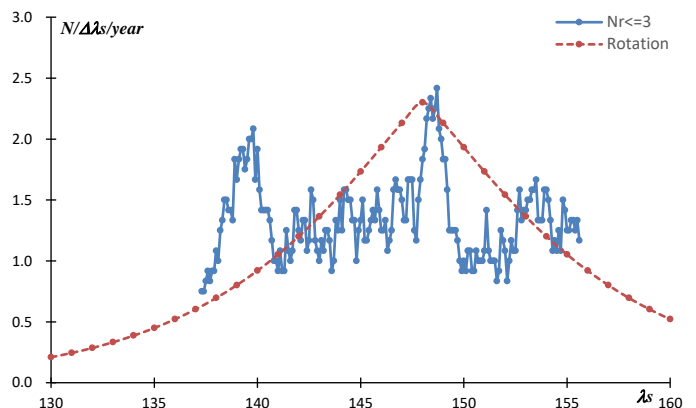




Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
NDA06	147	207.3	6.9
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	148.5	26	
DR3	155.5	6.7	
DR10	139.5	20.2	
DR15	147.5	14.5	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
130	208.9	6.1	338.2	-2.5	40.0	0.968	0.071	22.8	332.9	130.0	104.7	-10.2	2.21
135	208.4	6.4	342.2	-0.7	39.5	0.964	0.079	22.1	331.4	135.0	108.2	-10.4	2.20
138	208.0	6.5	344.6	0.5	39.2	0.962	0.084	21.8	330.5	138.0	110.3	-10.5	2.19
139	207.9	6.5	345.4	0.9	39.1	0.961	0.086	21.7	330.2	139.0	111.0	-10.6	2.19
140	207.8	6.6	346.2	1.2	39.0	0.960	0.088	21.5	329.9	140.0	111.7	-10.6	2.18
141	207.7	6.6	347.0	1.6	38.9	0.959	0.089	21.4	329.6	141.0	112.4	-10.7	2.18
142	207.6	6.7	347.8	2.0	38.8	0.958	0.091	21.3	329.3	142.0	113.1	-10.7	2.18
143	207.5	6.7	348.6	2.4	38.7	0.957	0.093	21.2	329.0	143.0	113.8	-10.7	2.17
144	207.4	6.8	349.4	2.8	38.6	0.956	0.095	21.1	328.7	144.0	114.4	-10.8	2.17
145	207.2	6.8	350.2	3.2	38.5	0.956	0.096	21.0	328.4	145.0	115.1	-10.8	2.17
146	207.1	6.9	351.0	3.6	38.4	0.955	0.098	20.9	328.1	146.0	115.8	-10.9	2.16
147	207.0	6.9	351.8	4.0	38.3	0.954	0.100	20.8	327.8	147.0	116.5	-10.9	2.16
148	206.9	7.0	352.6	4.4	38.2	0.953	0.102	20.7	327.5	148.0	117.2	-10.9	2.16
149	206.8	7.0	353.4	4.8	38.1	0.952	0.103	20.6	327.2	149.0	117.9	-11.0	2.15
150	206.7	7.0	354.2	5.1	38.0	0.951	0.105	20.5	326.9	150.0	118.6	-11.0	2.15
151	206.6	7.1	354.9	5.5	37.9	0.950	0.107	20.4	326.6	151.0	119.3	-11.0	2.15
152	206.5	7.1	355.7	5.9	37.8	0.949	0.109	20.3	326.3	152.0	120.0	-11.1	2.14
153	206.4	7.2	356.5	6.3	37.8	0.948	0.111	20.2	326.0	153.0	120.7	-11.1	2.14
154	206.2	7.2	357.3	6.7	37.7	0.947	0.113	20.1	325.7	154.0	121.4	-11.1	2.14
155	206.1	7.3	358.1	7.1	37.6	0.946	0.115	20.0	325.4	155.0	122.1	-11.2	2.13
160	205.6	7.5	358.1	9.1	37.1	0.941	0.124	19.5	324.0	160.0	125.6	-11.3	2.12

Year	N
2007	33
2008	8
2009	30
2010	35
2011	8
2012	49
2013	33
2014	12
2015	11
2016	25
2017	19
2018	47
Total	310

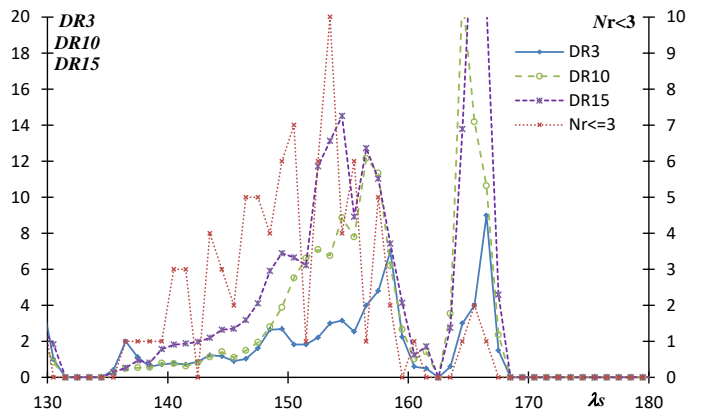
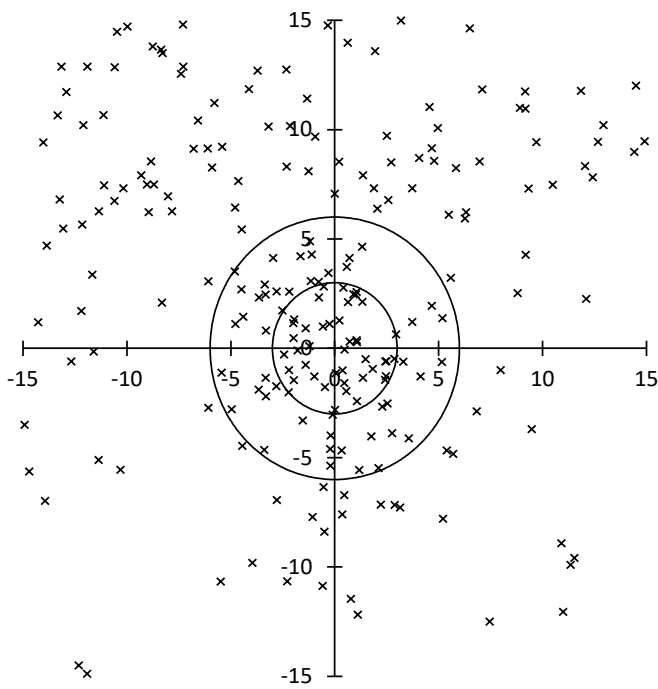


#0197AUD

August Draconids

$\alpha=272.5, \delta=65.1, \lambda_s=142$

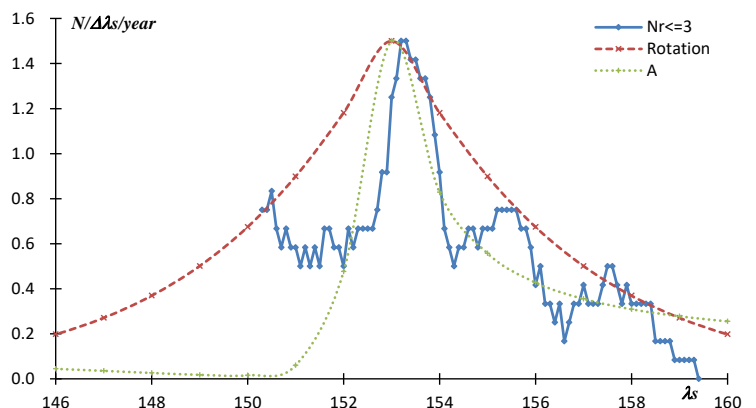
[注釈を読む](#)



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ZDR*	155	47.5	81.6
$\Delta r=$	3		
$\Delta \lambda_s=$	5	$\theta=$	-15
	$\lambda_s$	max	
Nr<=3	153.5	10	
DR3	158.5	7.0	
DR10	156.5	12.2	
DR15	154.5	14.5	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
140	185.0	74.9	292.3	55.7	23.4	0.599	0.973	38.1	206.6	140.0	341.5	-16.0	2.43
145	171.4	81.7	282.1	60.3	22.6	0.612	1.000	36.8	194.3	145.0	336.5	-8.5	2.58
146	165.6	83.0	279.6	61.0	22.4	0.615	1.004	36.5	192.0	146.0	335.7	-7.1	2.60
147	157.4	84.2	276.9	61.6	22.3	0.618	1.006	36.2	189.8	147.0	334.9	-5.7	2.63
148	145.6	85.1	274.2	62.0	22.1	0.621	1.008	35.8	187.5	148.0	334.1	-4.4	2.66
149	129.0	85.8	271.3	62.4	21.9	0.624	1.010	35.5	185.4	149.0	333.4	-3.1	2.69
150	108.3	86.0	268.3	62.7	21.8	0.628	1.011	35.1	183.3	150.0	332.7	-1.9	2.71
151	88.1	85.7	265.2	62.8	21.6	0.631	1.011	34.8	181.2	151.0	332.0	-0.7	2.74
152	72.1	85.0	262.1	62.9	21.5	0.634	1.011	34.4	179.2	152.0	331.4	0.4	2.76
153	60.9	84.0	259.1	62.8	21.3	0.638	1.010	34.0	177.3	153.0	330.7	1.5	2.79
154	53.1	82.8	256.0	62.6	21.1	0.641	1.009	33.6	175.4	154.0	330.1	2.6	2.81
155	47.5	81.6	253.1	62.3	21.0	0.644	1.008	33.2	173.5	155.0	329.6	3.5	2.83
156	43.4	80.2	250.2	61.9	20.8	0.647	1.006	32.7	171.7	156.0	329.0	4.5	2.85
157	40.3	78.9	247.4	61.3	20.6	0.650	1.003	32.3	169.9	157.0	328.4	5.4	2.87
158	37.9	77.5	244.8	60.7	20.5	0.653	1.001	31.8	168.2	158.0	327.9	6.2	2.88
159	36.0	76.1	242.3	60.0	20.3	0.655	0.998	31.3	166.5	159.0	327.4	7.0	2.90
160	34.4	74.7	240.0	59.2	20.2	0.658	0.995	30.9	164.9	160.0	326.9	7.7	2.91
161	33.1	73.2	237.9	58.3	20.0	0.660	0.992	30.4	163.3	161.0	326.5	8.4	2.92
162	31.9	71.8	235.9	57.3	19.8	0.662	0.988	29.9	161.7	162.0	326.0	9.0	2.93
163	31.0	70.4	234.0	56.3	19.7	0.664	0.984	29.4	160.2	163.0	325.6	9.6	2.93
164	30.1	68.9	232.3	55.2	19.5	0.666	0.980	28.8	158.7	164.0	325.2	10.1	2.94

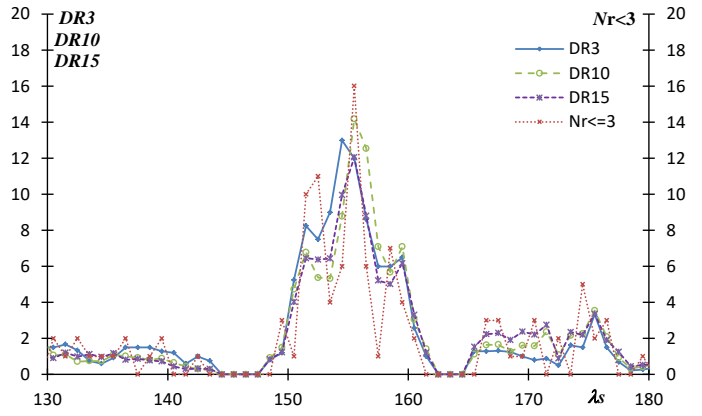
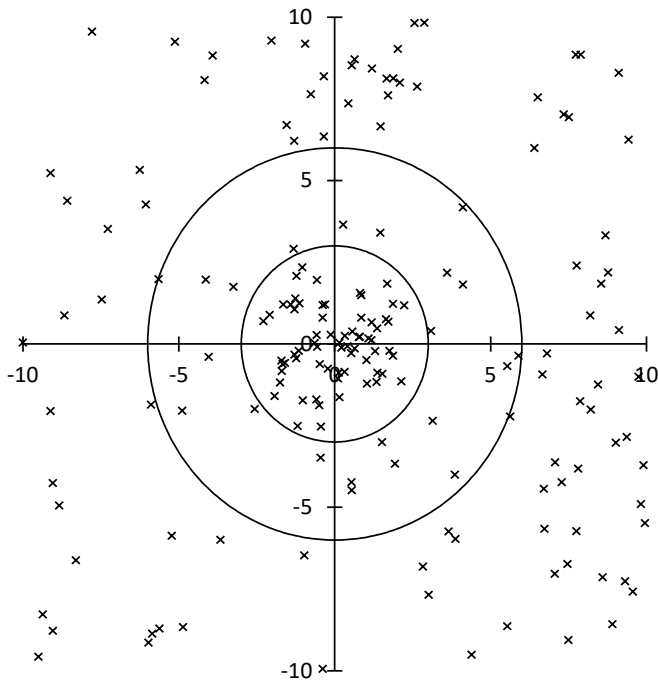
Year	N
2007	2
2008	1
2009	11
2010	14
2011	3
2012	15
2013	7
2014	1
2015	1
2016	2
2017	7
2018	5
Total	69



#0523AGC

August gamma Cepheids

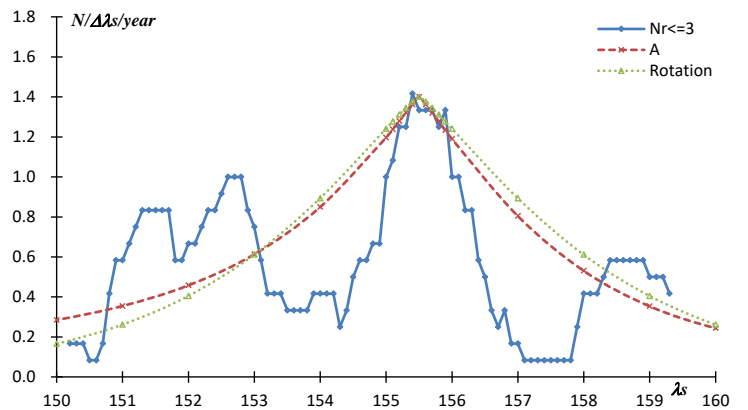
$\alpha=358, \delta=76.4, \lambda_s=155.1$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
AGC02	154.9	263.5	64.0
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
Nr<=3	155.5	16	
DR3	154.5	13.0	
DR10	155.5	14.2	
DR15	155.5	12.1	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
145	266.4	62.3	356.3	73.1	42.6	0.733	1.010	75.6	185.5	145.0	326.4	-5.3	3.79
146	266.2	62.4	356.6	73.5	42.7	0.747	1.010	75.6	185.7	146.0	327.4	-5.5	3.99
147	265.9	62.5	356.8	73.8	42.8	0.760	1.010	75.6	185.9	147.0	328.5	-5.7	4.21
148	265.7	62.7	357.1	74.2	42.9	0.773	1.009	75.6	186.2	148.0	329.5	-6.0	4.45
149	265.4	62.8	357.3	74.5	43.0	0.787	1.009	75.6	186.4	149.0	330.6	-6.2	4.73
150	265.1	62.9	357.5	74.9	43.1	0.800	1.008	75.6	186.6	150.0	331.6	-6.4	5.05
151	264.9	63.0	357.7	75.2	43.3	0.814	1.008	75.6	186.8	151.0	332.7	-6.6	5.42
152	264.6	63.2	357.9	75.6	43.4	0.828	1.007	75.6	187.0	152.0	333.8	-6.8	5.85
153	264.3	63.3	358.1	75.9	43.5	0.841	1.007	75.6	187.2	153.0	334.8	-7.0	6.35
154	264.1	63.4	358.3	76.3	43.6	0.855	1.006	75.5	187.4	154.0	335.9	-7.2	6.95
155	263.8	63.5	358.5	76.6	43.7	0.869	1.006	75.5	187.6	155.0	336.9	-7.4	7.68
156	263.5	63.6	358.7	77.0	43.8	0.883	1.005	75.5	187.8	156.0	338.0	-7.6	8.59
157	263.2	63.8	358.8	77.3	43.9	0.897	1.005	75.5	188.0	157.0	339.0	-7.7	9.74
158	263.0	63.9	359.0	77.7	44.0	0.911	1.004	75.5	188.2	158.0	340.1	-7.9	11.27
159	262.7	64.0	359.1	78.0	44.2	0.925	1.004	75.4	188.4	159.0	341.1	-8.1	13.37
160	262.4	64.1	359.2	78.3	44.3	0.939	1.003	75.4	188.5	160.0	342.2	-8.3	16.46
161	262.1	64.2	359.3	78.7	44.4	0.953	1.003	75.4	188.7	161.0	343.2	-8.4	21.45
162	261.8	64.3	359.4	79.0	44.5	0.967	1.002	75.4	188.9	162.0	344.3	-8.6	30.82
163	261.5	64.5	359.4	79.3	44.6	0.982	1.002	75.4	189.1	163.0	345.3	-8.8	54.97
164	261.2	64.6	359.5	79.6	44.7	0.996	1.001	75.3	189.2	164.0	346.4	-8.9	258.57
165	260.9	64.7	359.5	80.0	44.8	1.011	1.001	75.3	189.4	165.0	347.4	-9.1	-94.97

Year	N
2007	2
2008	1
2009	7
2010	12
2011	8
2012	8
2013	7
2014	1
2015	1
2016	12
2017	5
2018	3
Total	67

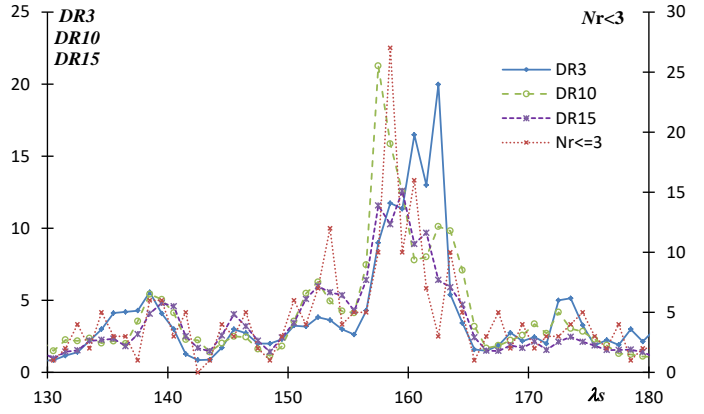
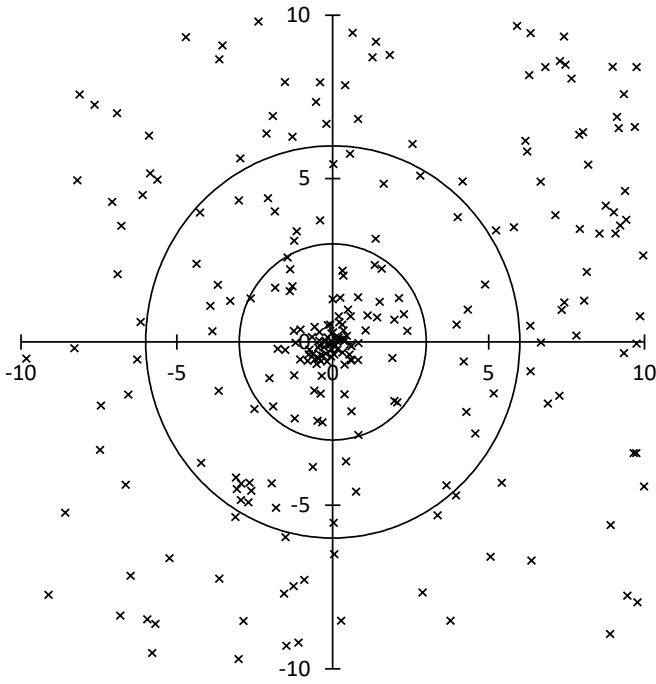




#0206AUR

Aurigids

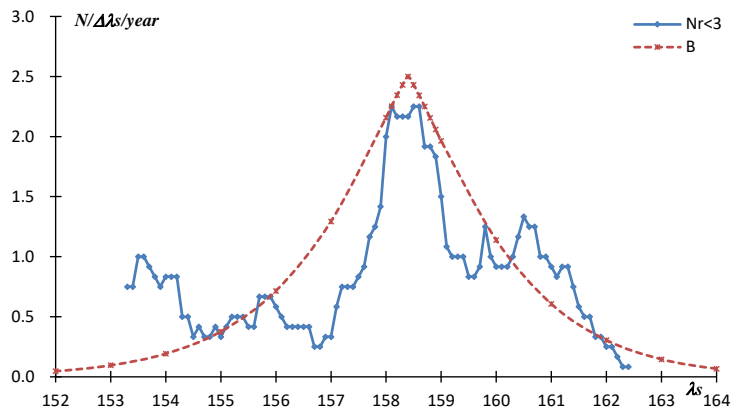
$\alpha=89.8, \delta=38.7, \lambda_s=158.7$

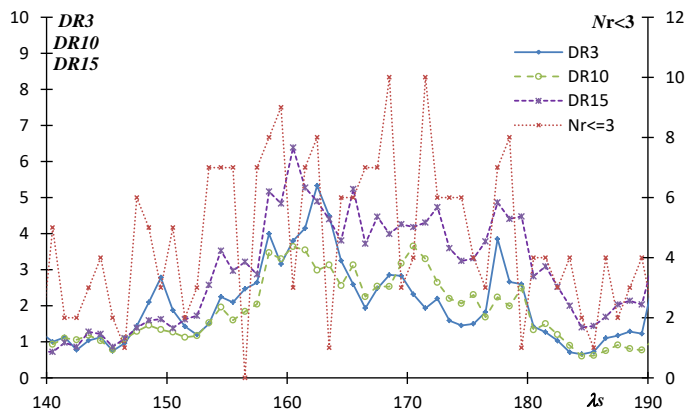
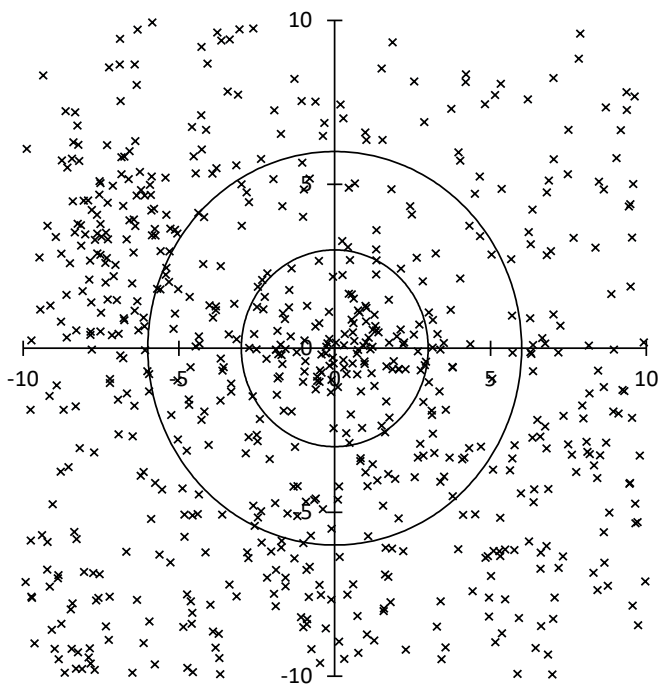


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
AUR02	158	292.6	15.9
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	158.5	27	
DR3	160.5	16.5	
DR10	157.5	21.3	
DR15	159.5	12.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
153	292.9	14.9	84.9	38.2	65.5	0.961	0.655	149.8	106.4	153.0	44.2	28.8	16.86
154	292.8	15.0	86.0	38.4	65.5	0.959	0.658	149.5	106.7	154.0	44.8	29.1	16.22
155	292.7	15.2	87.1	38.6	65.4	0.958	0.661	149.2	107.0	155.0	45.4	29.3	15.63
156	292.6	15.4	88.3	38.8	65.4	0.956	0.663	148.9	107.3	156.0	46.0	29.5	15.10
157	292.5	15.5	89.4	39.0	65.4	0.954	0.666	148.7	107.6	157.0	46.6	29.7	14.60
158	292.4	15.7	90.5	39.1	65.4	0.953	0.669	148.4	108.0	158.0	47.2	29.9	14.15
158.1	292.4	15.7	90.6	39.1	65.4	0.953	0.669	148.3	108.0	158.1	47.2	30.0	14.11
158.2	292.4	15.7	90.8	39.2	65.4	0.952	0.669	148.3	108.0	158.2	47.3	30.0	14.07
158.3	292.4	15.7	90.9	39.2	65.4	0.952	0.670	148.3	108.1	158.3	47.3	30.0	14.02
158.4	292.4	15.7	91.0	39.2	65.4	0.952	0.670	148.3	108.1	158.4	47.4	30.0	13.98
158.5	292.4	15.8	91.1	39.2	65.4	0.952	0.670	148.2	108.1	158.5	47.5	30.0	13.94
158.6	292.4	15.8	91.2	39.2	65.4	0.952	0.670	148.2	108.1	158.6	47.5	30.1	13.90
158.7	292.4	15.8	91.3	39.2	65.4	0.952	0.671	148.2	108.2	158.7	47.6	30.1	13.86
158.8	292.4	15.8	91.4	39.2	65.4	0.951	0.671	148.1	108.2	158.8	47.6	30.1	13.82
158.9	292.3	15.8	91.5	39.3	65.4	0.951	0.671	148.1	108.2	158.9	47.7	30.1	13.78
159	292.3	15.8	91.7	39.3	65.4	0.951	0.671	148.1	108.3	159.0	47.7	30.1	13.74
160	292.2	16.0	92.8	39.4	65.4	0.949	0.674	147.8	108.6	160.0	48.3	30.3	13.35
161	292.2	16.2	93.9	39.6	65.3	0.948	0.677	147.5	108.9	161.0	48.9	30.5	12.99
162	292.1	16.3	95.1	39.7	65.3	0.946	0.680	147.2	109.2	162.0	49.5	30.7	12.66
163	292.0	16.5	96.2	39.8	65.3	0.945	0.682	146.9	109.6	163.0	50.0	30.9	12.35

Year	N
2007	3
2008	6
2009	6
2010	17
2011	2
2012	12
2013	16
2014	3
2015	1
2016	15
2017	7
2018	11
Total	99

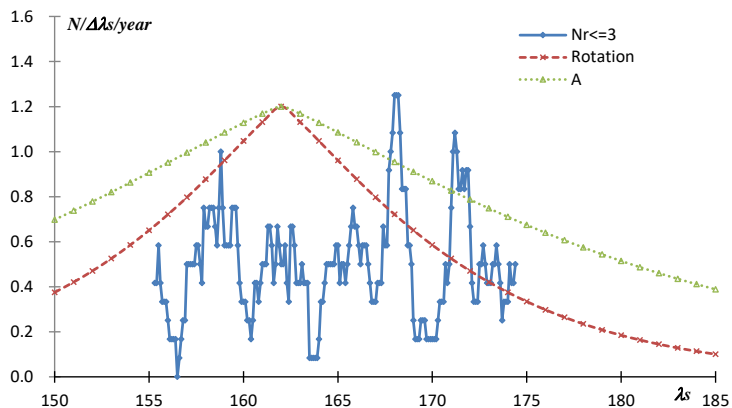




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
NIA02	*165	198.0	4.3
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	168.5	10	
DR3	162.5	5.3	
DR10	170.5	3.7	
DR15	160.5	6.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
150	198.2	3.6	347.8	-1.4	29.8	0.849	0.256	5.2	308.8	150.0	99.0	-4.1	1.70
155	198.1	3.6	352.2	0.6	29.9	0.850	0.257	5.3	308.5	155.0	103.7	-4.1	1.72
156	198.1	3.6	353.1	1.0	29.9	0.851	0.257	5.3	308.5	156.0	104.6	-4.1	1.72
157	198.1	3.6	354.0	1.3	29.9	0.851	0.257	5.3	308.4	157.0	105.5	-4.2	1.72
158	198.0	3.6	354.9	1.7	29.9	0.851	0.257	5.3	308.4	158.0	106.5	-4.2	1.73
159	198.0	3.6	355.8	2.1	29.9	0.851	0.257	5.3	308.3	159.0	107.4	-4.2	1.73
160	198.0	3.6	356.7	2.5	29.9	0.851	0.258	5.3	308.2	160.0	108.4	-4.2	1.74
161	198.0	3.6	357.6	2.9	29.9	0.852	0.258	5.3	308.2	161.0	109.3	-4.2	1.74
162	198.0	3.6	358.5	3.3	29.9	0.852	0.258	5.3	308.1	162.0	110.2	-4.2	1.74
163	197.9	3.7	359.4	3.7	29.9	0.852	0.258	5.4	308.1	163.0	111.2	-4.2	1.75
164	197.9	3.7	0.3	4.1	30.0	0.852	0.259	5.4	308.0	164.0	112.1	-4.2	1.75
165	197.9	3.7	1.2	4.5	30.0	0.852	0.259	5.4	307.9	165.0	113.1	-4.2	1.75
166	197.9	3.7	2.1	4.9	30.0	0.853	0.259	5.4	307.9	166.0	114.0	-4.2	1.76
167	197.9	3.7	3.0	5.3	30.0	0.853	0.259	5.4	307.8	167.0	114.9	-4.3	1.76
168	197.8	3.7	3.9	5.7	30.0	0.853	0.260	5.4	307.8	168.0	115.9	-4.3	1.76
169	197.8	3.7	4.8	6.1	30.0	0.853	0.260	5.4	307.7	169.0	116.8	-4.3	1.77
170	197.8	3.7	5.7	6.5	30.0	0.853	0.260	5.4	307.6	170.0	117.8	-4.3	1.77
171	197.8	3.7	6.6	6.9	30.0	0.853	0.260	5.4	307.6	171.0	118.7	-4.3	1.78
172	197.8	3.7	7.5	7.3	30.0	0.854	0.260	5.4	307.5	172.0	119.6	-4.3	1.78
175	197.7	3.7	10.2	8.5	30.1	0.854	0.261	5.5	307.3	175.0	122.5	-4.3	1.79
180	197.6	3.8	14.8	10.4	30.1	0.855	0.262	5.5	307.0	180.0	127.2	-4.4	1.81

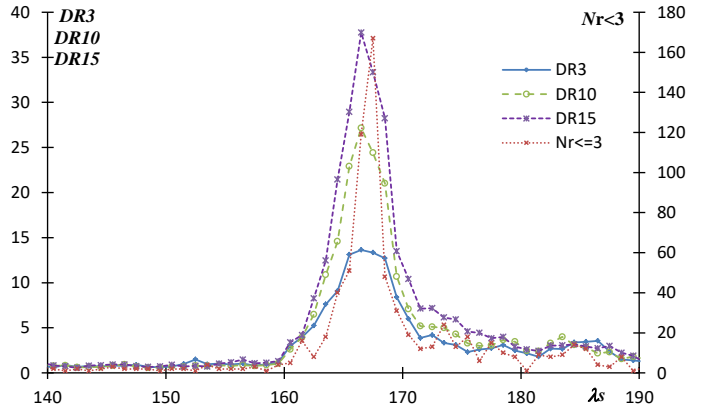
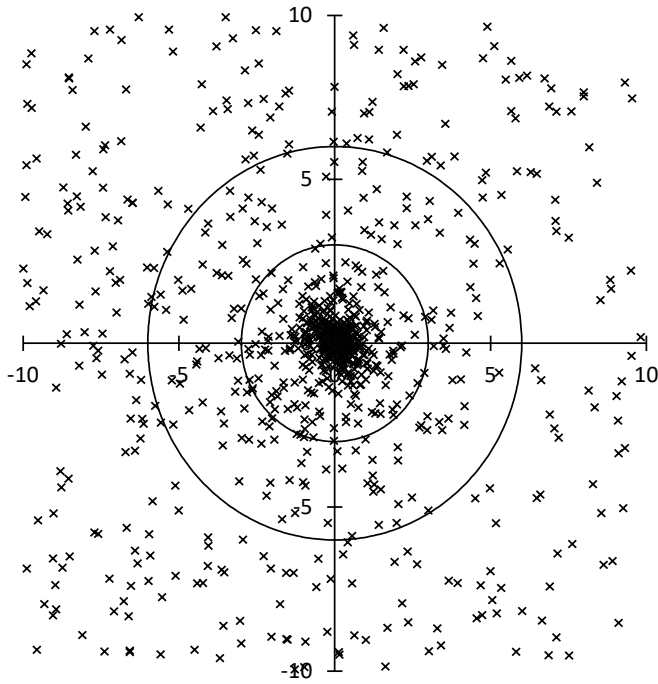
Year	N
2007	5
2008	6
2009	9
2010	17
2011	20
2012	20
2013	11
2014	9
2015	1
2016	9
2017	10
2018	4
Total	121



#0208SPE

September epsilon Perseids

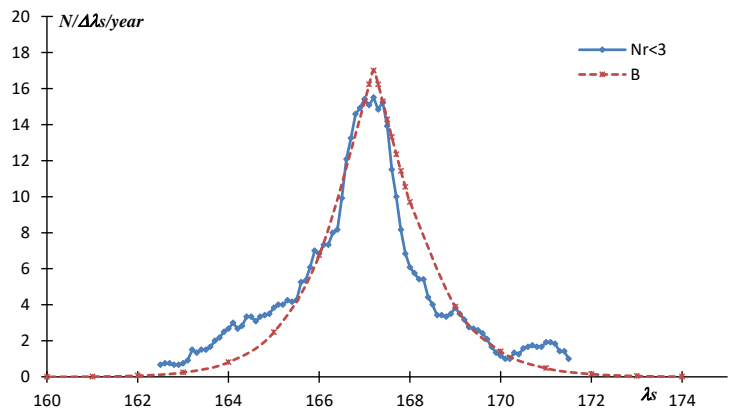
$\alpha=50.2, \delta=39.4, \lambda_s=170$

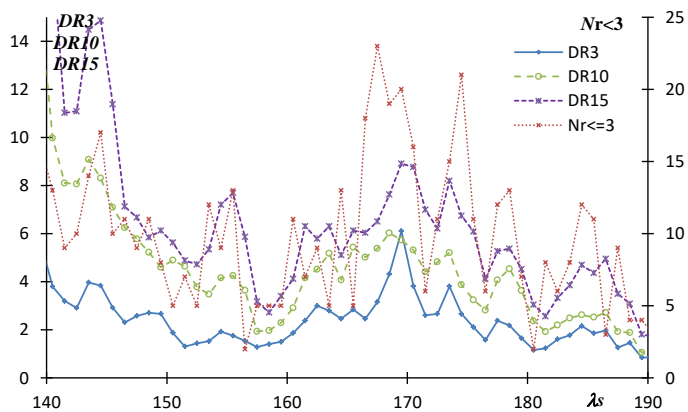
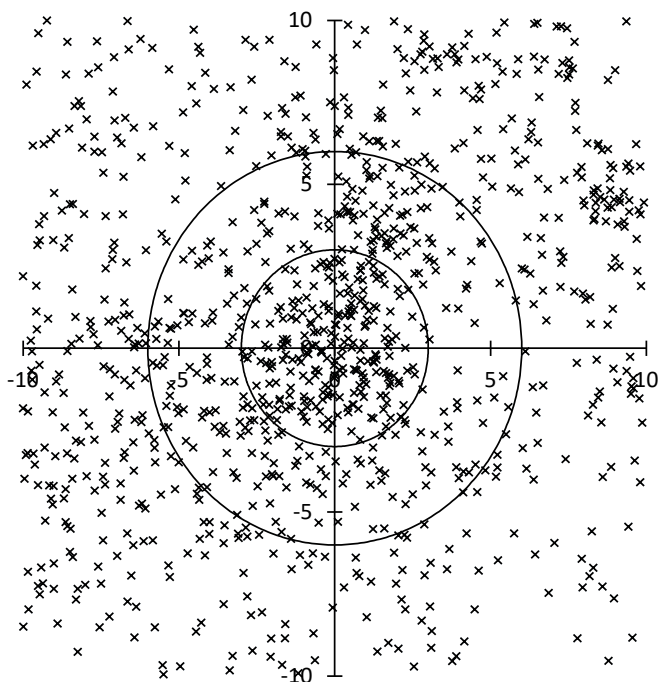


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
SPE01	167.1	248.8	20.8
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	167.5	167	
DR3	166.5	13.6	
DR10	166.5	27.1	
DR15	166.5	37.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
160	249.5	22.2	39.5	38.8	63.8	0.950	0.736	137.0	243.5	160.0	284.3	-37.7	14.82
161	249.4	22.0	40.6	38.9	63.9	0.950	0.734	137.3	243.9	161.0	284.8	-37.5	14.82
162	249.4	21.8	41.8	39.0	63.9	0.951	0.731	137.6	244.2	162.0	285.2	-37.4	14.82
163	249.3	21.6	42.9	39.1	64.0	0.951	0.728	137.9	244.5	163.0	285.7	-37.3	14.82
164	249.3	21.5	44.1	39.2	64.0	0.951	0.726	138.2	244.8	164.0	286.2	-37.1	14.83
165	249.2	21.3	45.2	39.3	64.1	0.951	0.723	138.5	245.1	165.0	286.8	-37.0	14.85
166	249.2	21.1	46.4	39.4	64.1	0.952	0.720	138.8	245.4	166.0	287.3	-36.8	14.87
167	249.1	20.9	47.6	39.5	64.2	0.952	0.718	139.1	245.8	167.0	287.8	-36.6	14.90
168	249.1	20.7	48.7	39.5	64.2	0.952	0.715	139.4	246.1	168.0	288.3	-36.5	14.93
169	249.0	20.5	49.9	39.6	64.3	0.952	0.712	139.8	246.4	169.0	288.8	-36.3	14.97
170	248.9	20.3	51.1	39.7	64.3	0.953	0.710	140.1	246.7	170.0	289.3	-36.1	15.02
171	248.9	20.1	52.3	39.7	64.4	0.953	0.707	140.4	247.0	171.0	289.9	-35.9	15.07
172	248.8	20.0	53.4	39.8	64.4	0.953	0.704	140.7	247.3	172.0	290.4	-35.7	15.13
173	248.8	19.8	54.6	39.8	64.5	0.954	0.702	141.0	247.6	173.0	290.9	-35.6	15.19
174	248.7	19.6	55.8	39.8	64.5	0.954	0.699	141.3	247.9	174.0	291.5	-35.4	15.27
175	248.7	19.4	57.0	39.9	64.6	0.955	0.696	141.7	248.2	175.0	292.0	-35.2	15.35
176	248.6	19.2	58.2	39.9	64.6	0.955	0.694	142.0	248.5	176.0	292.6	-35.0	15.44
177	248.6	19.0	59.4	39.9	64.7	0.956	0.691	142.3	248.8	177.0	293.1	-34.7	15.53
178	248.5	18.8	60.6	39.9	64.7	0.956	0.689	142.6	249.1	178.0	293.7	-34.5	15.64
179	248.5	18.6	61.8	39.9	64.8	0.956	0.686	143.0	249.4	179.0	294.3	-34.3	15.75
180	248.4	18.4	63.0	39.9	64.8	0.957	0.683	143.3	249.7	180.0	294.8	-34.1	15.88

Year	N
2007	19
2008	60
2009	76
2010	61
2011	83
2012	82
2013	30
2014	28
2015	24
2016	20
2017	23
2018	7
Total	513

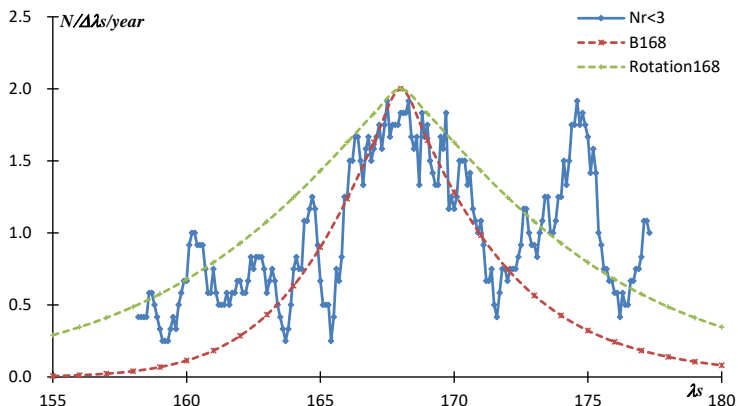




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
NUE00	167.9	259.3	-20.7
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$Nr \leq 3$	167.5	23	
DR3	169.5	6.1	
DR10	168.5	6.0	
DR15	169.5	8.9	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
157	259.2	-23.3	59.2	-3.3	65.2	0.902	0.923	138.8	34.9	337.0	309.3	22.2	9.42
158	259.2	-23.0	60.0	-3.0	65.3	0.900	0.921	139.1	35.3	338.0	309.8	22.2	9.20
159	259.1	-22.8	60.8	-2.6	65.3	0.898	0.920	139.4	35.7	339.0	310.4	22.3	9.00
160	259.0	-22.6	61.6	-2.2	65.4	0.896	0.918	139.8	36.0	340.0	311.0	22.3	8.81
161	259.0	-22.4	62.4	-1.8	65.4	0.894	0.916	140.1	36.4	341.0	311.5	22.4	8.63
162	258.9	-22.2	63.2	-1.4	65.4	0.892	0.914	140.4	36.8	342.0	312.1	22.4	8.46
163	258.8	-22.0	64.0	-1.1	65.5	0.890	0.912	140.8	37.1	343.0	312.6	22.4	8.30
164	258.8	-21.8	64.9	-0.7	65.5	0.888	0.910	141.1	37.5	344.0	313.2	22.5	8.15
165	258.7	-21.6	65.7	-0.3	65.6	0.887	0.908	141.4	37.9	345.0	313.7	22.5	8.01
166	258.6	-21.4	66.5	0.0	65.6	0.885	0.906	141.8	38.2	346.0	314.3	22.5	7.87
167	258.6	-21.2	67.3	0.4	65.6	0.883	0.904	142.1	38.6	347.0	314.8	22.5	7.74
168	258.5	-20.9	68.2	0.7	65.7	0.882	0.902	142.4	38.9	348.0	315.4	22.5	7.62
169	258.5	-20.7	69.0	1.1	65.7	0.880	0.900	142.8	39.3	349.0	315.9	22.5	7.50
170	258.4	-20.5	69.8	1.4	65.8	0.878	0.898	143.1	39.7	350.0	316.5	22.5	7.39
171	258.3	-20.3	70.7	1.7	65.8	0.877	0.896	143.5	40.0	351.0	317.0	22.5	7.28
172	258.3	-20.1	71.5	2.1	65.8	0.876	0.894	143.8	40.4	352.0	317.5	22.5	7.18
173	258.2	-19.9	72.3	2.4	65.9	0.874	0.892	144.1	40.7	353.0	318.1	22.5	7.09
174	258.1	-19.7	73.2	2.7	65.9	0.873	0.890	144.5	41.1	354.0	318.6	22.4	7.00
175	258.1	-19.5	74.0	3.0	66.0	0.872	0.888	144.8	41.4	355.0	319.2	22.4	6.91
176	258.0	-19.3	74.9	3.3	66.0	0.870	0.886	145.2	41.8	356.0	319.7	22.4	6.83
177	258.0	-19.1	75.8	3.6	66.0	0.869	0.884	145.5	42.1	357.0	320.3	22.3	6.75
178	257.9	-18.8	76.6	3.9	66.1	0.868	0.881	145.9	42.5	358.0	320.8	22.3	6.68

Year	N
2007	12
2008	27
2009	20
2010	25
2011	29
2012	38
2013	34
2014	13
2015	9
2016	10
2017	15
2018	6
Total	238

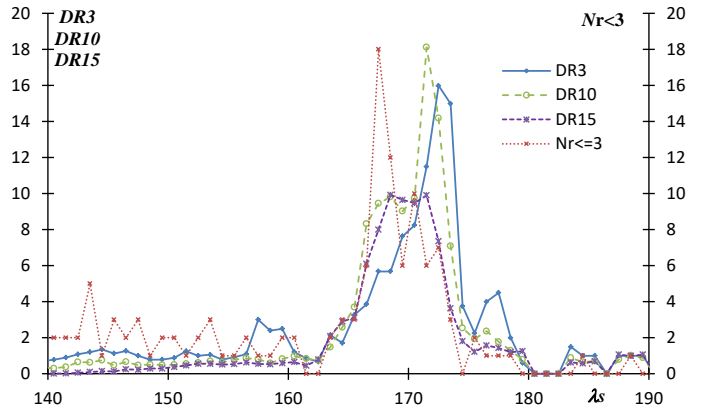
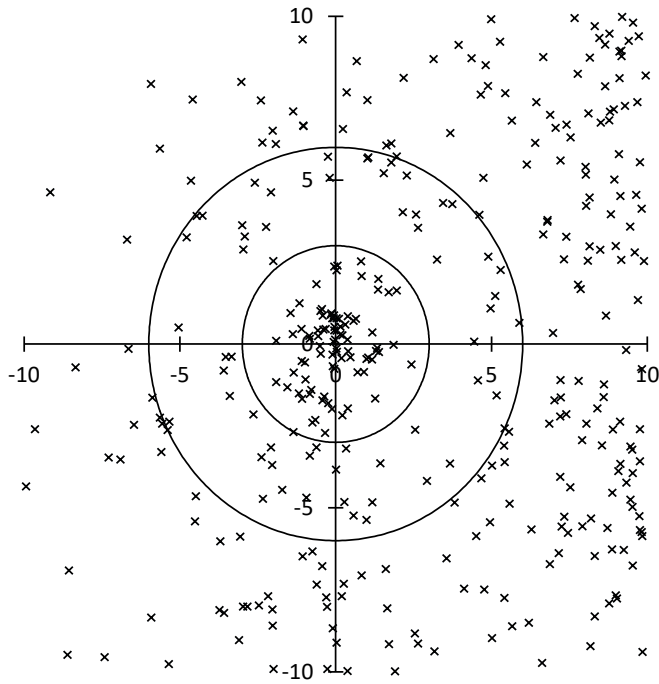


#0081SLY\_0

September Lyncids

$\alpha=107.4, \delta=55.0, \lambda_s=167$

[注釈を読む](#)

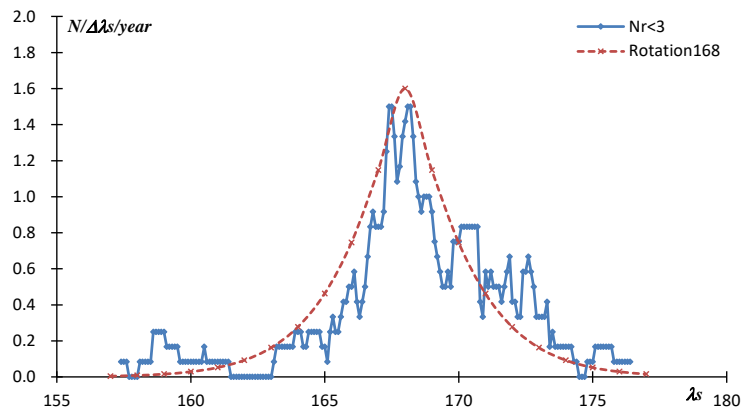


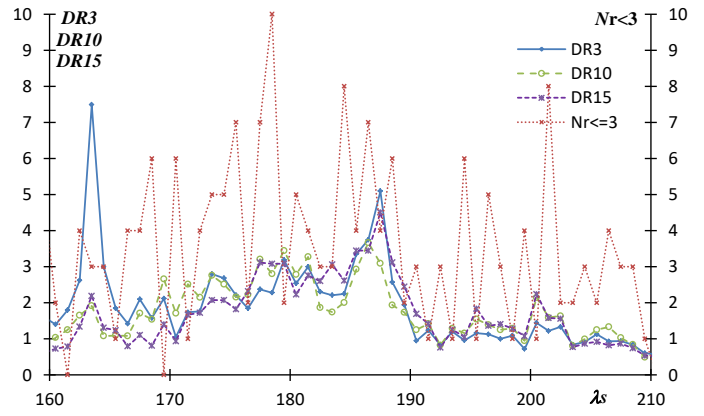
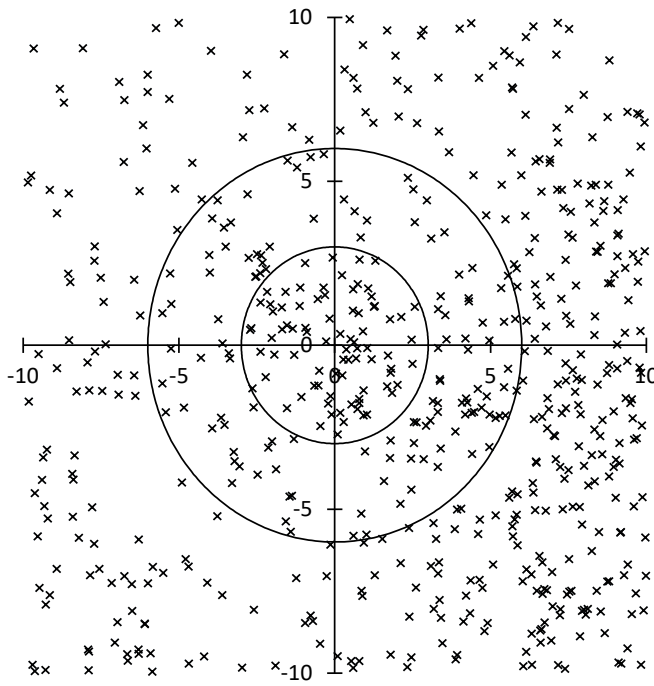
Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
SLY00	167	294.7	32.3
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	167.5	18	
DR3	172.5	16.0	
DR10	171.5	18.1	

DR15 168.5 9.9

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
157	291.3	29.7	87.6	53.2	61.7	0.969	0.792	123.7	124.2	157.0	16.2	43.5	25.22
158	291.6	30.1	89.4	53.5	61.5	0.966	0.789	123.0	123.8	158.0	17.1	44.2	23.35
159	291.9	30.4	91.3	53.8	61.3	0.964	0.786	122.2	123.3	159.0	18.0	45.0	21.82
160	292.2	30.7	93.2	54.1	61.1	0.962	0.783	121.5	122.9	160.0	18.9	45.7	20.55
161	292.5	31.0	95.1	54.4	60.8	0.960	0.780	120.8	122.5	161.0	19.8	46.5	19.47
162	292.7	31.3	97.0	54.7	60.6	0.958	0.777	120.0	122.1	162.0	20.6	47.2	18.55
163	293.0	31.7	98.9	54.9	60.4	0.956	0.774	119.3	121.7	163.0	21.4	47.9	17.77
164	293.3	32.0	100.9	55.1	60.2	0.955	0.771	118.5	121.3	164.0	22.1	48.6	17.09
165	293.6	32.3	102.9	55.3	60.0	0.953	0.769	117.8	121.0	165.0	22.9	49.3	16.50
166	293.9	32.6	104.8	55.5	59.7	0.952	0.766	117.1	120.6	166.0	23.6	50.0	15.99
167	294.2	32.9	106.8	55.7	59.5	0.951	0.764	116.3	120.3	167.0	24.2	50.7	15.54
168	294.5	33.2	108.8	55.8	59.3	0.950	0.761	115.6	119.9	168.0	24.9	51.4	15.15
169	294.8	33.5	110.8	56.0	59.1	0.949	0.759	114.8	119.6	169.0	25.5	52.1	14.81
170	295.1	33.8	112.8	56.1	58.8	0.948	0.756	114.1	119.3	170.0	26.0	52.8	14.52
171	295.4	34.2	114.8	56.2	58.6	0.947	0.754	113.4	119.0	171.0	26.6	53.4	14.26
172	295.7	34.5	116.9	56.3	58.4	0.946	0.752	112.6	118.7	172.0	27.1	54.0	14.04
173	296.0	34.8	118.9	56.3	58.2	0.946	0.750	111.9	118.5	173.0	27.5	54.7	13.85
174	296.3	35.1	120.9	56.4	58.0	0.945	0.748	111.1	118.2	174.0	27.9	55.3	13.69
175	296.6	35.4	122.9	56.4	57.7	0.945	0.746	110.4	118.0	175.0	28.3	55.9	13.56
176	297.0	35.7	124.9	56.4	57.5	0.945	0.744	109.6	117.7	176.0	28.6	56.5	13.45
177	297.3	36.0	126.9	56.4	57.3	0.945	0.742	108.9	117.5	177.0	28.9	57.0	13.37

Year	N
2007	2
2008	2
2009	8
2010	17
2011	17
2012	13
2013	5
2014	7
2015	6
2016	3
2017	4
2018	1
Total	85

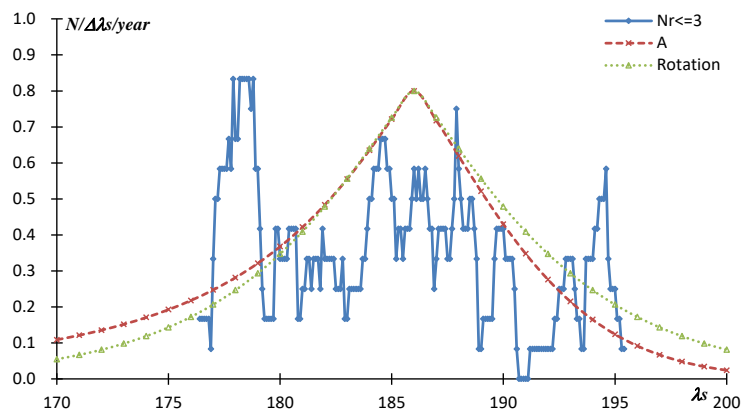




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
SLY01	186	278.8	26.0
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$Nr \leq 3$	178.5	10	
DR3	187.5	5.1	
DR10	186.5	3.7	
DR15	187.5	4.5	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
170	283.2	26.9	94.5	50.3	63.9	0.902	0.906	131.9	142.1	170.0	17.5	27.2	9.24
175	282.2	26.5	100.0	49.7	64.4	0.910	0.918	132.9	144.9	175.0	20.6	24.9	10.18
176	282.1	26.4	101.1	49.5	64.5	0.912	0.920	133.2	145.5	176.0	21.2	24.4	10.40
177	281.9	26.3	102.2	49.4	64.6	0.913	0.923	133.4	146.0	177.0	21.8	24.0	10.64
178	281.7	26.2	103.3	49.2	64.7	0.915	0.925	133.6	146.6	178.0	22.4	23.5	10.90
179	281.5	26.1	104.4	49.0	64.8	0.917	0.927	133.8	147.2	179.0	23.1	23.0	11.17
180	281.3	26.0	105.5	48.9	64.9	0.919	0.929	134.0	147.7	180.0	23.7	22.6	11.46
181	281.1	26.0	106.6	48.7	65.0	0.921	0.931	134.2	148.3	181.0	24.3	22.1	11.78
182	280.9	25.9	107.7	48.5	65.1	0.923	0.934	134.4	148.9	182.0	24.9	21.7	12.12
183	280.7	25.8	108.7	48.3	65.2	0.925	0.936	134.6	149.4	183.0	25.5	21.2	12.48
184	280.5	25.7	109.8	48.1	65.3	0.927	0.938	134.8	150.0	184.0	26.1	20.8	12.88
185	280.3	25.6	110.9	47.9	65.4	0.929	0.940	135.0	150.6	185.0	26.8	20.3	13.31
186	280.1	25.5	111.9	47.7	65.5	0.932	0.942	135.3	151.1	186.0	27.4	19.9	13.78
187	280.0	25.4	113.0	47.5	65.6	0.934	0.944	135.5	151.7	187.0	28.0	19.4	14.30
188	279.8	25.3	114.0	47.3	65.7	0.936	0.946	135.7	152.3	188.0	28.6	19.0	14.86
189	279.6	25.2	115.0	47.1	65.8	0.939	0.947	135.9	152.8	189.0	29.2	18.5	15.48
190	279.4	25.2	116.1	46.9	65.9	0.941	0.949	136.1	153.4	190.0	29.8	18.1	16.17
191	279.2	25.1	117.1	46.6	66.0	0.944	0.951	136.3	154.0	191.0	30.4	17.7	16.94
192	279.0	25.0	118.1	46.4	66.1	0.946	0.953	136.5	154.5	192.0	31.0	17.2	17.79
195	278.5	24.7	121.1	45.6	66.4	0.955	0.958	137.1	156.2	195.0	32.9	15.9	21.11
200	277.5	24.3	126.1	44.3	66.9	0.969	0.965	138.1	159.0	200.0	35.9	13.8	31.63

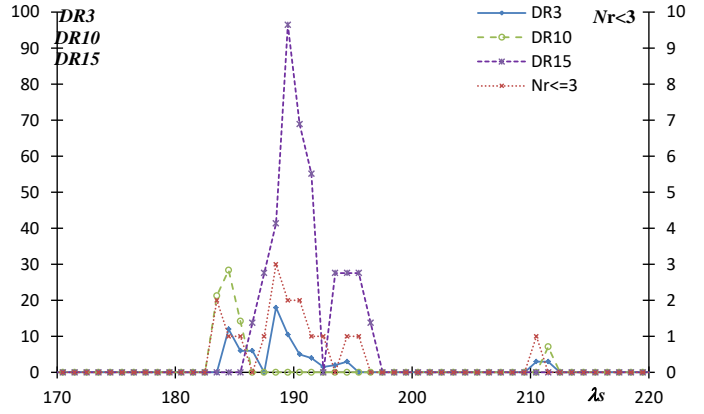
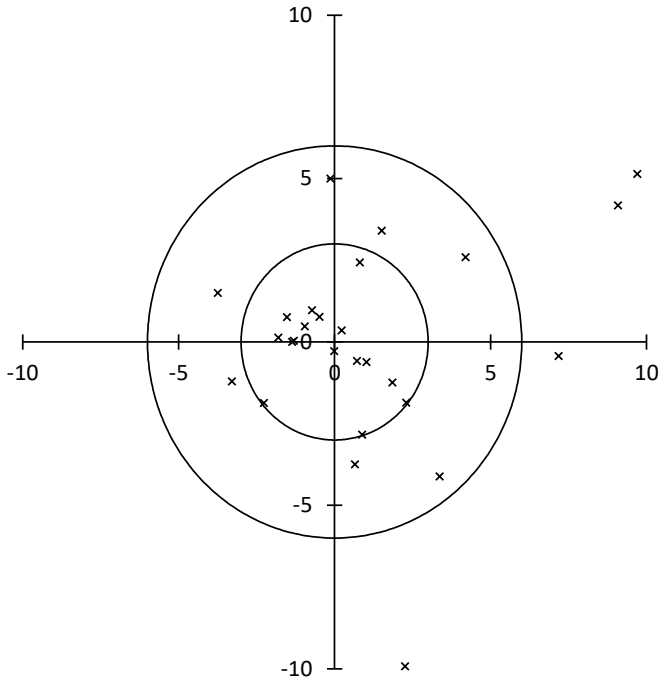
Year	N
2007	5
2008	0
2009	1
2010	10
2011	11
2012	5
2013	17
2014	12
2015	8
2016	3
2017	5
2018	5
Total	82



#0221DSX

Daytime Sextantids

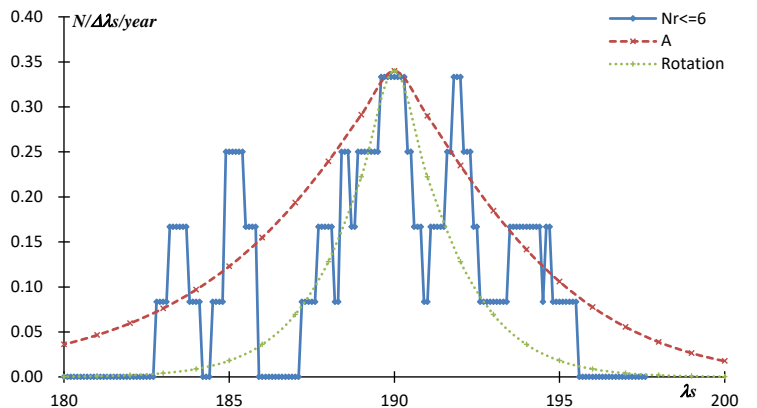
$\alpha=154.5, \delta=-1.5, \lambda_s=186.1$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
DSX05	189.2	329.8	-11.8
$\Delta r=$	6		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$Nr \leq 3$	188.5	3	
DR3	188.5	18.0	
DR10	184.5	28.4	
DR15	189.5	96.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
180	329.4	-12.9	147.0	-0.4	33.5	0.881	0.136	29.8	212.2	0.0	208.7	-15.4	1.14
181	329.4	-12.8	148.0	-0.7	33.4	0.879	0.137	29.4	212.3	1.0	209.8	-15.2	1.13
182	329.4	-12.7	149.0	-0.9	33.2	0.878	0.138	29.0	212.3	2.0	210.9	-15.0	1.13
183	329.5	-12.6	150.0	-1.2	33.1	0.876	0.139	28.5	212.3	3.0	212.1	-14.8	1.12
184	329.5	-12.5	150.9	-1.5	32.9	0.875	0.140	28.1	212.3	4.0	213.2	-14.6	1.11
185	329.6	-12.5	151.9	-1.8	32.8	0.873	0.140	27.7	212.4	5.0	214.3	-14.4	1.11
186	329.6	-12.4	152.9	-2.1	32.7	0.872	0.141	27.3	212.4	6.0	215.4	-14.2	1.10
187	329.6	-12.3	153.9	-2.4	32.5	0.870	0.142	26.9	212.4	7.0	216.6	-14.0	1.09
188	329.7	-12.2	154.8	-2.7	32.4	0.868	0.143	26.5	212.5	8.0	217.7	-13.8	1.09
189	329.7	-12.1	155.8	-3.0	32.2	0.867	0.144	26.1	212.5	9.0	218.8	-13.7	1.08
190	329.8	-12.1	156.8	-3.3	32.1	0.865	0.145	25.7	212.6	10.0	219.9	-13.5	1.08
191	329.8	-12.0	157.8	-3.6	31.9	0.863	0.146	25.3	212.6	11.0	221.1	-13.3	1.07
192	329.9	-11.9	158.7	-3.9	31.8	0.862	0.147	24.9	212.7	12.0	222.2	-13.1	1.07
193	329.9	-11.8	159.7	-4.2	31.7	0.860	0.149	24.5	212.7	13.0	223.3	-12.9	1.06
194	329.9	-11.7	160.7	-4.5	31.5	0.858	0.150	24.1	212.8	14.0	224.4	-12.8	1.06
195	330.0	-11.7	161.7	-4.8	31.4	0.856	0.151	23.7	212.8	15.0	225.5	-12.6	1.05
196	330.0	-11.6	162.6	-5.2	31.2	0.855	0.152	23.3	212.9	16.0	226.7	-12.4	1.05
197	330.1	-11.5	163.6	-5.5	31.1	0.853	0.153	23.0	212.9	17.0	227.8	-12.2	1.04
198	330.1	-11.4	164.6	-5.8	30.9	0.851	0.154	22.6	213.0	18.0	228.9	-12.1	1.04
199	330.1	-11.3	165.6	-6.1	30.8	0.849	0.155	22.2	213.0	19.0	230.0	-11.9	1.03
200	330.2	-11.3	166.5	-6.5	30.7	0.847	0.157	21.9	213.1	20.0	231.2	-11.7	1.03

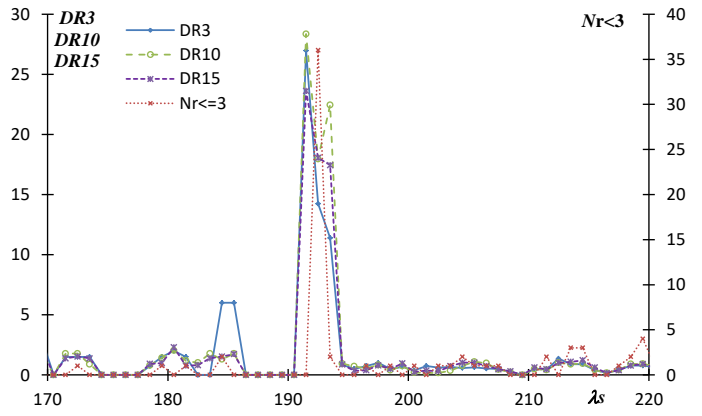
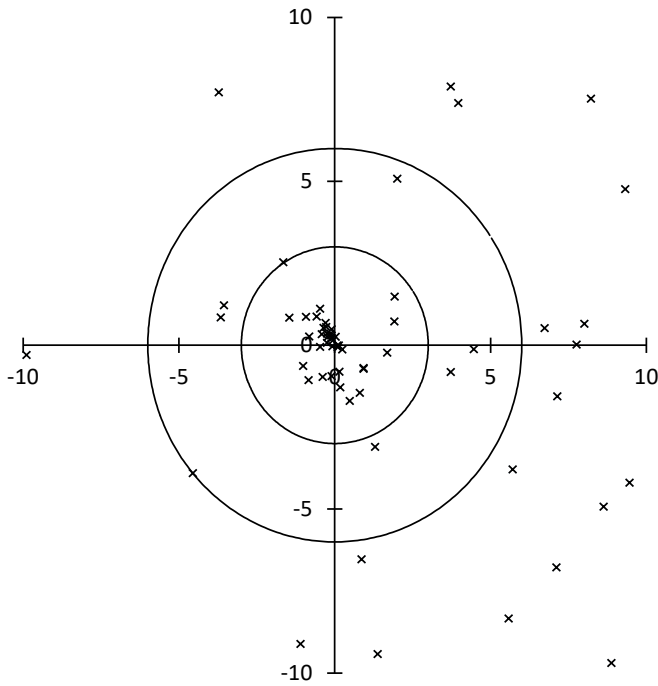
Year	N
2007	0
2008	5
2009	1
2010	4
2011	3
2012	2
2013	1
2014	1
2015	3
2016	0
2017	1
2018	2
Total	23



#0281OCT

October Camelopardalids

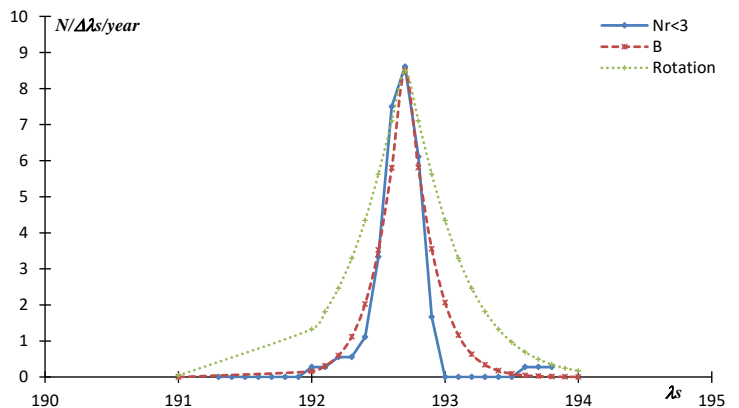
$\alpha=166, \delta=79.1, \lambda_s=193$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
OCT05	192.6	281.0	62.2
$\Delta r=$	3		
$\Delta \lambda_s=$	1.5		
	$\lambda_s$	max	
$Nr \leq 3$	192.5	36	
DR3	191.5	27.0	
DR10	191.5	28.4	
DR15	191.5	23.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
192	282.6	62.4	169.9	78.7	45.8	0.969	0.990	77.4	168.5	192.0	9.5	11.2	31.94
192.1	282.4	62.3	169.5	78.7	45.7	0.961	0.990	77.4	168.6	192.1	9.6	11.1	25.50
192.2	282.3	62.2	169.1	78.7	45.7	0.953	0.990	77.5	168.6	192.2	9.7	11.1	21.23
192.3	282.1	62.2	168.7	78.7	45.6	0.946	0.991	77.5	168.7	192.3	9.8	11.0	18.19
192.4	281.9	62.1	168.4	78.6	45.6	0.938	0.991	77.5	168.8	192.4	9.9	10.9	15.92
192.5	281.8	62.0	168.0	78.6	45.5	0.930	0.991	77.5	168.9	192.5	10.1	10.9	14.15
192.6	281.6	62.0	167.6	78.6	45.5	0.922	0.991	77.6	168.9	192.6	10.2	10.8	12.75
192.7	281.5	61.9	167.3	78.6	45.4	0.915	0.991	77.6	169.0	192.7	10.3	10.7	11.59
192.8	281.3	61.8	166.9	78.6	45.4	0.907	0.991	77.6	169.1	192.8	10.4	10.6	10.64
192.9	281.2	61.7	166.6	78.5	45.3	0.899	0.991	77.6	169.2	192.9	10.6	10.6	9.83
193	281.0	61.7	166.2	78.5	45.3	0.891	0.991	77.7	169.3	193.0	10.7	10.5	9.13
193.1	280.9	61.6	165.8	78.5	45.2	0.884	0.992	77.7	169.3	193.1	10.8	10.4	8.53
193.2	280.7	61.5	165.5	78.5	45.1	0.876	0.992	77.7	169.4	193.2	10.9	10.3	8.01
193.3	280.6	61.5	165.1	78.4	45.1	0.869	0.992	77.7	169.5	193.3	11.0	10.3	7.54
193.4	280.4	61.4	164.8	78.4	45.0	0.861	0.992	77.8	169.6	193.4	11.2	10.2	7.13
193.5	280.3	61.3	164.4	78.4	45.0	0.853	0.992	77.8	169.7	193.5	11.3	10.1	6.76
193.6	280.2	61.2	164.1	78.4	44.9	0.846	0.992	77.8	169.7	193.6	11.4	10.0	6.43
193.7	280.0	61.2	163.7	78.3	44.9	0.838	0.992	77.8	169.8	193.7	11.5	9.9	6.13
193.8	279.9	61.1	163.4	78.3	44.8	0.831	0.992	77.9	169.9	193.8	11.7	9.9	5.86
193.9	279.7	61.0	163.0	78.3	44.8	0.823	0.993	77.9	170.0	193.9	11.8	9.8	5.61
194	279.6	60.9	162.7	78.3	44.7	0.816	0.993	77.9	170.1	194.0	11.9	9.7	5.38

Year	N
2007	5
2008	0
2009	0
2010	1
2011	2
2012	6
2013	0
2014	0
2015	14
2016	8
2017	0
2018	2
Total	38

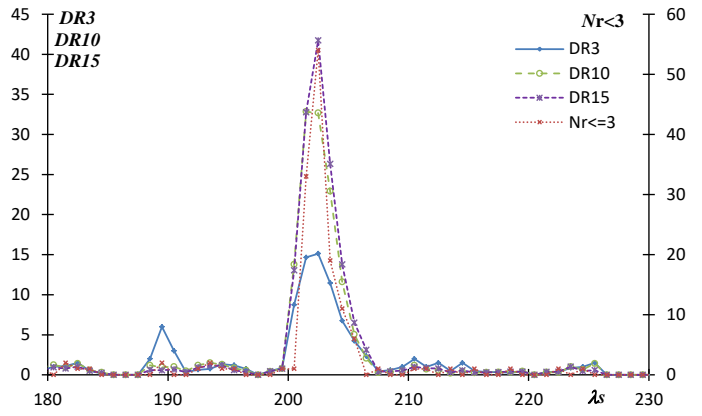
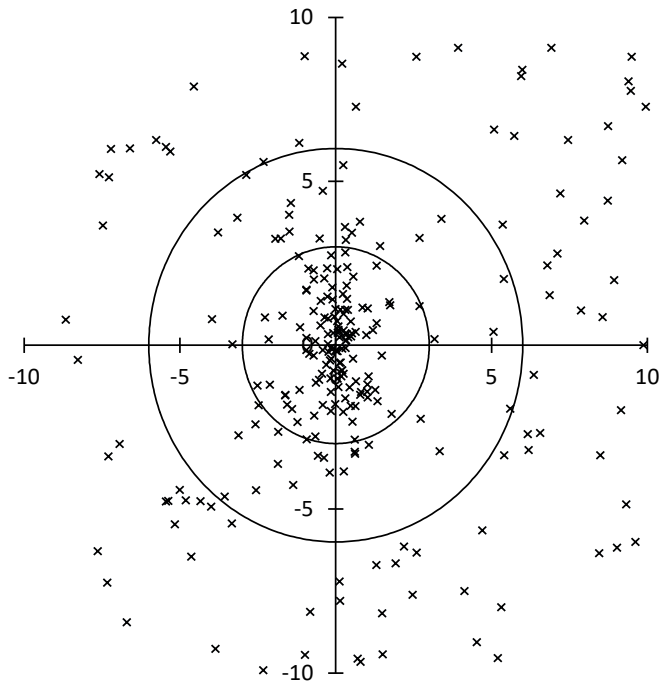




#0333OCU

October Ursae Majorids

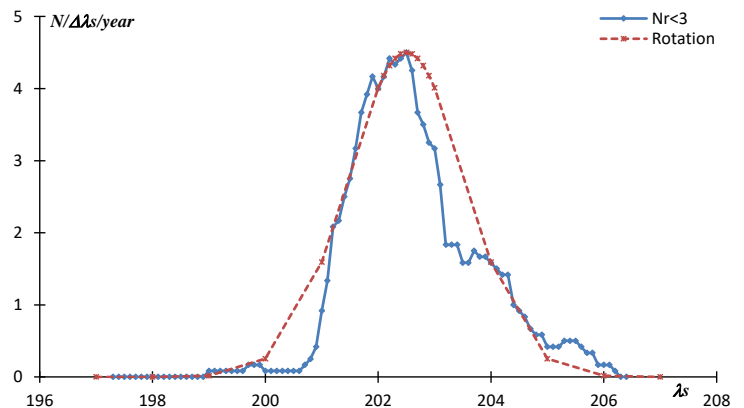
$\alpha=144.8, \delta=64.5, \lambda_s=202$

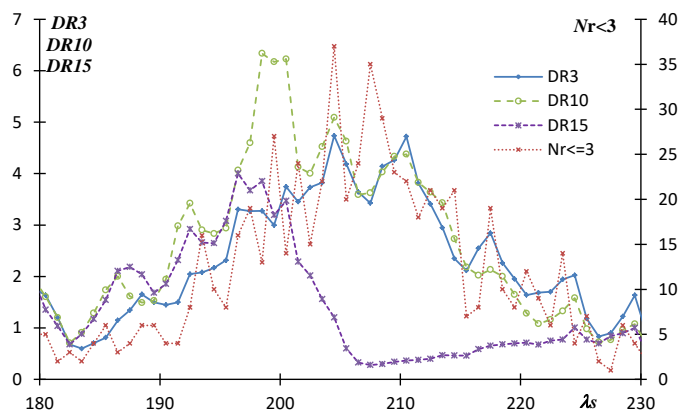
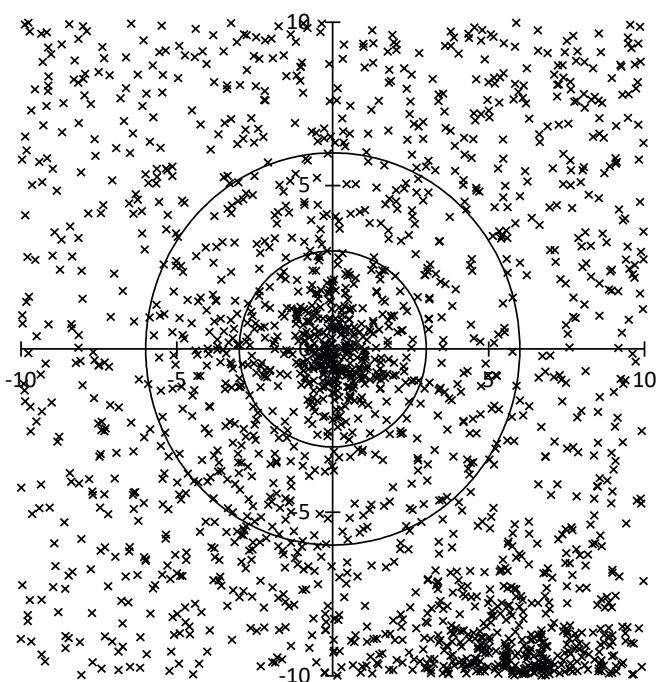


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
OCU00	202	278.9	46.8
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	202.5	54	
DR3	202.5	15.1	
DR10	201.5	32.8	
DR15	202.5	41.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
197	275.5	46.8	132.1	66.9	56.4	0.999	0.993	101.9	171.2	197.0	18.8	8.6	691.38
198	276.2	46.8	134.6	66.5	56.2	0.984	0.991	101.7	170.0	198.0	20.0	9.8	60.39
199	276.8	46.7	137.1	66.0	56.0	0.969	0.989	101.5	168.7	199.0	21.3	11.0	31.81
200	277.4	46.7	139.6	65.5	55.8	0.955	0.986	101.3	167.5	200.0	22.5	12.3	21.70
201	278.0	46.7	141.9	65.0	55.6	0.940	0.983	101.0	166.2	201.0	23.7	13.5	16.53
202	278.7	46.7	144.2	64.5	55.4	0.927	0.981	100.8	164.9	202.0	24.9	14.8	13.39
202.1	278.7	46.7	144.4	64.4	55.4	0.925	0.980	100.8	164.8	202.1	25.0	15.0	13.14
202.2	278.8	46.7	144.7	64.3	55.4	0.924	0.980	100.8	164.6	202.2	25.1	15.1	12.90
202.3	278.8	46.7	144.9	64.3	55.3	0.923	0.980	100.8	164.5	202.3	25.3	15.2	12.67
202.4	278.9	46.7	145.1	64.2	55.3	0.921	0.979	100.7	164.4	202.4	25.4	15.3	12.45
202.5	279.0	46.7	145.3	64.2	55.3	0.920	0.979	100.7	164.2	202.5	25.5	15.5	12.24
202.6	279.0	46.7	145.6	64.1	55.3	0.919	0.979	100.7	164.1	202.6	25.6	15.6	12.03
202.7	279.1	46.7	145.8	64.1	55.3	0.917	0.978	100.7	164.0	202.7	25.7	15.7	11.83
202.8	279.2	46.7	146.0	64.0	55.2	0.916	0.978	100.7	163.8	202.8	25.9	15.9	11.64
202.9	279.2	46.6	146.2	64.0	55.2	0.915	0.978	100.6	163.7	202.9	26.0	16.0	11.46
203	279.3	46.6	146.4	63.9	55.2	0.913	0.977	100.6	163.6	203.0	26.1	16.1	11.28
204	279.9	46.6	148.6	63.3	55.0	0.900	0.974	100.4	162.2	204.0	27.3	17.5	9.77
205	280.5	46.6	150.7	62.7	54.8	0.888	0.970	100.2	160.9	205.0	28.5	18.8	8.63
206	281.1	46.5	152.7	62.1	54.6	0.875	0.967	99.9	159.5	206.0	29.7	20.2	7.74
207	281.8	46.5	154.7	61.5	54.4	0.863	0.962	99.7	158.1	207.0	30.9	21.6	7.03

Year	N
2007	3
2008	5
2009	17
2010	11
2011	4
2012	12
2013	7
2014	14
2015	17
2016	27
2017	2
2018	6
Total	125

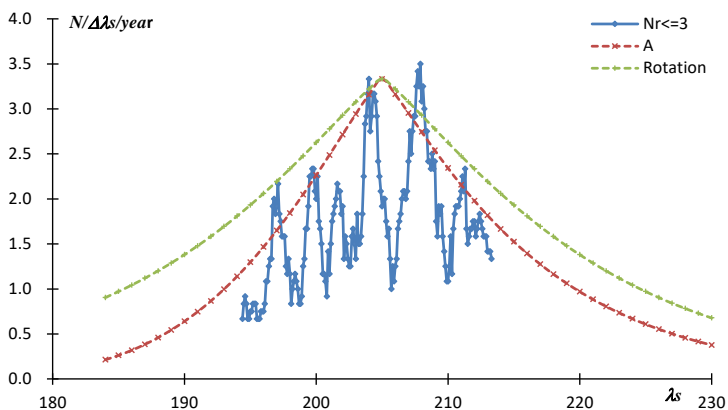


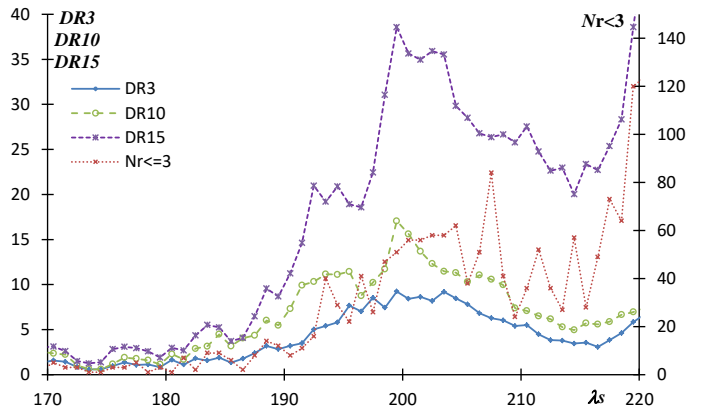
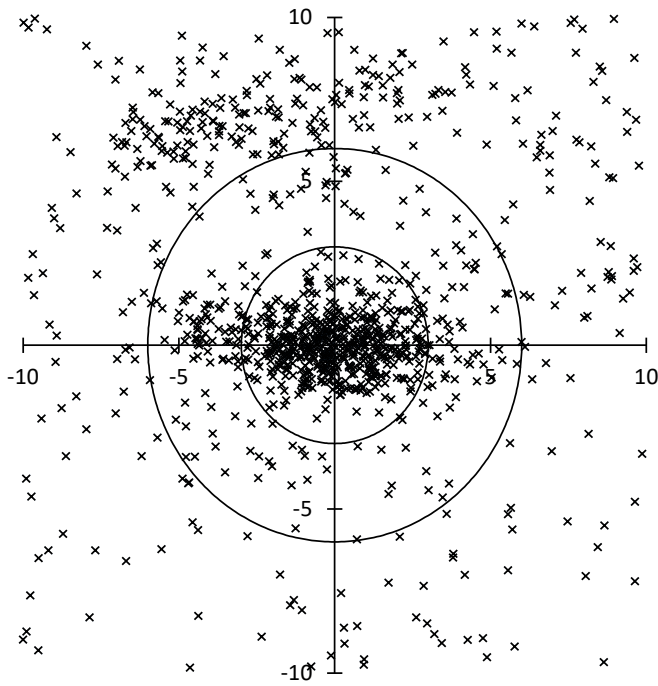


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
EGE03	204.1	254.7	5.2
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	204.5	37	
DR3	204.5	4.7	
DR10	198.5	6.3	
DR15	196.5	4.0	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
185	259.2	6.6	83.3	29.9	69.9	0.958	0.894	168.2	218.8	185.0	326.8	-7.4	21.44
190	258.0	6.2	87.8	29.7	69.5	0.941	0.868	168.7	223.4	190.0	327.1	-7.7	14.66
195	256.9	5.9	92.1	29.3	69.2	0.926	0.840	169.2	228.1	195.0	327.4	-8.0	11.40
199	255.9	5.6	95.6	28.9	68.9	0.917	0.816	169.7	231.8	199.0	327.7	-8.1	9.82
200	255.7	5.5	96.5	28.8	68.8	0.915	0.810	169.8	232.7	200.0	327.7	-8.1	9.51
201	255.5	5.4	97.4	28.7	68.8	0.913	0.803	169.9	233.7	201.0	327.8	-8.1	9.23
202	255.3	5.3	98.2	28.6	68.7	0.911	0.797	170.0	234.6	202.0	327.8	-8.1	8.97
203	255.0	5.3	99.1	28.5	68.6	0.909	0.791	170.1	235.5	203.0	327.9	-8.1	8.73
204	254.8	5.2	100.0	28.3	68.6	0.908	0.784	170.2	236.4	204.0	327.9	-8.1	8.50
205	254.6	5.1	100.8	28.2	68.5	0.906	0.778	170.3	237.4	205.0	328.0	-8.1	8.30
206	254.3	5.0	101.7	28.1	68.4	0.905	0.772	170.4	238.3	206.0	328.1	-8.1	8.11
207	254.1	5.0	102.5	27.9	68.4	0.904	0.765	170.6	239.2	207.0	328.1	-8.1	7.93
208	253.9	4.9	103.4	27.8	68.3	0.902	0.758	170.7	240.1	208.0	328.2	-8.1	7.77
209	253.6	4.8	104.2	27.6	68.2	0.901	0.752	170.8	241.0	209.0	328.3	-8.1	7.62
210	253.4	4.7	105.1	27.5	68.2	0.900	0.745	170.9	242.0	210.0	328.3	-8.0	7.47
211	253.2	4.7	105.9	27.3	68.1	0.899	0.738	171.0	242.9	211.0	328.4	-8.0	7.34
212	252.9	4.6	106.8	27.2	68.0	0.899	0.732	171.1	243.8	212.0	328.5	-7.9	7.22
215	252.2	4.4	109.3	26.6	67.8	0.897	0.711	171.5	246.5	215.0	328.8	-7.8	6.89
220	251.1	4.0	113.5	25.7	67.5	0.896	0.677	172.1	250.9	220.0	329.2	-7.5	6.48
225	249.9	3.6	117.6	24.7	67.1	0.896	0.642	172.7	255.3	225.0	329.8	-7.0	6.19

Year	N
2007	25
2008	32
2009	48
2010	31
2011	24
2012	50
2013	26
2014	45
2015	40
2016	40
2017	18
2018	40
Total	419

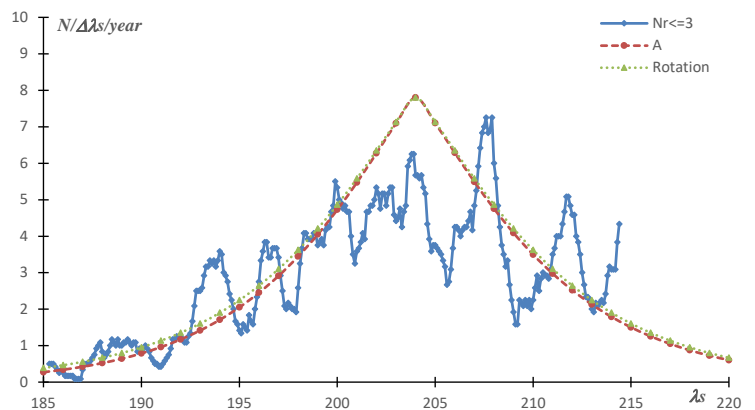


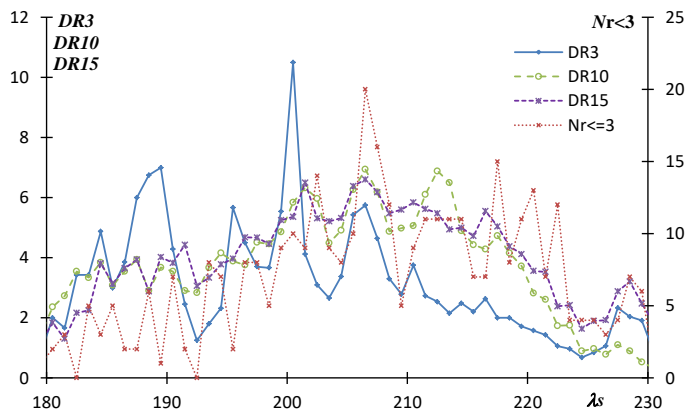
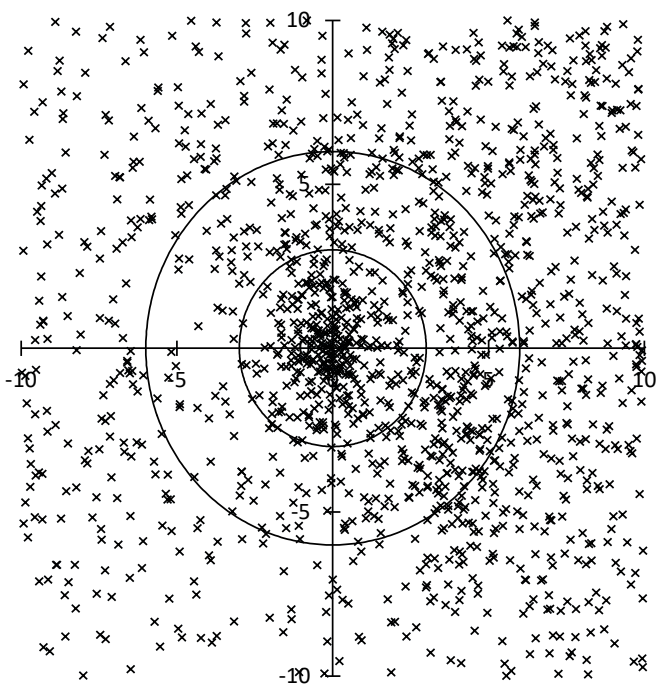


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
*SE	202.6	194.8	-4.4
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	204.5	62	
DR3	199.5	9.2	
DR10	199.5	17.1	
DR15	199.5	38.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
185	200.4	-4.0	25.0	6.1	30.5	0.858	0.226	6.3	132.6	5.0	137.8	4.6	1.59
190	199.0	-4.1	28.4	7.3	29.9	0.849	0.248	6.1	129.6	10.0	139.8	4.7	1.64
195	197.7	-4.3	31.9	8.4	29.4	0.840	0.271	6.0	126.6	15.0	141.8	4.8	1.69
198	196.8	-4.4	34.0	9.0	29.0	0.834	0.285	5.9	124.8	18.0	143.0	4.8	1.72
199	196.6	-4.4	34.7	9.2	28.9	0.833	0.290	5.8	124.2	19.0	143.3	4.8	1.73
200	196.3	-4.4	35.4	9.5	28.8	0.831	0.294	5.8	123.6	20.0	143.7	4.8	1.74
201	196.0	-4.4	36.2	9.7	28.7	0.829	0.299	5.8	123.0	21.0	144.1	4.8	1.75
202	195.8	-4.5	36.9	9.9	28.6	0.828	0.304	5.7	122.4	22.0	144.5	4.8	1.76
203	195.5	-4.5	37.6	10.1	28.5	0.826	0.308	5.7	121.8	23.0	144.9	4.8	1.77
204	195.2	-4.5	38.3	10.3	28.4	0.824	0.313	5.7	121.2	24.0	145.3	4.9	1.78
205	194.9	-4.5	39.0	10.5	28.2	0.823	0.318	5.6	120.6	25.0	145.7	4.9	1.79
206	194.7	-4.6	39.7	10.7	28.1	0.821	0.323	5.6	120.0	26.0	146.1	4.9	1.80
207	194.4	-4.6	40.4	10.9	28.0	0.819	0.328	5.6	119.3	27.0	146.5	4.9	1.81
208	194.1	-4.6	41.1	11.1	27.9	0.818	0.332	5.6	118.7	28.0	146.9	4.9	1.82
209	193.8	-4.7	41.8	11.3	27.8	0.816	0.337	5.5	118.1	29.0	147.2	4.9	1.83
210	193.6	-4.7	42.5	11.4	27.7	0.815	0.342	5.5	117.5	30.0	147.6	4.9	1.84
215	192.2	-4.8	46.1	12.4	27.1	0.807	0.366	5.4	114.5	35.0	149.6	4.9	1.89
220	190.8	-4.9	49.8	13.2	26.6	0.799	0.390	5.2	111.4	40.0	151.5	4.9	1.95
225	189.5	-5.1	53.4	14.0	26.0	0.792	0.414	5.1	108.4	45.0	153.5	4.8	2.00
230	188.1	-5.2	57.1	14.7	25.4	0.785	0.439	5.0	105.4	50.0	155.5	4.8	2.04
235	186.8	-5.3	60.8	15.3	24.9	0.779	0.462	4.8	102.5	55.0	157.5	4.7	2.09

Year	N
2007	13
2008	54
2009	91
2010	26
2011	17
2012	80
2013	42
2014	50
2015	61
2016	52
2017	8
2018	37
Total	531

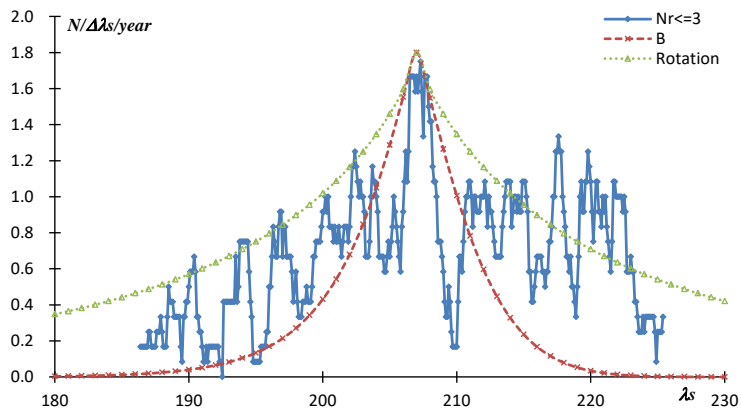


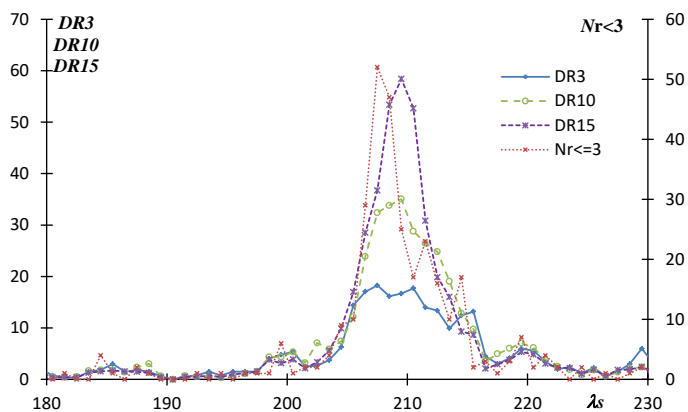
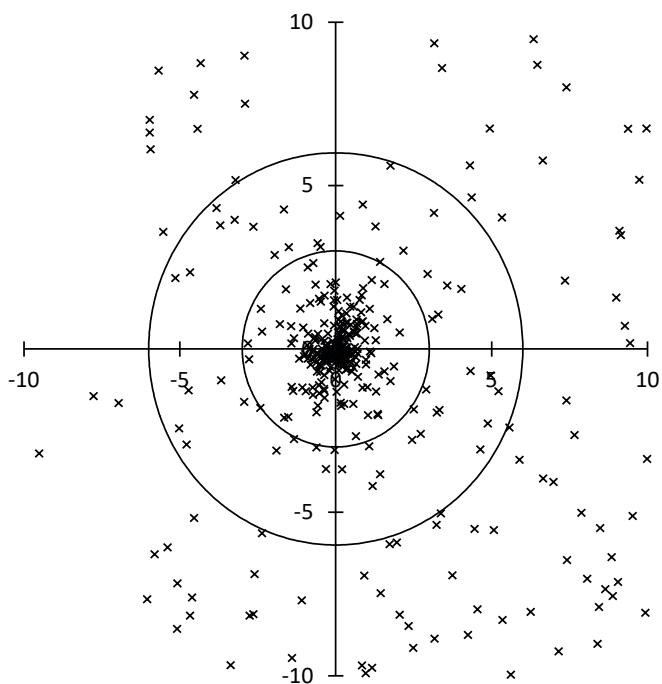


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
TCA02	206	284.8	12.4
$\Delta r=$	3		
$\Delta \lambda_s=$	20		
	$\lambda_s$	max	
Nr<=3	206.5	20	
DR3	200.5	10.5	
DR10	206.5	6.9	
DR15	206.5	6.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
180	289.8	6.8	112.5	28.7	66.7	0.877	0.683	166.4	108.4	180.0	71.1	12.9	5.57
185	288.7	7.9	117.1	29.1	66.8	0.862	0.711	164.4	111.8	185.0	72.4	14.4	5.13
190	287.6	9.0	121.7	29.5	66.8	0.847	0.739	162.5	115.5	190.0	73.5	15.8	4.83
195	286.5	10.1	126.3	29.6	66.9	0.834	0.767	160.6	119.3	195.0	74.3	16.8	4.63
196	286.3	10.3	127.3	29.7	66.9	0.832	0.773	160.3	120.1	196.0	74.4	17.0	4.60
197	286.1	10.5	128.2	29.7	66.9	0.830	0.778	159.9	120.9	197.0	74.5	17.2	4.57
198	285.9	10.7	129.1	29.7	66.9	0.828	0.784	159.5	121.7	198.0	74.6	17.3	4.54
199	285.7	11.0	130.0	29.7	67.0	0.825	0.789	159.2	122.5	199.0	74.7	17.5	4.52
200	285.5	11.2	130.9	29.7	67.0	0.823	0.795	158.8	123.3	200.0	74.8	17.6	4.50
204	284.6	12.1	134.6	29.7	67.0	0.817	0.816	157.4	126.6	204.0	75.1	18.0	4.45
205	284.4	12.3	135.5	29.7	67.1	0.815	0.821	157.0	127.5	205.0	75.2	18.1	4.45
206	284.1	12.5	136.4	29.7	67.1	0.814	0.826	156.7	128.4	206.0	75.2	18.1	4.44
207	283.9	12.7	137.3	29.7	67.1	0.813	0.832	156.3	129.2	207.0	75.3	18.1	4.44
208	283.7	12.9	138.3	29.6	67.1	0.812	0.837	156.0	130.1	208.0	75.3	18.2	4.44
209	283.5	13.1	139.2	29.6	67.1	0.811	0.842	155.6	131.0	209.0	75.4	18.2	4.45
210	283.3	13.3	140.1	29.6	67.1	0.810	0.847	155.3	131.8	210.0	75.4	18.2	4.45
211	283.0	13.6	141.0	29.5	67.1	0.809	0.852	154.9	132.7	211.0	75.4	18.1	4.46
215	282.2	14.4	144.6	29.4	67.2	0.808	0.871	153.6	136.3	215.0	75.5	17.9	4.53
220	281.0	15.5	149.0	29.1	67.3	0.809	0.893	151.9	140.9	220.0	75.7	17.3	4.67
225	279.9	16.6	153.4	28.7	67.4	0.814	0.913	150.2	145.5	225.0	75.8	16.3	4.91
230	278.7	17.6	157.7	28.3	67.4	0.823	0.930	148.6	150.1	230.0	76.1	15.0	5.26

Year	N
2007	21
2008	17
2009	34
2010	11
2011	20
2012	32
2013	25
2014	27
2015	40
2016	39
2017	18
2018	41
Total	325

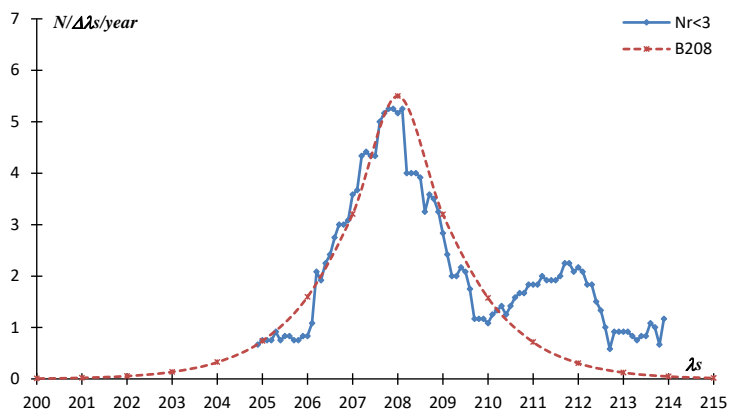


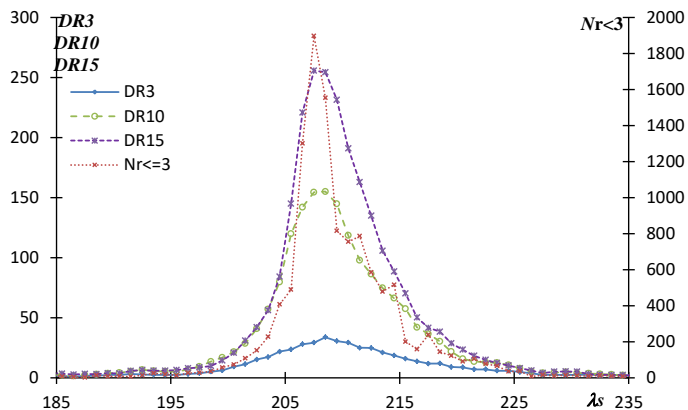
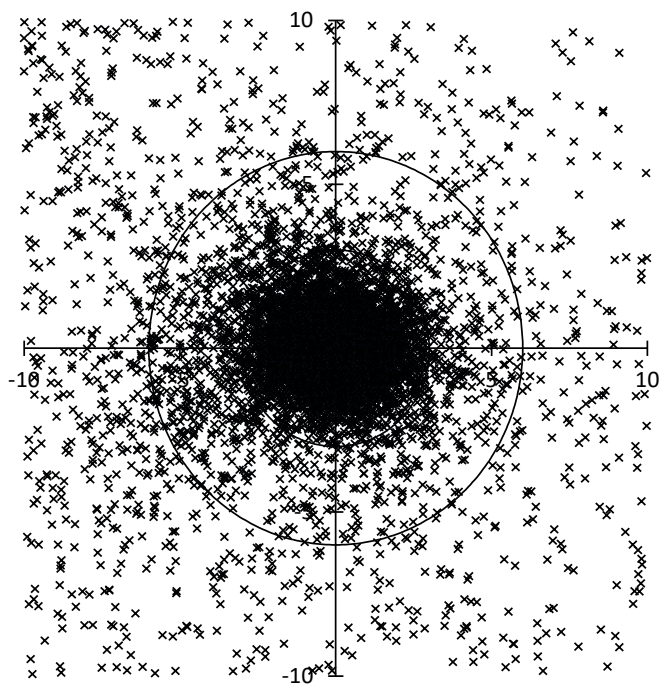


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
LMI04	209.6	297.9	26.2
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	207.5	52	
DR3	207.5	18.3	
DR10	209.5	35.0	
DR15	209.5	58.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
200	297.3	25.5	149.5	39.7	61.6	0.953	0.624	126.4	103.5	200.0	88.0	51.5	13.33
201	297.3	25.6	150.7	39.4	61.6	0.954	0.624	126.2	103.5	201.0	88.9	51.7	13.61
202	297.4	25.7	151.9	39.1	61.5	0.955	0.623	126.0	103.4	202.0	89.9	51.9	13.90
203	297.5	25.7	153.1	38.8	61.5	0.956	0.622	125.8	103.4	203.0	90.9	52.0	14.21
204	297.6	25.8	154.2	38.5	61.5	0.957	0.622	125.7	103.4	204.0	91.8	52.2	14.54
205	297.6	25.9	155.4	38.1	61.5	0.958	0.621	125.5	103.3	205.0	92.8	52.4	14.89
206	297.7	25.9	156.5	37.8	61.5	0.959	0.621	125.3	103.3	206.0	93.7	52.6	15.26
207	297.8	26.0	157.7	37.5	61.5	0.960	0.620	125.1	103.3	207.0	94.7	52.8	15.66
208	297.8	26.1	158.8	37.2	61.4	0.961	0.619	124.9	103.2	208.0	95.7	52.9	16.08
209	297.9	26.2	160.0	36.8	61.4	0.963	0.619	124.8	103.2	209.0	96.6	53.1	16.53
210	298.0	26.2	161.1	36.5	61.4	0.964	0.618	124.6	103.2	210.0	97.6	53.3	17.02
211	298.0	26.3	162.2	36.2	61.4	0.965	0.617	124.4	103.2	211.0	98.5	53.5	17.54
212	298.1	26.4	163.3	35.8	61.4	0.966	0.617	124.2	103.1	212.0	99.4	53.6	18.11
213	298.2	26.5	164.4	35.5	61.3	0.967	0.616	124.0	103.1	213.0	100.4	53.8	18.72
214	298.2	26.5	165.5	35.1	61.3	0.968	0.616	123.9	103.1	214.0	101.3	54.0	19.38
215	298.3	26.6	166.6	34.8	61.3	0.969	0.615	123.7	103.1	215.0	102.3	54.2	20.10
216	298.4	26.7	167.7	34.4	61.3	0.971	0.615	123.5	103.1	216.0	103.2	54.3	20.89
217	298.5	26.7	168.8	34.1	61.3	0.972	0.614	123.3	103.0	217.0	104.1	54.5	21.76
218	298.5	26.8	169.8	33.7	61.2	0.973	0.613	123.1	103.0	218.0	105.1	54.7	22.71
219	298.6	26.9	170.9	33.4	61.2	0.974	0.613	122.9	103.0	219.0	106.0	54.8	23.76
220	298.7	27.0	172.0	33.0	61.2	0.975	0.612	122.8	103.0	220.0	106.9	55.0	24.93

Year	N
2007	21
2008	12
2009	30
2010	8
2011	11
2012	42
2013	3
2014	20
2015	29
2016	20
2017	4
2018	45
Total	245

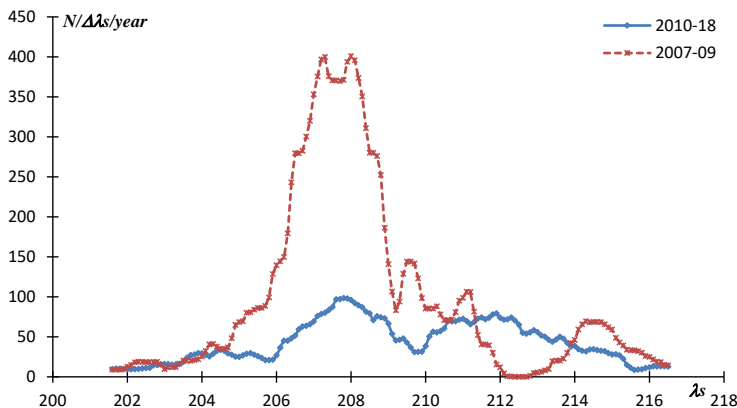




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ORI06	209	246.7	-7.6
$\Delta r=$	3		
$\Delta \lambda_s=$	8		
	$\lambda_s$	max	
$Nr \leq 3$	207.5	1897	
DR3	208.5	33.8	
DR10	208.5	155.1	
DR15	207.5	255.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
190	251.9	-9.1	81.8	14.1	67.4	0.929	0.725	162.3	64.6	10.0	306.4	16.0	10.14
195	250.6	-8.7	85.5	14.6	67.0	0.927	0.685	162.7	69.7	15.0	306.2	16.2	9.36
200	249.2	-8.4	89.2	15.1	66.7	0.927	0.644	163.1	74.7	20.0	306.0	16.3	8.88
201	248.9	-8.3	89.9	15.2	66.6	0.928	0.636	163.1	75.7	21.0	305.9	16.3	8.82
202	248.7	-8.2	90.7	15.2	66.5	0.928	0.628	163.2	76.6	22.0	305.9	16.3	8.76
203	248.4	-8.1	91.4	15.3	66.4	0.929	0.620	163.3	77.6	23.0	305.9	16.3	8.71
204	248.1	-8.0	92.2	15.4	66.4	0.929	0.612	163.4	78.6	24.0	305.9	16.3	8.66
205	247.9	-8.0	92.9	15.5	66.3	0.930	0.603	163.5	79.5	25.0	305.9	16.2	8.63
206	247.6	-7.9	93.7	15.5	66.2	0.931	0.595	163.6	80.5	26.0	305.9	16.2	8.60
207	247.3	-7.8	94.4	15.6	66.1	0.932	0.587	163.6	81.4	27.0	305.9	16.2	8.58
208	247.0	-7.7	95.2	15.6	66.1	0.932	0.579	163.7	82.4	28.0	305.9	16.1	8.56
209	246.8	-7.6	95.9	15.7	66.0	0.933	0.571	163.8	83.3	29.0	305.9	16.1	8.56
210	246.5	-7.5	96.7	15.7	65.9	0.934	0.562	163.9	84.3	30.0	306.0	16.0	8.56
211	246.2	-7.5	97.4	15.8	65.8	0.935	0.554	164.0	85.2	31.0	306.0	16.0	8.56
212	246.0	-7.4	98.2	15.8	65.8	0.936	0.546	164.1	86.1	32.0	306.0	15.9	8.57
213	245.7	-7.3	99.0	15.9	65.7	0.937	0.538	164.1	87.0	33.0	306.1	15.8	8.59
214	245.4	-7.2	99.7	15.9	65.6	0.939	0.530	164.2	87.9	34.0	306.1	15.8	8.62
215	245.1	-7.1	100.5	15.9	65.5	0.940	0.522	164.3	88.8	35.0	306.2	15.7	8.65
220	243.8	-6.7	104.3	16.0	65.2	0.946	0.482	164.8	93.3	40.0	306.6	15.2	8.93
225	242.4	-6.3	108.1	16.0	64.8	0.953	0.443	165.2	97.6	45.0	307.1	14.6	9.42
230	241.1	-5.9	111.9	16.0	64.4	0.960	0.406	165.7	101.8	50.0	307.8	14.0	10.19

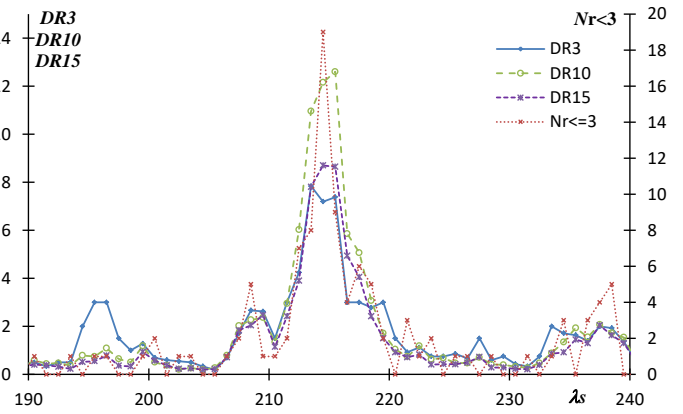
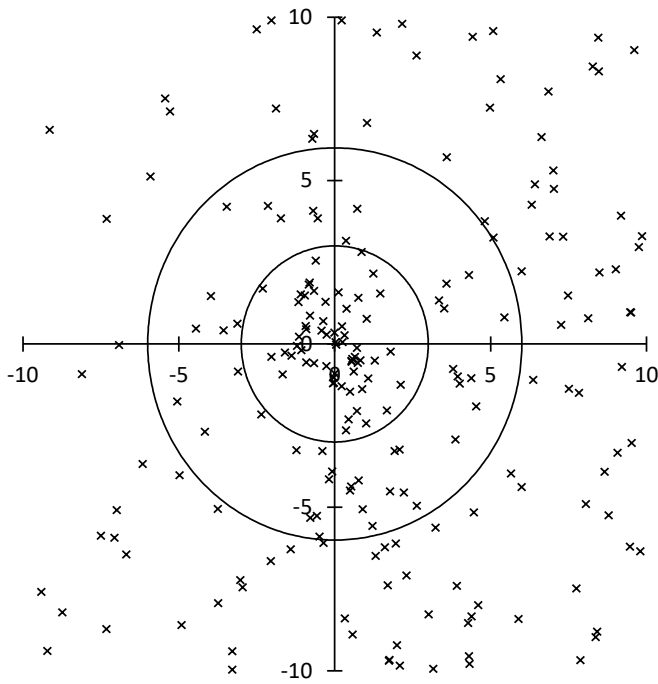
Year	N
2007	1505
2008	1040
2009	1926
2010	277
2011	722
2012	1177
2013	201
2014	599
2015	705
2016	736
2017	354
2018	1198
Total	10440



#0524LUM

lambda Ursae Majorids

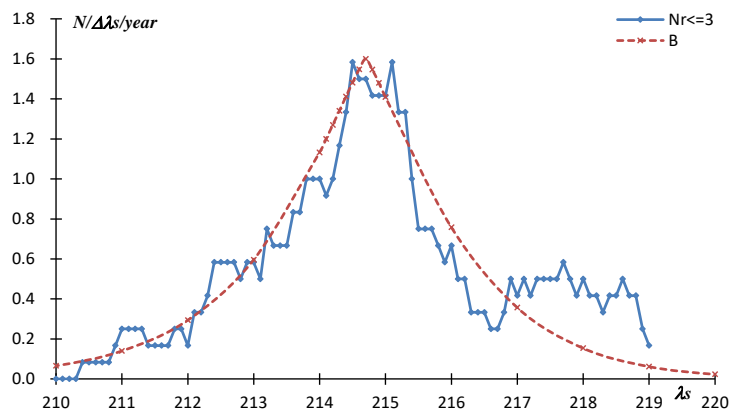
$\alpha=158.2, \delta=49.4, \lambda_s=15.0$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
LUM02	214.6	284.6	37.1
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	214.5	19	
DR3	213.5	7.8	
DR10	215.5	12.6	
DR15	214.5	8.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
205	284.1	37.1	146.9	53.0	61.1	1.007	0.924	115.3	148.7	205.0	39.5	28.0-126.21	
206	284.2	37.0	148.1	52.7	61.0	1.004	0.923	115.3	148.7	206.0	40.6	28.1-249.82	
207	284.2	37.0	149.3	52.3	61.0	1.000	0.923	115.3	148.6	207.0	41.6	28.1-10741.63	
208	284.2	37.0	150.5	52.0	61.0	0.996	0.922	115.2	148.5	208.0	42.7	28.2 262.76	
209	284.2	37.0	151.6	51.6	61.0	0.993	0.922	115.2	148.4	209.0	43.7	28.3 129.98	
210	284.2	37.0	152.8	51.2	60.9	0.989	0.921	115.2	148.3	210.0	44.8	28.4 86.43	
211	284.2	36.9	153.9	50.9	60.9	0.986	0.920	115.2	148.2	211.0	45.8	28.5 64.79	
212	284.2	36.9	155.0	50.5	60.9	0.982	0.920	115.2	148.1	212.0	46.9	28.6 51.85	
213	284.2	36.9	156.1	50.1	60.8	0.979	0.919	115.2	148.0	213.0	47.9	28.6 43.24	
214	284.2	36.9	157.2	49.7	60.8	0.975	0.919	115.2	147.9	214.0	49.0	28.7 37.10	
215	284.2	36.9	158.3	49.3	60.8	0.972	0.918	115.2	147.8	215.0	50.0	28.8 32.50	
216	284.2	36.8	159.4	48.9	60.8	0.968	0.918	115.2	147.7	216.0	51.1	28.9 28.92	
217	284.2	36.8	160.4	48.6	60.7	0.965	0.917	115.2	147.6	217.0	52.1	29.0 26.07	
218	284.2	36.8	161.5	48.2	60.7	0.961	0.917	115.2	147.5	218.0	53.2	29.1 23.73	
219	284.2	36.8	162.5	47.8	60.7	0.958	0.916	115.2	147.4	219.0	54.2	29.2 21.79	
220	284.2	36.8	163.6	47.4	60.7	0.955	0.915	115.2	147.3	220.0	55.3	29.3 20.14	
221	284.2	36.8	164.6	47.0	60.6	0.951	0.915	115.2	147.2	221.0	56.3	29.3 18.73	
222	284.2	36.7	165.6	46.6	60.6	0.948	0.914	115.2	147.1	222.0	57.4	29.4 17.51	
223	284.2	36.7	166.6	46.2	60.6	0.944	0.914	115.2	147.0	223.0	58.4	29.5 16.44	
224	284.2	36.7	167.6	45.8	60.5	0.941	0.913	115.2	146.9	224.0	59.5	29.6 15.50	
225	284.2	36.7	168.6	45.3	60.5	0.938	0.913	115.2	146.8	225.0	60.6	29.7 14.67	

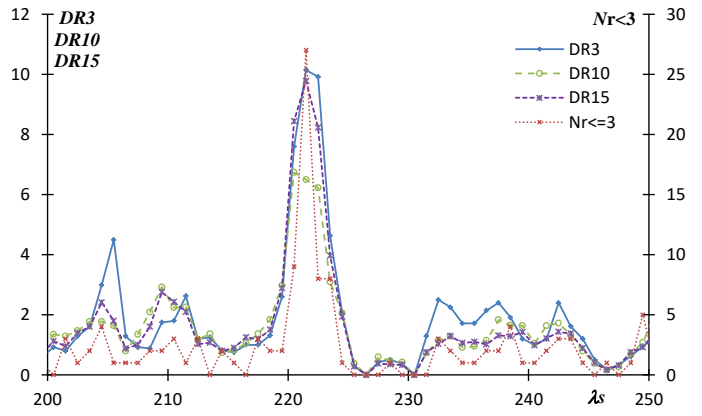
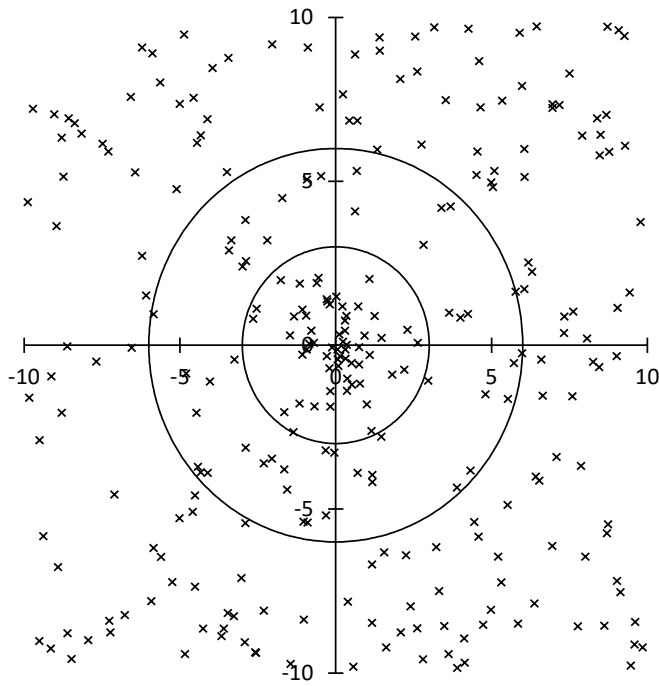
Year	N
2007	3
2008	8
2009	6
2010	1
2011	13
2012	7
2013	7
2014	4
2015	2
2016	2
2017	7
2018	2
Total	62



#0526SLD

Southern lambda Draconids

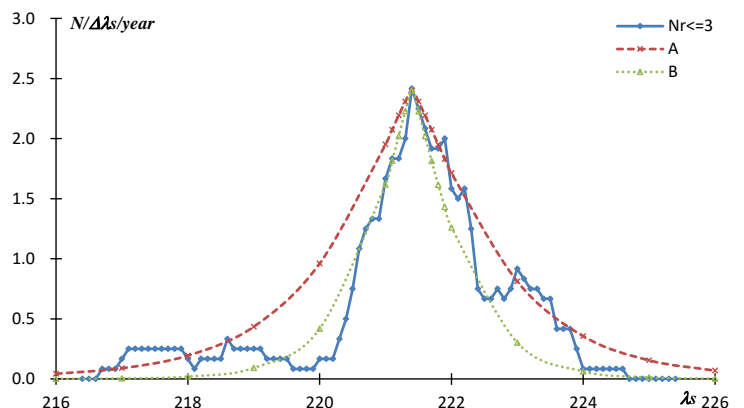
$\alpha=163, \delta=68.1, \lambda_s=221.6$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
SLD01	221	265.7	53.7
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	221.5	27	
DR3	221.5	10.1	
DR10	220.5	6.7	
DR15	221.5	9.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
216	262.7	53.9	151.5	71.2	49.5	0.816	0.981	88.5	193.3	216.0	36.3	-13.3	5.33
217	263.1	53.8	153.5	70.7	49.3	0.799	0.982	88.5	192.8	217.0	37.4	-12.8	4.88
218	263.5	53.8	155.4	70.1	49.2	0.782	0.983	88.4	192.3	218.0	38.4	-12.3	4.50
219	263.9	53.7	157.2	69.6	49.0	0.765	0.983	88.3	191.8	219.0	39.4	-11.8	4.18
220	264.3	53.7	159.0	69.0	48.8	0.748	0.984	88.2	191.2	220.0	40.4	-11.2	3.90
221	264.7	53.6	160.7	68.5	48.6	0.731	0.985	88.1	190.7	221.0	41.4	-10.7	3.66
221.1	264.8	53.6	160.8	68.4	48.6	0.730	0.985	88.1	190.6	221.1	41.5	-10.6	3.64
221.2	264.8	53.6	161.0	68.4	48.6	0.728	0.985	88.1	190.6	221.2	41.6	-10.6	3.62
221.3	264.8	53.6	161.2	68.3	48.6	0.726	0.985	88.1	190.5	221.3	41.7	-10.5	3.60
221.4	264.9	53.6	161.3	68.2	48.6	0.725	0.985	88.1	190.5	221.4	41.8	-10.5	3.58
221.5	264.9	53.6	161.5	68.2	48.5	0.723	0.985	88.1	190.4	221.5	41.9	-10.4	3.55
221.6	265.0	53.6	161.7	68.1	48.5	0.721	0.985	88.0	190.3	221.6	42.0	-10.3	3.53
221.7	265.0	53.6	161.8	68.1	48.5	0.720	0.985	88.0	190.3	221.7	42.1	-10.3	3.51
221.8	265.1	53.6	162.0	68.0	48.5	0.718	0.985	88.0	190.2	221.8	42.2	-10.2	3.49
221.9	265.1	53.6	162.2	68.0	48.5	0.716	0.985	88.0	190.2	221.9	42.3	-10.2	3.47
222	265.1	53.6	162.3	67.9	48.5	0.715	0.985	88.0	190.1	222.0	42.4	-10.1	3.45
223	265.5	53.5	163.9	67.3	48.3	0.698	0.986	87.9	189.5	223.0	43.3	-9.5	3.27
224	266.0	53.5	165.5	66.7	48.1	0.682	0.986	87.8	188.9	224.0	44.3	-8.9	3.10
225	266.4	53.4	167.0	66.1	47.9	0.666	0.987	87.7	188.3	225.0	45.3	-8.3	2.95
226	266.8	53.3	168.4	65.6	47.8	0.650	0.987	87.6	187.7	226.0	46.3	-7.7	2.82

Year	N
2007	1
2008	2
2009	6
2010	9
2011	8
2012	4
2013	1
2014	7
2015	9
2016	5
2017	4
2018	4
Total	60

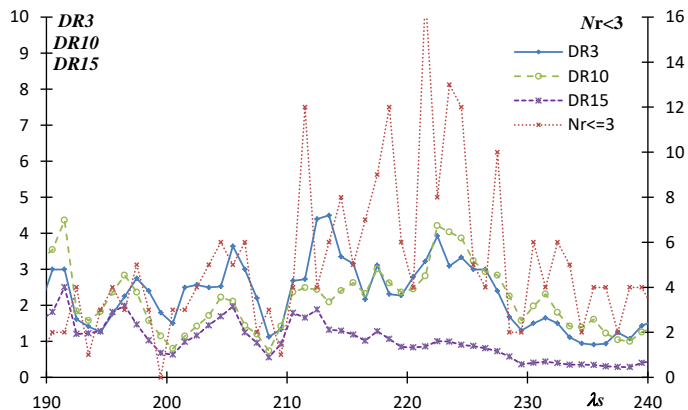
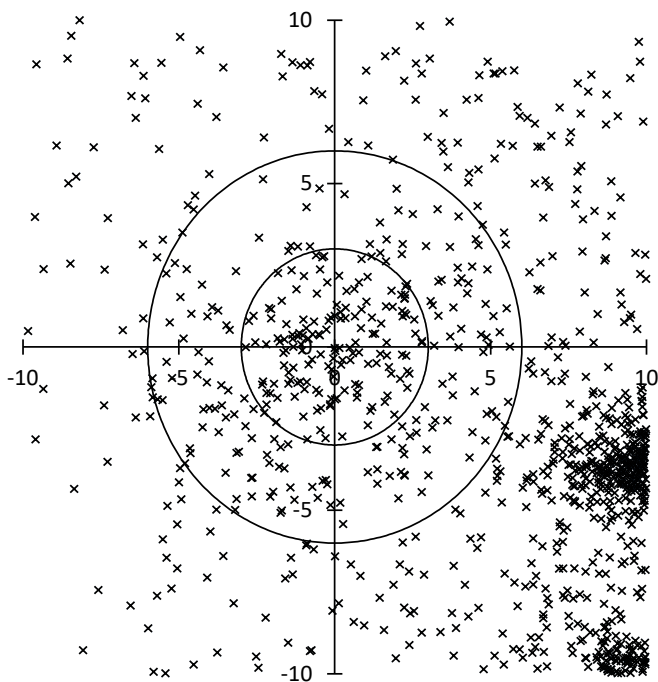




#0388CTA

chi Taurids

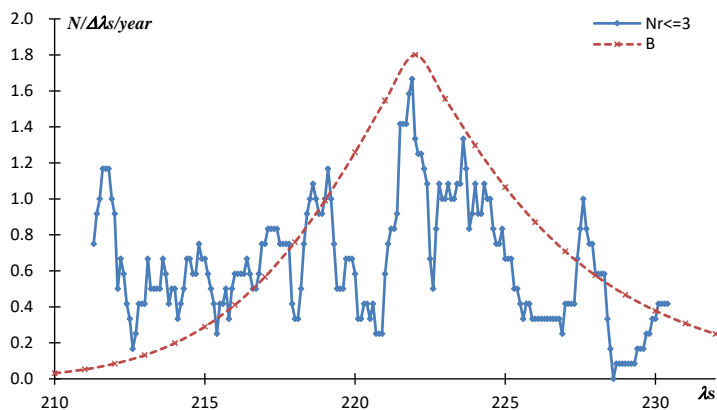
$\alpha=63.2, \delta=24.7, \lambda_s=220.0$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
CTA01	221	204.9	5.0
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	221.5	17	
DR3	213.5	4.5	
DR10	222.5	4.2	
DR15	212.5	1.9	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
210	206.6	5.7	52.8	24.9	42.3	0.983	0.079	20.7	328.9	210.0	180.5	-10.5	4.79
211	206.4	5.7	53.7	25.1	42.1	0.982	0.082	20.4	328.4	211.0	181.1	-10.5	4.66
212	206.3	5.7	54.6	25.3	42.0	0.981	0.084	20.0	328.0	212.0	181.6	-10.4	4.53
213	206.1	5.7	55.5	25.5	41.8	0.980	0.086	19.7	327.6	213.0	182.2	-10.4	4.41
214	206.0	5.7	56.4	25.7	41.6	0.979	0.089	19.4	327.2	214.0	182.7	-10.3	4.30
215	205.8	5.8	57.4	25.9	41.4	0.978	0.091	19.0	326.8	215.0	183.3	-10.3	4.19
216	205.7	5.8	58.3	26.1	41.2	0.977	0.094	18.7	326.4	216.0	183.8	-10.2	4.09
217	205.5	5.8	59.2	26.3	41.1	0.976	0.096	18.4	326.0	217.0	184.4	-10.2	3.99
218	205.4	5.8	60.1	26.5	40.9	0.975	0.099	18.2	325.6	218.0	184.9	-10.1	3.90
219	205.2	5.8	61.1	26.7	40.7	0.974	0.101	17.9	325.2	219.0	185.5	-10.1	3.82
220	205.1	5.8	62.0	26.9	40.5	0.972	0.104	17.6	324.8	220.0	186.0	-10.0	3.73
221	204.9	5.8	62.9	27.0	40.3	0.971	0.106	17.3	324.4	221.0	186.6	-10.0	3.65
222	204.8	5.8	63.9	27.2	40.1	0.970	0.109	17.1	324.0	222.0	187.2	-9.9	3.58
223	204.7	5.8	64.8	27.3	40.0	0.968	0.111	16.8	323.6	223.0	187.7	-9.9	3.51
224	204.5	5.9	65.7	27.5	39.8	0.967	0.114	16.6	323.2	224.0	188.3	-9.9	3.44
225	204.4	5.9	66.7	27.6	39.6	0.965	0.117	16.3	322.8	225.0	188.9	-9.8	3.37
226	204.2	5.9	67.6	27.8	39.4	0.964	0.119	16.1	322.4	226.0	189.5	-9.8	3.31
227	204.1	5.9	68.6	27.9	39.2	0.962	0.122	15.9	322.0	227.0	190.0	-9.7	3.25
228	203.9	5.9	69.5	28.1	39.1	0.961	0.125	15.7	321.6	228.0	190.6	-9.7	3.19
229	203.8	5.9	70.5	28.2	38.9	0.959	0.128	15.4	321.2	229.0	191.2	-9.6	3.13
230	203.6	5.9	71.4	28.3	38.7	0.958	0.130	15.2	320.8	230.0	191.8	-9.6	3.08

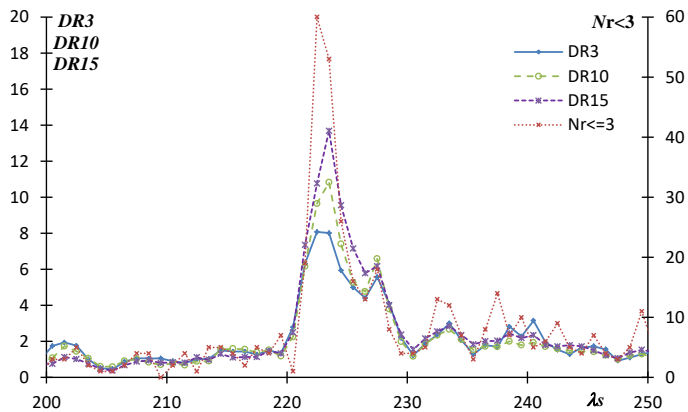
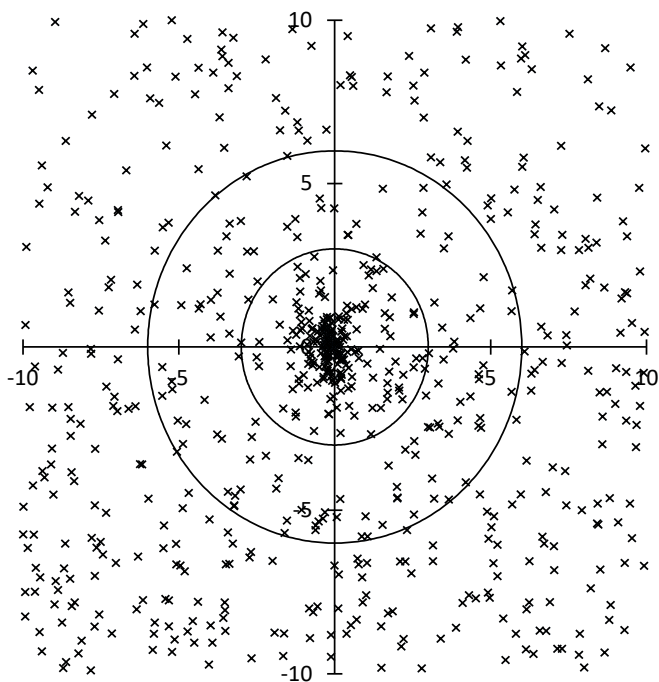
Year	N
2007	3
2008	9
2009	20
2010	10
2011	14
2012	12
2013	12
2014	17
2015	10
2016	14
2017	20
2018	11
Total	152



#0445KUM

kappa Ursae Majorids

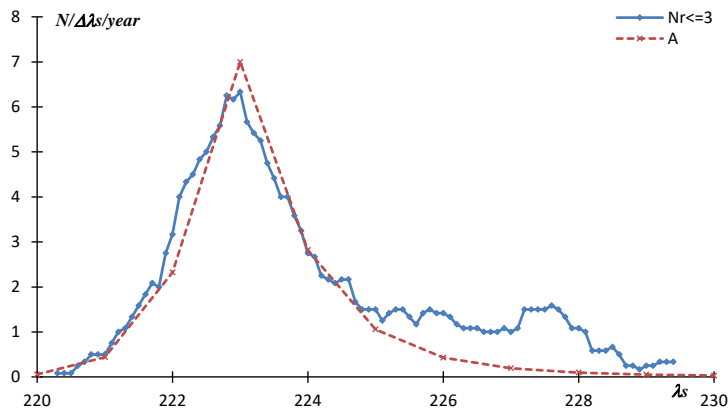
$\alpha=147.2, \delta=45.0, \lambda_s=225.0$

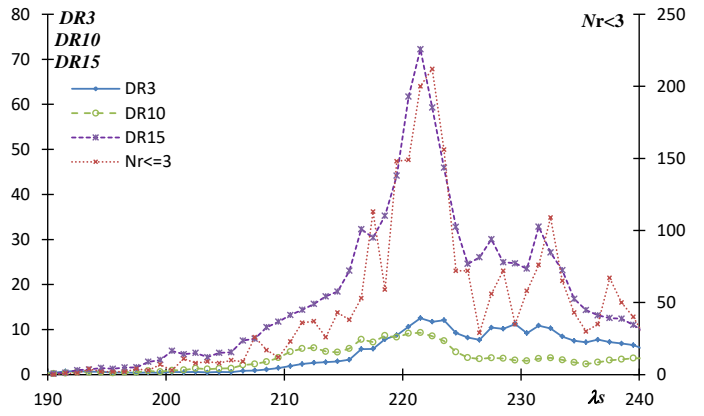
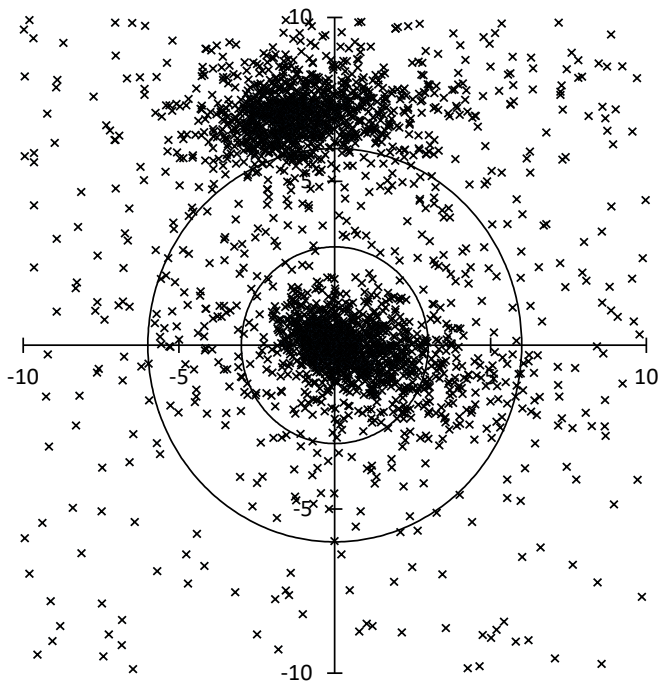


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
KUM00	225	268.2	29.8
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	222.5	60	
DR3	222.5	8.1	
DR10	223.5	10.8	
DR15	223.5	13.7	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
215	268.2	29.6	135.3	48.0	66.3	1.069	0.991	130.2	185.9	215.0	31.2	-4.5	-14.38
216	268.1	29.6	136.4	47.7	66.1	1.049	0.990	130.1	186.1	216.0	32.0	-4.7	-20.34
217	268.1	29.6	137.6	47.4	65.9	1.029	0.990	130.0	186.3	217.0	32.9	-4.9	-34.61
218	268.0	29.6	138.7	47.1	65.7	1.009	0.989	129.9	186.6	218.0	33.8	-5.0	-114.31
219	268.0	29.6	139.8	46.8	65.5	0.989	0.989	129.8	186.8	219.0	34.7	-5.2	88.66
220	267.9	29.6	140.9	46.5	65.3	0.969	0.989	129.7	187.0	220.0	35.5	-5.4	32.06
221	267.8	29.5	142.1	46.2	65.1	0.950	0.988	129.6	187.2	221.0	36.4	-5.6	19.62
222	267.8	29.5	143.2	45.9	64.9	0.930	0.988	129.5	187.5	222.0	37.2	-5.8	14.15
223	267.7	29.5	144.2	45.6	64.7	0.911	0.987	129.4	187.7	223.0	38.1	-6.0	11.09
224	267.7	29.5	145.3	45.3	64.4	0.892	0.987	129.3	188.0	224.0	38.9	-6.2	9.12
225	267.6	29.5	146.4	45.0	64.2	0.873	0.986	129.2	188.2	225.0	39.8	-6.4	7.75
226	267.6	29.5	147.5	44.6	64.0	0.854	0.986	129.1	188.5	226.0	40.6	-6.6	6.75
227	267.5	29.5	148.5	44.3	63.8	0.835	0.985	129.0	188.8	227.0	41.4	-6.8	5.98
228	267.5	29.5	149.6	44.0	63.6	0.817	0.985	128.9	189.1	228.0	42.3	-7.1	5.37
229	267.4	29.5	150.6	43.6	63.4	0.798	0.984	128.8	189.4	229.0	43.1	-7.3	4.88
230	267.3	29.4	151.6	43.3	63.2	0.780	0.984	128.7	189.7	230.0	43.9	-7.5	4.47
231	267.3	29.4	152.7	43.0	63.0	0.762	0.983	128.6	190.0	231.0	44.7	-7.8	4.13
232	267.2	29.4	153.7	42.6	62.8	0.744	0.982	128.5	190.3	232.0	45.5	-8.1	3.83
233	267.2	29.4	154.7	42.3	62.6	0.726	0.982	128.4	190.7	233.0	46.3	-8.3	3.58
234	267.1	29.4	155.7	41.9	62.3	0.708	0.981	128.3	191.0	234.0	47.1	-8.6	3.36
235	267.1	29.4	156.7	41.6	62.1	0.690	0.981	128.1	191.4	235.0	47.9	-8.9	3.17

Year	N
2007	0
2008	18
2009	26
2010	32
2011	3
2012	14
2013	17
2014	16
2015	18
2016	27
2017	34
2018	13
Total	218

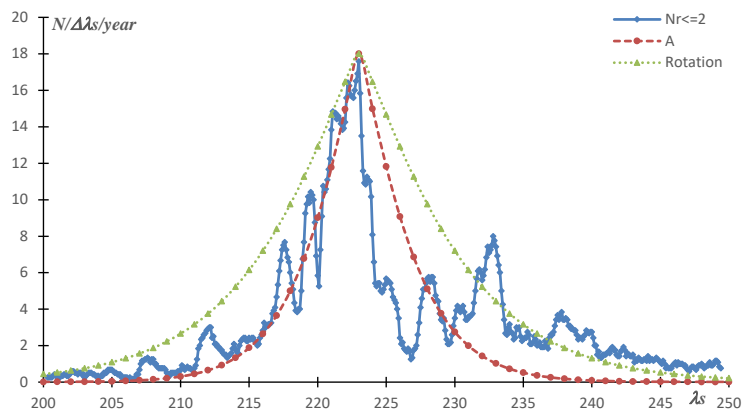




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
*SF	221.5	190.7	-5.0
$\Delta r=$	2		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	222.5	212	
DR3	221.5	12.5	
DR10	221.5	9.3	
DR15	221.5	72.2	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
200	202.5	-3.0	41.0	12.7	34.1	0.911	0.169	6.1	138.0	20.0	158.2	4.1	1.89
205	200.2	-3.4	43.7	13.1	32.7	0.892	0.208	6.0	132.7	25.0	157.9	4.4	1.93
206	199.7	-3.5	44.3	13.2	32.4	0.889	0.216	5.9	131.6	26.0	157.8	4.4	1.94
207	199.2	-3.6	44.8	13.3	32.2	0.885	0.224	5.9	130.6	27.0	157.7	4.5	1.95
208	198.8	-3.6	45.4	13.4	31.9	0.881	0.232	5.9	129.5	28.0	157.7	4.5	1.96
209	198.3	-3.7	45.9	13.5	31.6	0.877	0.241	5.8	128.5	29.0	157.6	4.6	1.96
210	197.9	-3.8	46.5	13.5	31.3	0.873	0.249	5.8	127.4	30.0	157.5	4.6	1.97
215	195.6	-4.1	49.3	13.9	29.9	0.854	0.293	5.6	122.1	35.0	157.2	4.8	2.00
218	194.2	-4.3	50.9	14.1	29.1	0.842	0.319	5.5	118.9	38.0	157.1	4.8	2.02
219	193.7	-4.4	51.5	14.2	28.8	0.838	0.328	5.5	117.9	39.0	157.0	4.8	2.02
220	193.3	-4.5	52.0	14.2	28.6	0.834	0.337	5.4	116.8	40.0	157.0	4.8	2.03
221	192.8	-4.6	52.6	14.3	28.3	0.830	0.346	5.4	115.8	41.0	156.9	4.9	2.03
222	192.3	-4.6	53.1	14.4	28.0	0.825	0.355	5.4	114.8	42.0	156.9	4.9	2.04
223	191.9	-4.7	53.7	14.4	27.7	0.821	0.365	5.3	113.7	43.0	156.8	4.9	2.04
224	191.4	-4.8	54.2	14.5	27.4	0.817	0.374	5.3	112.7	44.0	156.8	4.9	2.04
225	190.9	-4.8	54.8	14.5	27.2	0.813	0.383	5.2	111.7	45.0	156.7	4.9	2.04
230	188.6	-5.2	57.6	14.8	25.8	0.791	0.428	5.1	106.5	50.0	156.6	4.9	2.05
235	186.3	-5.5	60.3	15.0	24.4	0.769	0.473	4.9	101.5	55.0	156.5	4.8	2.05
240	184.0	-5.8	63.1	15.2	23.0	0.745	0.518	4.7	96.5	60.0	156.6	4.6	2.03
245	181.7	-6.1	65.9	15.4	21.6	0.720	0.561	4.5	91.7	65.0	156.7	4.5	2.00
250	179.4	-6.4	68.7	15.5	20.2	0.693	0.603	4.3	87.0	70.0	157.0	4.3	1.97

Year	N
2007	17
2008	170
2009	43
2010	40
2011	27
2012	160
2013	31
2014	12
2015	359
2016	31
2017	48
2018	94
Total	1032

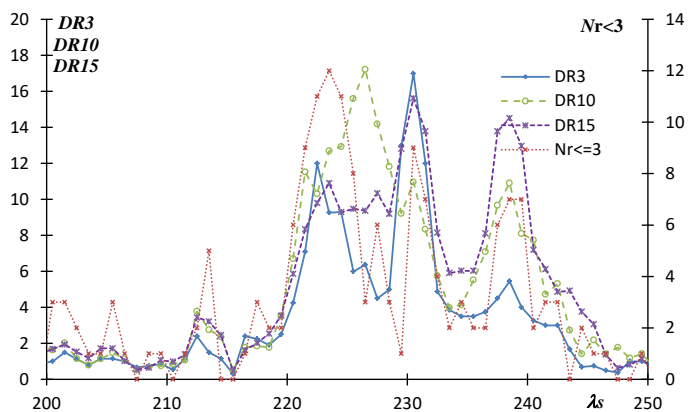
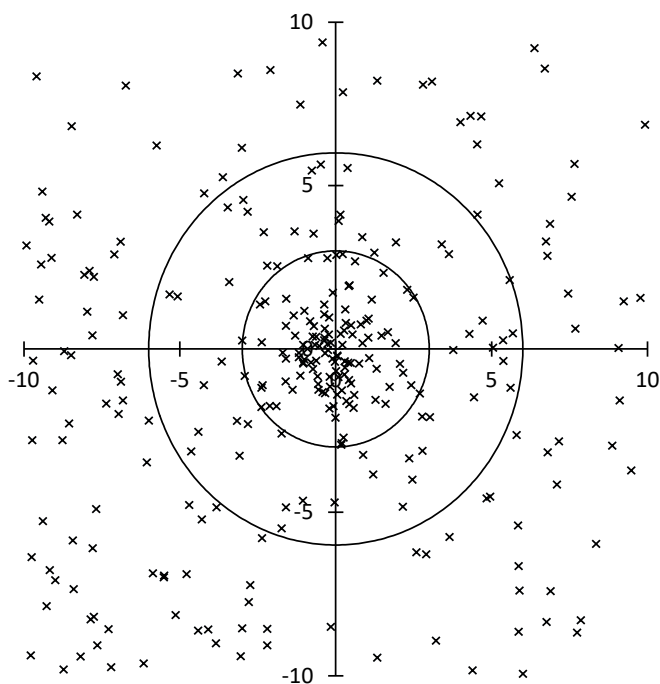


#0018AND

Andromedids

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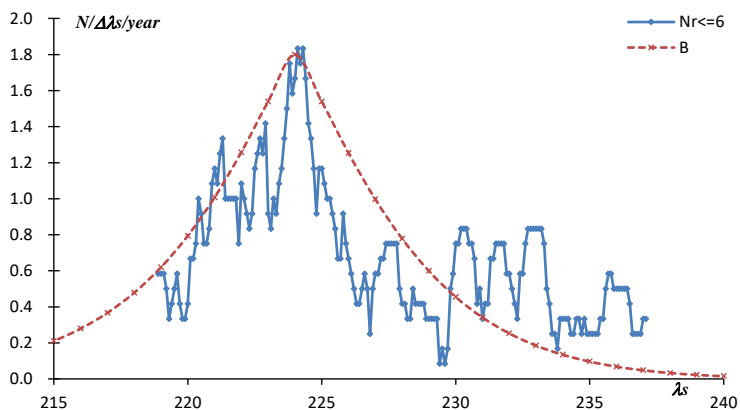
[注釈を読む](#)

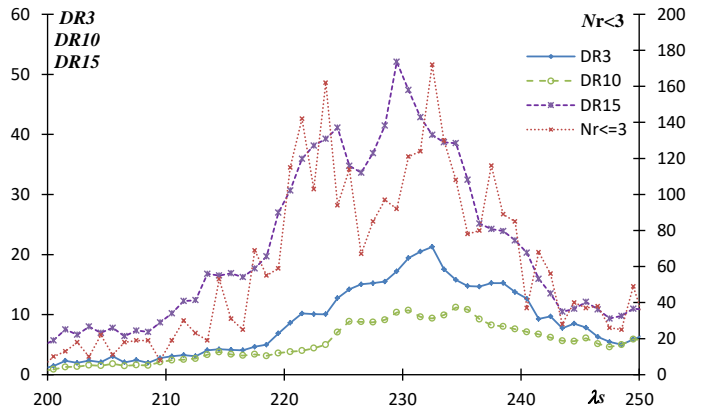
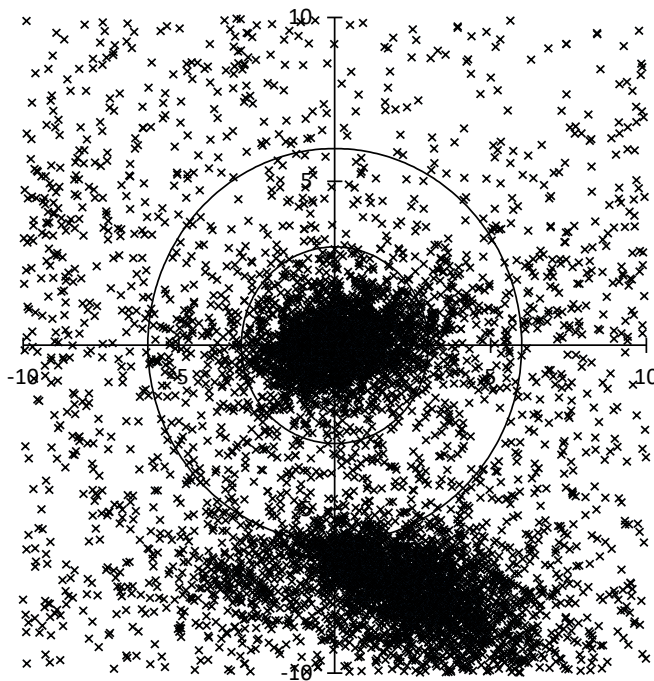


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
AND01	228.6	163.4	18.8
$\Delta r=$	6		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	223.5	12	
DR3	230.5	17.0	
DR10	226.5	17.2	
DR15	230.5	15.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
210	172.5	10.3	16.8	18.3	20.9	0.796	0.670	6.6	254.8	210.0	104.7	-6.3	3.28
215	170.2	13.0	18.2	21.8	19.9	0.781	0.705	7.7	250.3	215.0	105.1	-7.2	3.22
220	167.8	15.7	19.6	25.3	18.9	0.765	0.738	8.6	245.8	220.0	105.6	-7.8	3.14
221	167.3	16.2	19.9	26.0	18.7	0.761	0.745	8.7	245.0	221.0	105.7	-7.9	3.12
222	166.8	16.8	20.2	26.6	18.5	0.757	0.751	8.9	244.1	222.0	105.8	-8.0	3.09
223	166.3	17.3	20.4	27.3	18.3	0.753	0.757	9.0	243.2	223.0	105.9	-8.1	3.07
224	165.8	17.8	20.7	28.0	18.1	0.749	0.764	9.2	242.4	224.0	106.1	-8.1	3.04
225	165.3	18.4	21.0	28.7	17.9	0.745	0.770	9.3	241.5	225.0	106.2	-8.2	3.02
226	164.8	18.9	21.2	29.3	17.7	0.741	0.776	9.4	240.7	226.0	106.3	-8.2	2.99
227	164.3	19.4	21.5	30.0	17.5	0.736	0.782	9.5	239.8	227.0	106.5	-8.2	2.96
228	163.8	20.0	21.7	30.7	17.3	0.732	0.787	9.7	239.0	228.0	106.6	-8.3	2.93
229	163.3	20.5	22.0	31.3	17.1	0.727	0.793	9.8	238.1	229.0	106.8	-8.3	2.91
230	162.8	21.0	22.2	32.0	16.9	0.722	0.799	9.9	237.3	230.0	106.9	-8.3	2.88
231	162.2	21.5	22.5	32.6	16.7	0.717	0.804	10.0	236.5	231.0	107.1	-8.3	2.85
232	161.7	22.0	22.7	33.3	16.5	0.712	0.810	10.0	235.7	232.0	107.3	-8.3	2.81
233	161.2	22.6	22.9	33.9	16.3	0.707	0.815	10.1	234.9	233.0	107.4	-8.3	2.78
234	160.7	23.1	23.2	34.6	16.1	0.702	0.821	10.2	234.0	234.0	107.6	-8.2	2.75
235	160.1	23.6	23.4	35.2	15.9	0.696	0.826	10.3	233.2	235.0	107.8	-8.2	2.72
240	157.4	26.1	24.5	38.4	14.8	0.667	0.850	10.5	229.3	240.0	108.8	-7.9	2.55
245	154.5	28.6	25.4	41.4	13.8	0.635	0.872	10.6	225.5	245.0	110.0	-7.5	2.39
250	151.5	31.1	26.2	44.4	12.8	0.599	0.892	10.6	221.7	250.0	111.2	-7.0	2.23

Year	N
2007	7
2008	12
2009	20
2010	23
2011	6
2012	12
2013	6
2014	11
2015	17
2016	20
2017	17
2018	16
Total	167

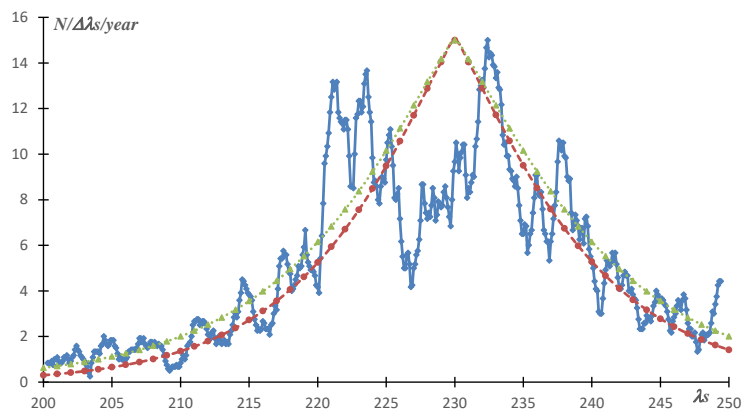




Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
*NTA	228	191.7	2.1
$\Delta r =$	3		
$\Delta \lambda_s =$	20		
	$\lambda_s$	max	
Nr<=3	223.5	162	
DR3	231.5	20.5	
DR10	230.5	10.7	
DR15	229.5	52.1	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
200	199.4	2.0	36.3	16.5	32.0	0.883	0.222	3.3	311.1	200.0	151.2	-2.5	1.90
205	198.0	2.0	39.9	17.7	31.2	0.873	0.245	3.2	308.1	205.0	153.1	-2.5	1.93
210	196.7	2.1	43.6	18.9	30.5	0.863	0.270	3.1	305.0	210.0	155.1	-2.5	1.96
215	195.4	2.2	47.3	20.0	29.8	0.852	0.294	3.0	302.0	215.0	157.0	-2.5	1.99
220	194.1	2.3	51.1	21.0	29.0	0.842	0.319	2.9	299.0	220.0	159.0	-2.5	2.01
222	193.5	2.3	52.6	21.4	28.7	0.837	0.329	2.8	297.8	222.0	159.8	-2.5	2.02
223	193.3	2.3	53.4	21.6	28.6	0.835	0.334	2.8	297.2	223.0	160.2	-2.5	2.03
224	193.0	2.3	54.1	21.8	28.5	0.833	0.339	2.8	296.6	224.0	160.6	-2.5	2.03
225	192.7	2.4	54.9	22.0	28.3	0.831	0.344	2.8	296.0	225.0	161.0	-2.5	2.04
226	192.5	2.4	55.7	22.1	28.2	0.829	0.349	2.8	295.4	226.0	161.4	-2.5	2.04
227	192.2	2.4	56.4	22.3	28.0	0.827	0.354	2.8	294.8	227.0	161.8	-2.5	2.04
228	191.9	2.4	57.2	22.5	27.9	0.824	0.360	2.8	294.2	228.0	162.2	-2.5	2.05
229	191.7	2.4	58.0	22.7	27.7	0.822	0.365	2.7	293.6	229.0	162.6	-2.5	2.05
230	191.4	2.4	58.7	22.8	27.6	0.820	0.370	2.7	293.0	230.0	163.0	-2.5	2.06
231	191.1	2.5	59.5	23.0	27.4	0.818	0.375	2.7	292.4	231.0	163.4	-2.5	2.06
232	190.9	2.5	60.3	23.2	27.3	0.816	0.380	2.7	291.8	232.0	163.8	-2.5	2.06
233	190.6	2.5	61.1	23.3	27.1	0.814	0.385	2.7	291.2	233.0	164.2	-2.5	2.07
235	190.1	2.5	62.6	23.6	26.8	0.809	0.395	2.6	290.0	235.0	165.0	-2.5	2.07
240	188.8	2.6	66.6	24.3	26.1	0.798	0.421	2.6	287.1	240.0	167.1	-2.5	2.08
245	187.4	2.7	70.6	24.9	25.4	0.787	0.446	2.5	284.1	245.0	169.2	-2.4	2.09
250	186.1	2.7	74.6	25.4	24.6	0.775	0.471	2.4	281.3	250.0	171.3	-2.4	2.10

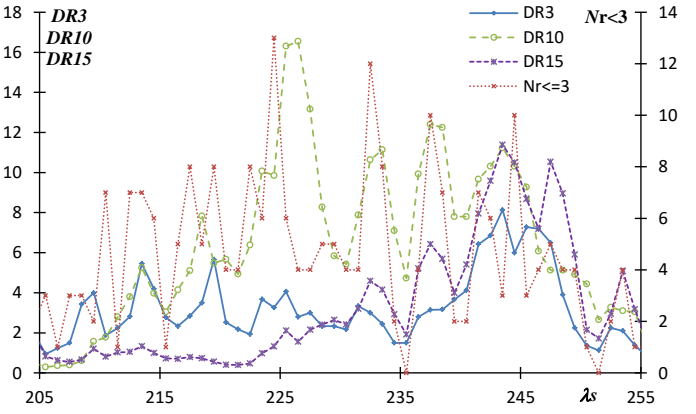
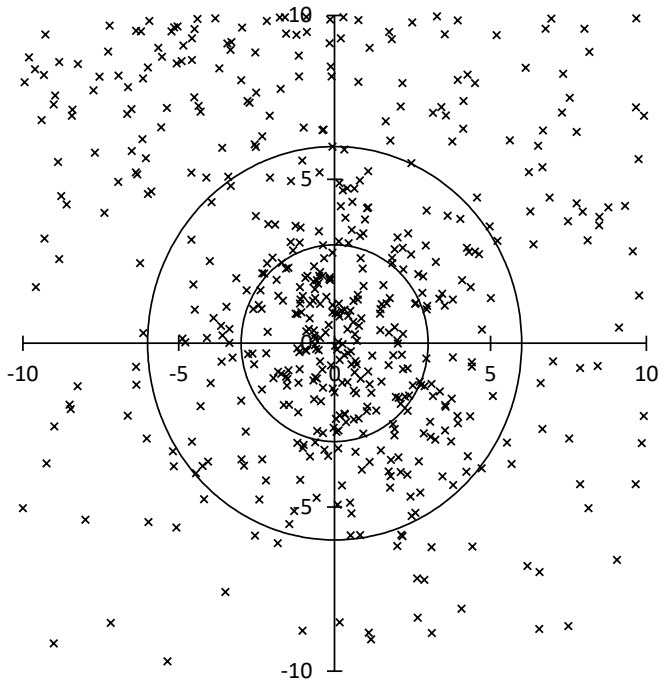
Year	N
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2008	202
2009	273
2010	291
2011	196
2012	272
2013	217
2014	250
2015	163
2016	237
2017	334
2018	303
Total	2916



#0338OER

omicron Eridanids

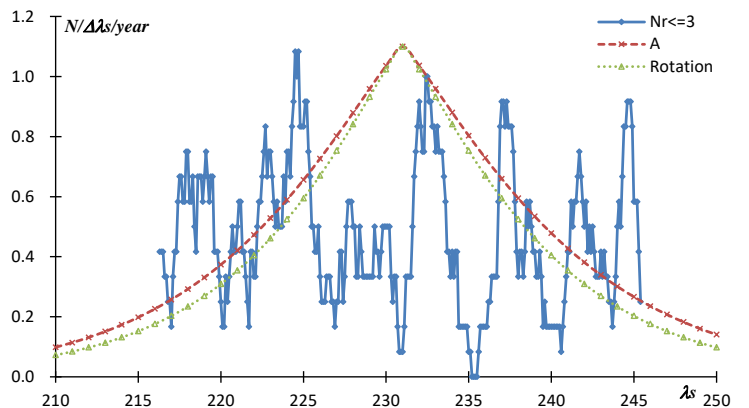
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Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
OER02	*231	184.4	-21.5
$\Delta r =$	3		
$\Delta \lambda_s =$	15		
	$\lambda_s$	max	
$Nr \leq 3$	224.5	13	
DR3	243.5	8.1	
DR10	226.5	16.5	
DR15	243.5	11.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
210	191.5	-15.1	43.7	0.9	30.5	0.881	0.381	18.3	108.6	30.0	139.5	17.3	3.19
215	190.0	-16.4	47.3	0.6	29.9	0.876	0.413	18.7	104.6	35.0	140.3	18.1	3.33
220	188.5	-17.8	50.9	0.2	29.2	0.872	0.445	19.0	100.6	40.0	141.2	18.7	3.47
223	187.6	-18.6	53.0	-0.1	28.8	0.869	0.465	19.2	98.2	43.0	141.7	19.0	3.55
224	187.3	-18.9	53.7	-0.2	28.7	0.868	0.471	19.2	97.4	44.0	141.9	19.1	3.58
225	187.0	-19.2	54.4	-0.3	28.5	0.868	0.477	19.3	96.6	45.0	142.0	19.1	3.60
226	186.7	-19.4	55.1	-0.4	28.4	0.867	0.484	19.3	95.9	46.0	142.2	19.2	3.63
227	186.4	-19.7	55.8	-0.5	28.3	0.866	0.490	19.4	95.1	47.0	142.4	19.3	3.66
228	186.1	-20.0	56.5	-0.6	28.1	0.865	0.496	19.4	94.3	48.0	142.6	19.3	3.68
229	185.8	-20.2	57.2	-0.7	28.0	0.864	0.503	19.4	93.5	49.0	142.7	19.4	3.71
230	185.4	-20.5	57.9	-0.8	27.9	0.864	0.509	19.5	92.8	50.0	142.9	19.4	3.74
231	185.1	-20.8	58.6	-1.0	27.7	0.863	0.515	19.5	92.0	51.0	143.1	19.5	3.76
232	184.8	-21.0	59.3	-1.1	27.6	0.862	0.521	19.5	91.2	52.0	143.3	19.5	3.79
233	184.5	-21.3	59.9	-1.2	27.5	0.862	0.528	19.5	90.5	53.0	143.5	19.5	3.81
234	184.2	-21.6	60.6	-1.3	27.3	0.861	0.534	19.6	89.7	54.0	143.7	19.6	3.84
235	183.8	-21.8	61.3	-1.5	27.2	0.860	0.540	19.6	88.9	55.0	143.9	19.6	3.86
236	183.5	-22.1	62.0	-1.6	27.0	0.859	0.546	19.6	88.2	56.0	144.1	19.6	3.88
237	183.2	-22.4	62.6	-1.7	26.9	0.859	0.552	19.6	87.4	57.0	144.3	19.6	3.91
240	182.2	-23.2	64.6	-2.1	26.5	0.857	0.570	19.6	85.2	60.0	144.9	19.6	3.97
245	180.6	-24.4	67.9	-2.9	25.8	0.853	0.599	19.7	81.5	65.0	146.0	19.4	4.08
250	178.9	-25.7	71.0	-3.7	25.2	0.849	0.628	19.6	77.9	70.0	147.2	19.2	4.16

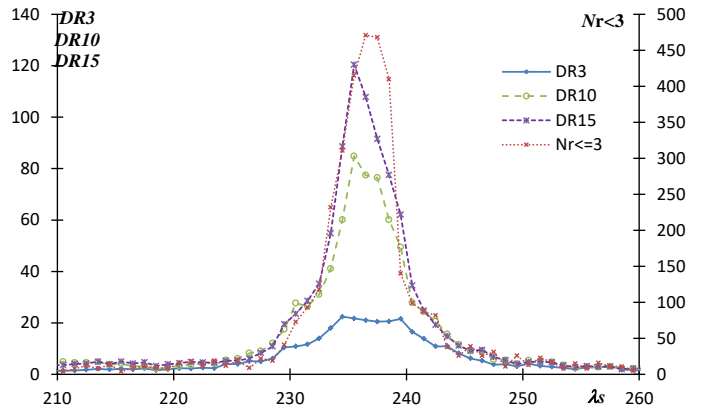
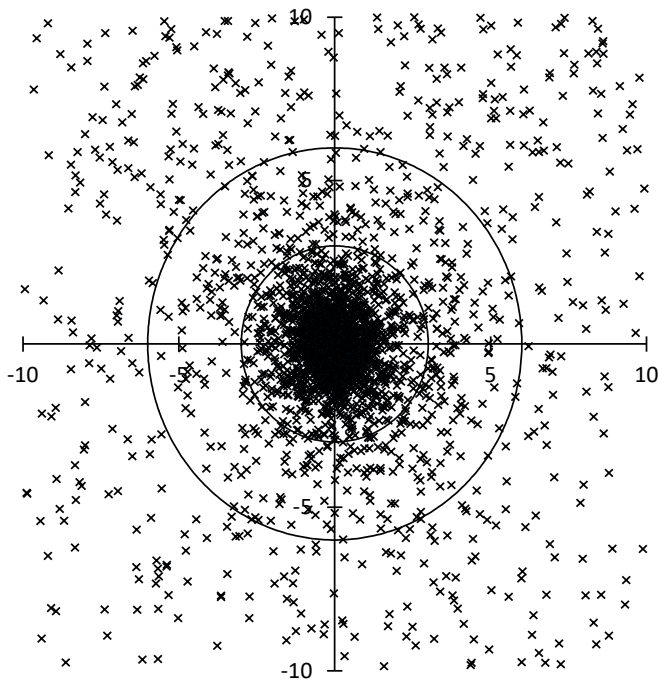
Year	N
2007	12
2008	14
2009	15
2010	16
2011	15
2012	11
2013	14
2014	12
2015	11
2016	10
2017	23
2018	16
Total	169



#0013LEO

Leonids

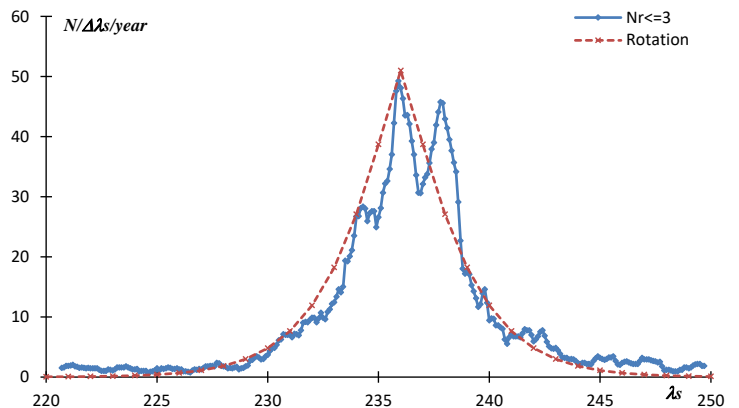
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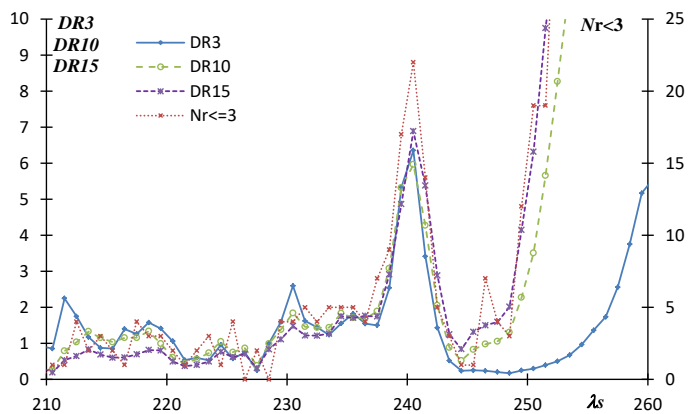
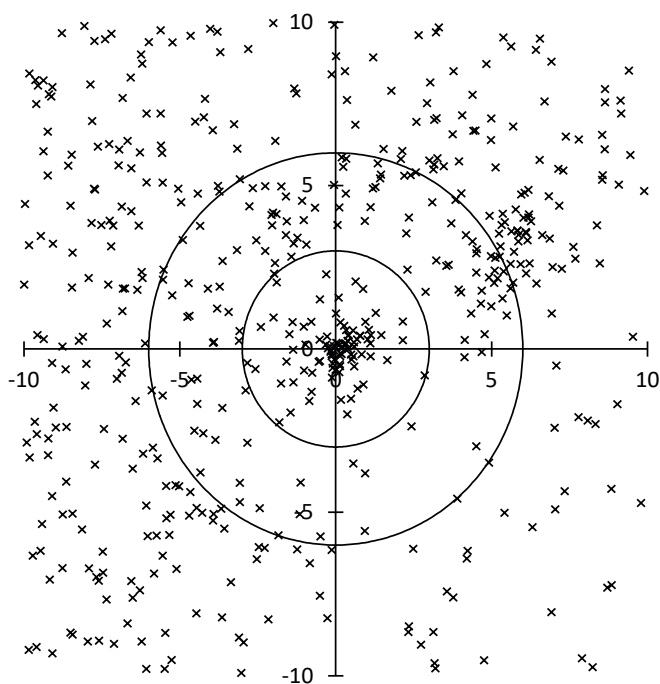


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
LEO04	235.4	272.3	10.2
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	236.5	471	
DR3	234.5	22.4	
DR10	235.5	84.8	
DR15	235.5	120.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
220	277.4	13.0	144.3	28.0	69.0	0.855	0.948	157.0	154.6	220.0	63.6	9.7	6.56
225	275.8	12.2	147.5	26.0	69.3	0.850	0.964	158.7	160.2	225.0	63.6	7.1	6.41
230	274.2	11.3	150.6	24.1	69.6	0.849	0.976	160.3	165.9	230.0	63.3	4.7	6.45
231	273.9	11.1	151.2	23.7	69.7	0.849	0.978	160.6	167.0	231.0	63.3	4.3	6.48
232	273.6	10.9	151.8	23.3	69.8	0.850	0.980	160.9	168.2	232.0	63.2	3.8	6.53
233	273.2	10.8	152.4	22.9	69.8	0.851	0.981	161.2	169.3	233.0	63.1	3.4	6.57
234	272.9	10.6	153.0	22.5	69.9	0.852	0.983	161.6	170.5	234.0	63.1	3.0	6.63
235	272.6	10.4	153.6	22.1	70.0	0.853	0.984	161.9	171.6	235.0	63.0	2.6	6.70
236	272.3	10.2	154.2	21.6	70.0	0.855	0.985	162.2	172.8	236.0	62.9	2.2	6.78
237	272.0	10.1	154.8	21.2	70.1	0.856	0.986	162.5	173.9	237.0	62.8	1.8	6.87
238	271.6	9.9	155.4	20.8	70.2	0.858	0.986	162.8	175.1	238.0	62.7	1.5	6.97
239	271.3	9.7	156.0	20.4	70.2	0.861	0.987	163.1	176.2	239.0	62.6	1.1	7.08
240	271.0	9.5	156.6	20.0	70.3	0.863	0.987	163.5	177.4	240.0	62.5	0.8	7.21
241	270.7	9.3	157.2	19.6	70.4	0.866	0.987	163.8	178.5	241.0	62.4	0.4	7.35
242	270.4	9.2	157.8	19.2	70.4	0.869	0.987	164.1	179.6	242.0	62.3	0.1	7.51
243	270.0	9.0	158.4	18.7	70.5	0.872	0.987	164.4	180.8	243.0	62.3	-0.2	7.69
244	269.7	8.8	159.0	18.3	70.6	0.875	0.987	164.7	181.9	244.0	62.2	-0.5	7.89
245	269.4	8.6	159.6	17.9	70.6	0.878	0.986	165.0	183.0	245.0	62.1	-0.8	8.11
246	269.1	8.4	160.2	17.5	70.7	0.882	0.985	165.4	184.2	246.0	62.0	-1.0	8.36
247	268.8	8.3	160.7	17.1	70.8	0.886	0.984	165.7	185.3	247.0	61.9	-1.3	8.64
250	267.8	7.7	162.5	15.8	71.0	0.899	0.981	166.6	188.6	250.0	61.7	-2.0	9.72

Year	N
2007	390
2008	225
2009	165
2010	314
2011	144
2012	191
2013	278
2014	266
2015	72
2016	184
2017	286
2018	269
Total	2784

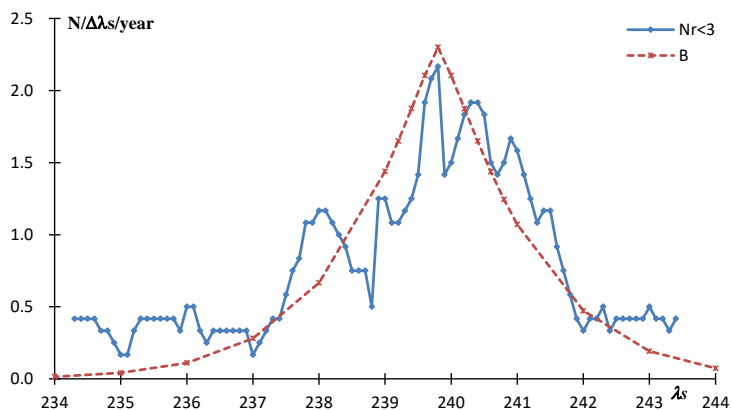




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
AMO01	239	239.7	-19.9
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	240.5	22	
DR3	240.5	6.4	
DR10	240.5	6.0	
DR15	240.5	6.9	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
230	243.3	-21.7	111.5	0.0	61.3	0.895	0.552	132.4	86.4	50.0	325.4	47.5	5.28
235	241.4	-20.9	114.6	0.4	61.4	0.927	0.510	132.9	90.4	55.0	324.5	47.1	7.00
236	241.1	-20.7	115.2	0.4	61.5	0.933	0.502	132.9	91.1	56.0	324.3	47.0	7.51
237	240.7	-20.5	115.8	0.5	61.5	0.939	0.494	133.0	91.9	57.0	324.2	46.9	8.12
238	240.3	-20.3	116.4	0.6	61.5	0.945	0.486	133.1	92.7	58.0	324.1	46.8	8.85
239	240.0	-20.1	117.1	0.6	61.6	0.951	0.478	133.2	93.4	59.0	324.0	46.7	9.74
239.2	239.9	-20.1	117.2	0.6	61.6	0.952	0.476	133.2	93.6	59.2	324.0	46.7	9.94
239.4	239.8	-20.1	117.3	0.6	61.6	0.953	0.474	133.2	93.7	59.4	324.0	46.6	10.15
239.6	239.8	-20.0	117.4	0.7	61.6	0.954	0.473	133.2	93.9	59.6	323.9	46.6	10.37
239.8	239.7	-20.0	117.6	0.7	61.6	0.956	0.471	133.3	94.0	59.8	323.9	46.6	10.60
240	239.6	-20.0	117.7	0.7	61.6	0.957	0.470	133.3	94.2	60.0	323.9	46.6	10.84
240.2	239.5	-19.9	117.8	0.7	61.6	0.958	0.468	133.3	94.3	60.2	323.9	46.5	11.10
240.4	239.5	-19.9	117.9	0.7	61.6	0.959	0.466	133.3	94.5	60.4	323.9	46.5	11.37
240.6	239.4	-19.8	118.1	0.7	61.6	0.960	0.465	133.3	94.6	60.6	323.9	46.5	11.65
240.8	239.3	-19.8	118.2	0.7	61.6	0.961	0.463	133.4	94.8	60.8	323.9	46.4	11.94
240	239.6	-20.0	117.7	0.7	61.6	0.957	0.470	133.3	94.2	60.0	323.9	46.6	10.84
241	239.3	-19.8	118.3	0.7	61.6	0.962	0.462	133.4	94.9	61.0	323.8	46.4	12.26
242	238.9	-19.6	118.9	0.8	61.7	0.968	0.454	133.5	95.7	62.0	323.8	46.3	14.12
243	238.5	-19.4	119.6	0.9	61.7	0.973	0.446	133.5	96.4	63.0	323.7	46.1	16.71
244	238.2	-19.2	120.2	0.9	61.7	0.979	0.438	133.6	97.2	64.0	323.7	45.9	20.52
245	237.8	-19.0	120.8	1.0	61.8	0.984	0.430	133.7	97.9	65.0	323.7	45.7	26.69

Year	N
2007	7
2008	5
2009	10
2010	4
2011	11
2012	5
2013	17
2014	14
2015	3
2016	5
2017	2
2018	8
Total	91

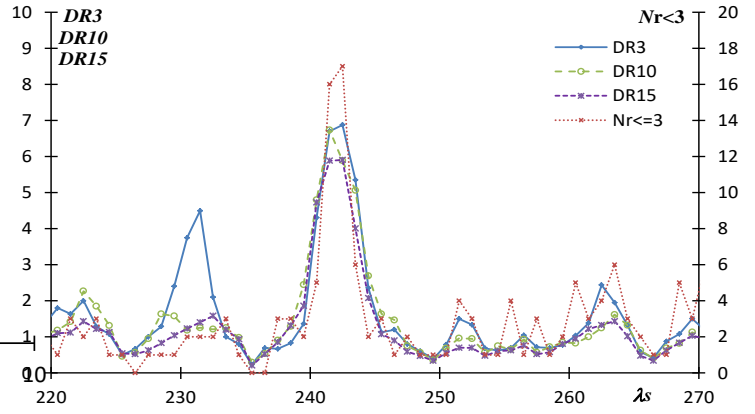
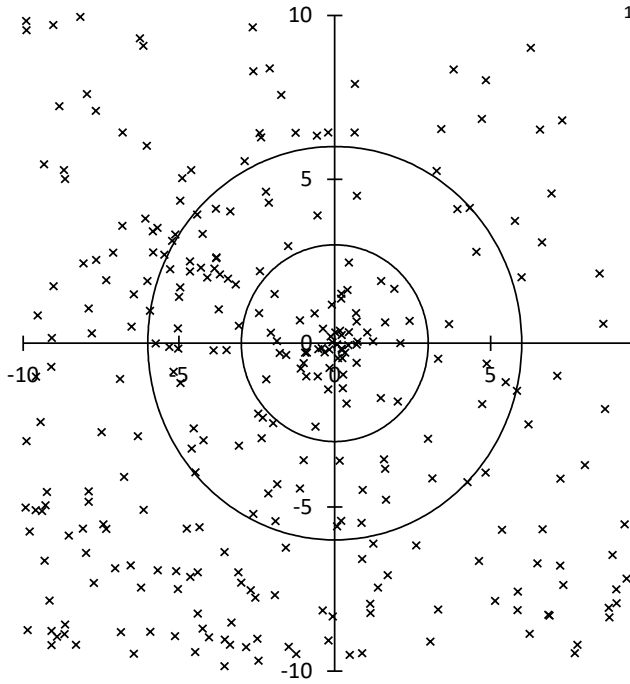




#0488NSU

November sigma Ursae Majorids

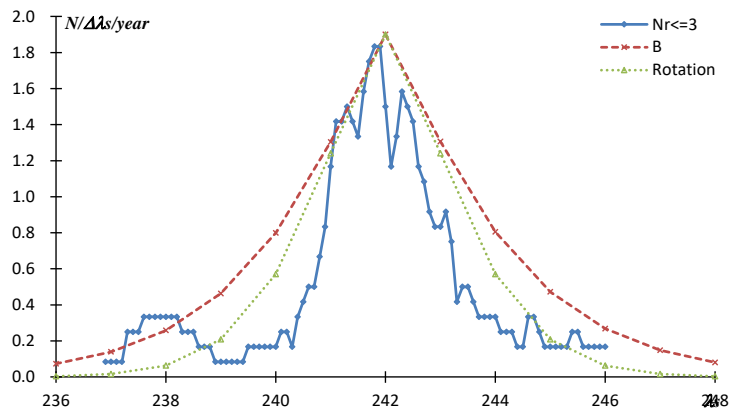
$\alpha=148.3, \delta=59.2, \lambda_s=241.6$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
NSU00	241.6	244.9	42.9
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$Nr \leq 3$	242.5	17	
DR3	242.5	6.9	
DR10	241.5	6.7	
DR15	242.5	5.9	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
235	244.5	43.9	139.8	62.3	50.8	0.748	0.788	94.8	238.3	235.0	47.4	-57.9	3.13
236	244.6	43.7	141.2	61.9	51.3	0.771	0.791	95.4	237.2	236.0	47.7	-56.8	3.46
237	244.6	43.6	142.5	61.4	51.9	0.794	0.794	96.1	236.2	237.0	48.0	-55.7	3.86
238	244.7	43.4	143.8	60.9	52.4	0.818	0.797	96.7	235.2	238.0	48.5	-54.6	4.39
239	244.8	43.3	145.1	60.4	52.9	0.843	0.800	97.4	234.2	239.0	48.9	-53.5	5.08
240	244.9	43.2	146.4	60.0	53.4	0.868	0.803	98.0	233.3	240.0	49.4	-52.5	6.07
241	244.9	43.0	147.6	59.5	54.0	0.893	0.806	98.6	232.4	241.0	50.0	-51.6	7.55
242	245.0	42.9	148.9	59.0	54.5	0.919	0.808	99.2	231.5	242.0	50.6	-50.6	10.03
243	245.1	42.7	150.1	58.5	55.0	0.946	0.811	99.8	230.7	243.0	51.2	-49.7	15.07
244	245.1	42.6	151.3	58.0	55.5	0.974	0.813	100.4	229.9	244.0	51.8	-48.8	30.72
245	245.2	42.4	152.4	57.5	56.1	1.001	0.816	101.0	229.2	245.0	52.5	-48.0	573.58
246	245.3	42.3	153.6	57.0	56.6	1.030	0.818	101.6	228.4	246.0	53.2	-47.1	-27.37
247	245.4	42.2	154.7	56.5	57.1	1.059	0.820	102.2	227.7	247.0	53.9	-46.3	-13.92
248	245.4	42.0	155.9	56.0	57.6	1.089	0.822	102.8	227.1	248.0	54.6	-45.5	-9.29
249	245.5	41.9	157.0	55.4	58.2	1.119	0.824	103.4	226.4	249.0	55.4	-44.8	-6.95
250	245.6	41.7	158.1	54.9	58.7	1.149	0.826	103.9	225.8	250.0	56.1	-44.1	-5.53

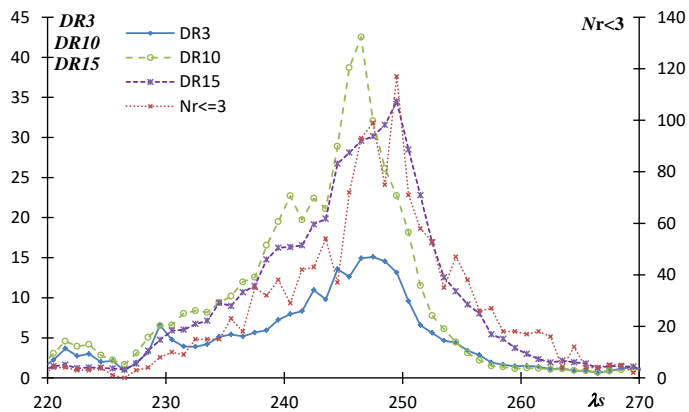
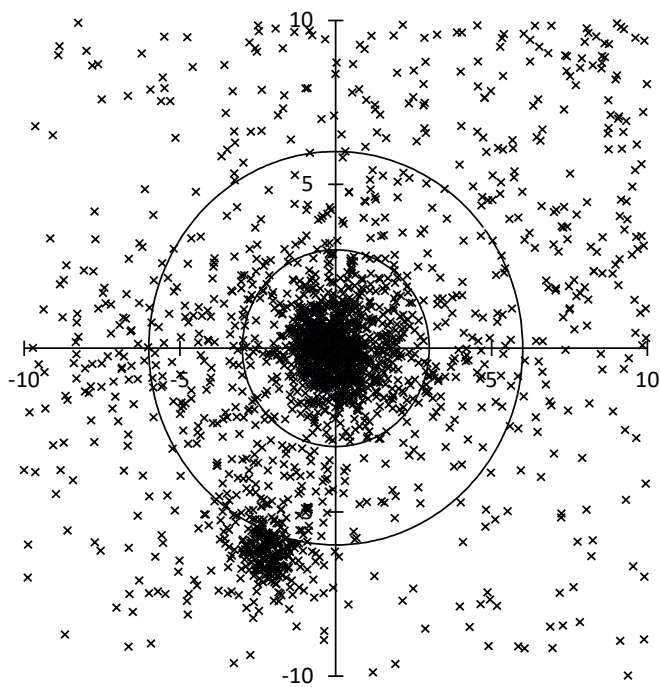
Year	N
2007	5
2008	2
2009	8
2010	5
2011	8
2012	5
2013	5
2014	1
2015	3
2016	2
2017	6
2018	8
Total	58



#0250NOO

November Orionids

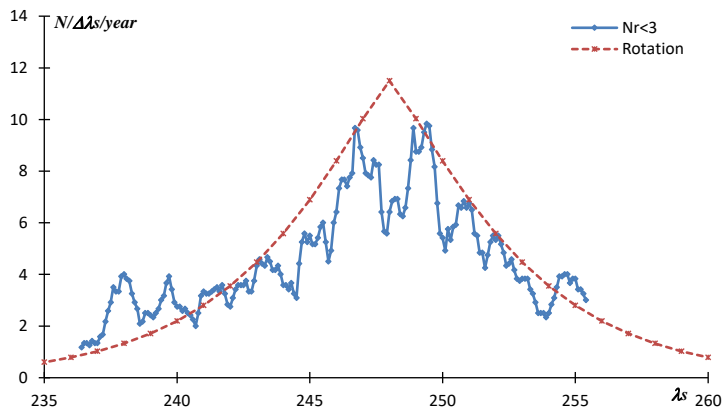
$\alpha=90.6, \delta=15.7, \lambda_s=245$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
NOO07	246.1	203.7	-8.1
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$Nr \leq 3$	249.5	117	
DR3	247.5	15.1	
DR10	246.5	42.5	
DR15	249.5	34.5	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
230	208.6	-7.0	78.3	16.0	45.1	0.993	0.058	32.4	152.8	50.0	206.5	14.2	8.01
235	207.2	-7.3	81.9	15.9	44.3	0.992	0.073	29.2	149.2	55.0	207.6	14.5	8.77
238	206.3	-7.5	84.1	15.9	43.9	0.991	0.083	27.7	147.1	58.0	208.2	14.6	9.29
239	206.0	-7.5	84.9	15.8	43.7	0.991	0.087	27.2	146.4	59.0	208.4	14.7	9.48
240	205.7	-7.6	85.6	15.8	43.6	0.991	0.090	26.7	145.6	60.0	208.6	14.7	9.68
241	205.4	-7.7	86.3	15.7	43.4	0.990	0.094	26.3	144.9	61.0	208.8	14.8	9.88
242	205.1	-7.7	87.1	15.7	43.2	0.990	0.098	25.9	144.2	62.0	209.0	14.8	10.09
243	204.8	-7.8	87.8	15.7	43.1	0.990	0.101	25.5	143.5	63.0	209.2	14.8	10.31
244	204.6	-7.8	88.5	15.6	42.9	0.990	0.105	25.1	142.7	64.0	209.4	14.9	10.54
245	204.3	-7.9	89.2	15.5	42.8	0.990	0.109	24.7	142.0	65.0	209.6	14.9	10.78
246	204.0	-8.0	90.0	15.5	42.6	0.990	0.113	24.3	141.3	66.0	209.8	14.9	11.02
247	203.7	-8.0	90.7	15.4	42.5	0.990	0.117	24.0	140.5	67.0	210.0	15.0	11.28
248	203.4	-8.1	91.4	15.4	42.3	0.990	0.121	23.6	139.8	68.0	210.3	15.0	11.55
249	203.1	-8.1	92.1	15.3	42.2	0.989	0.125	23.3	139.1	69.0	210.5	15.0	11.83
250	202.8	-8.2	92.9	15.2	42.0	0.989	0.129	23.0	138.3	70.0	210.7	15.1	12.13
251	202.5	-8.2	93.6	15.1	41.9	0.989	0.133	22.7	137.6	71.0	210.9	15.1	12.43
252	202.2	-8.3	94.3	15.1	41.7	0.989	0.138	22.4	136.9	72.0	211.1	15.1	12.75
253	201.9	-8.4	95.0	15.0	41.5	0.989	0.142	22.1	136.2	73.0	211.3	15.1	13.09
254	201.6	-8.4	95.8	14.9	41.4	0.989	0.146	21.8	135.4	74.0	211.6	15.1	13.44
255	201.3	-8.5	96.5	14.8	41.2	0.989	0.151	21.6	134.7	75.0	211.8	15.1	13.80
260	199.9	-8.8	100.1	14.3	40.5	0.989	0.173	20.3	131.1	80.0	212.9	15.2	15.93

Year	N
2007	52
2008	117
2009	88
2010	128
2011	68
2012	74
2013	122
2014	81
2015	102
2016	84
2017	105
2018	68
Total	1089

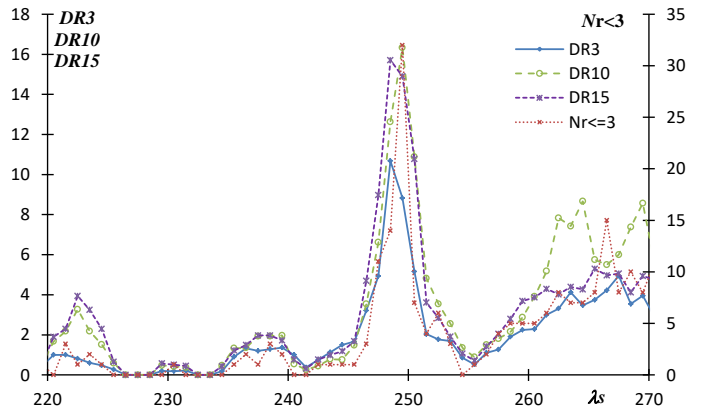
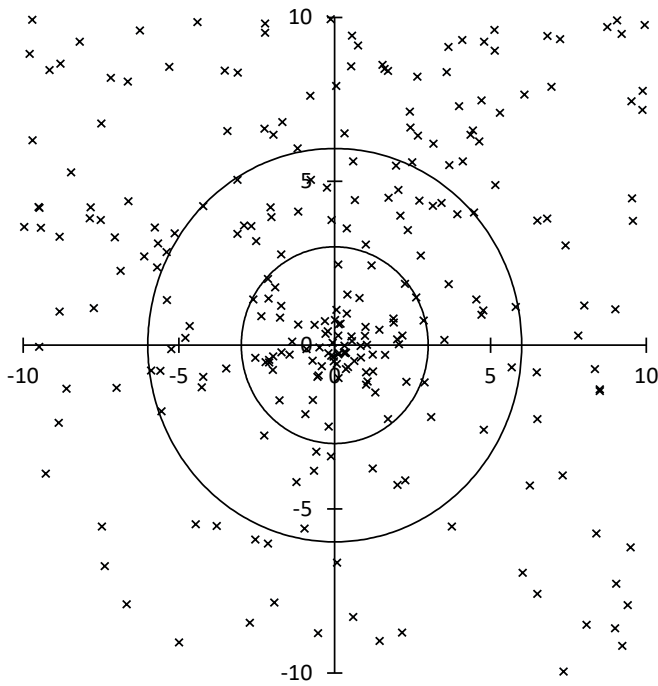


#0340TPY\_0

theta Pyxidids

$\alpha=139.0, \delta=-25.5, \lambda_s=249.4$

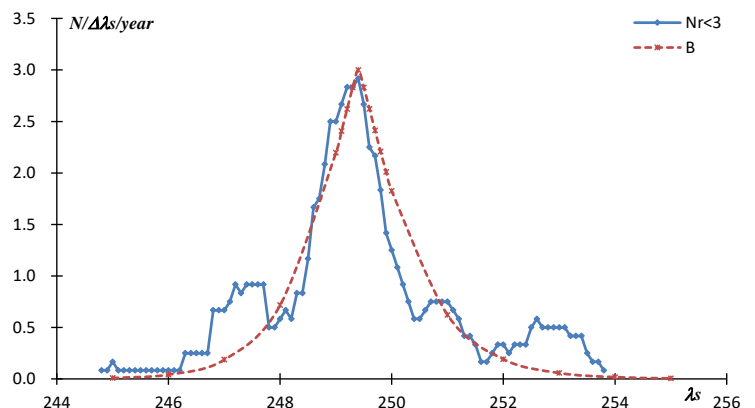
[注釈を読む](#)



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
TPY00	249.4	262.0	-39.1
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
Nr<=3	249.5	32	
DR3	248.5	10.7	
DR10	249.5	16.3	
DR15	248.5	15.7	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
245	262.6	-40.7	135.3	-25.9	57.9	0.827	0.963	109.5	18.8	65.0	58.5	17.7	5.56
246	262.4	-40.4	136.1	-25.8	58.3	0.846	0.962	110.1	19.1	66.0	59.2	17.9	6.26
247	262.2	-40.1	136.9	-25.8	58.7	0.866	0.960	110.8	19.4	67.0	59.9	18.1	7.18
248	262.0	-39.7	137.6	-25.7	59.1	0.886	0.959	111.4	19.7	68.0	60.5	18.3	8.43
249	261.8	-39.4	138.4	-25.6	59.5	0.907	0.958	112.0	20.0	69.0	61.2	18.5	10.25
249.1	261.8	-39.4	138.5	-25.6	59.6	0.909	0.958	112.1	20.0	69.1	61.3	18.5	10.47
249.2	261.8	-39.4	138.6	-25.6	59.6	0.911	0.957	112.2	20.1	69.2	61.4	18.5	10.71
249.3	261.7	-39.3	138.6	-25.6	59.7	0.913	0.957	112.2	20.1	69.3	61.4	18.5	10.96
249.4	261.7	-39.3	138.7	-25.6	59.7	0.915	0.957	112.3	20.1	69.4	61.5	18.6	11.23
249.5	261.7	-39.3	138.8	-25.6	59.7	0.917	0.957	112.4	20.1	69.5	61.6	18.6	11.50
249.6	261.7	-39.2	138.9	-25.6	59.8	0.919	0.957	112.4	20.2	69.6	61.6	18.6	11.79
249.7	261.7	-39.2	139.0	-25.6	59.8	0.921	0.957	112.5	20.2	69.7	61.7	18.6	12.10
249.8	261.7	-39.2	139.0	-25.6	59.9	0.923	0.957	112.6	20.2	69.8	61.8	18.6	12.42
249.9	261.6	-39.1	139.1	-25.6	59.9	0.925	0.957	112.6	20.3	69.9	61.8	18.6	12.76
250	261.6	-39.1	139.2	-25.6	59.9	0.927	0.956	112.7	20.3	70.0	61.9	18.7	13.12
251	261.4	-38.8	140.0	-25.6	60.4	0.948	0.955	113.3	20.6	71.0	62.6	18.8	18.33
252	261.3	-38.5	140.8	-25.5	60.8	0.969	0.954	114.0	20.8	72.0	63.2	19.0	30.74
253	261.1	-38.2	141.6	-25.5	61.2	0.990	0.953	114.6	21.1	73.0	63.9	19.1	98.16
254	260.9	-37.9	142.4	-25.5	61.6	1.012	0.951	115.2	21.4	74.0	64.5	19.2	-80.03
255	260.7	-37.5	143.2	-25.4	62.0	1.034	0.950	115.9	21.6	75.0	65.2	19.4	-28.16

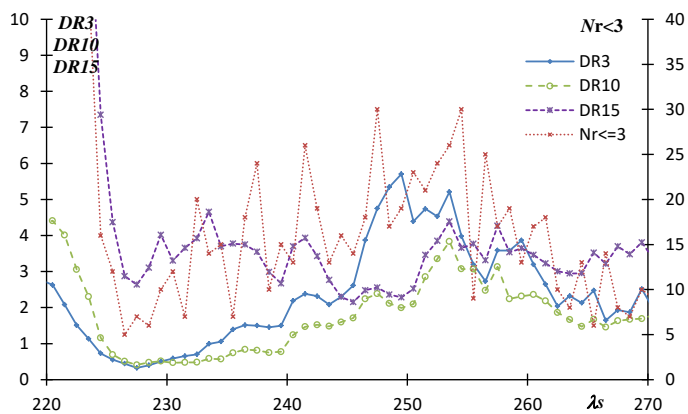
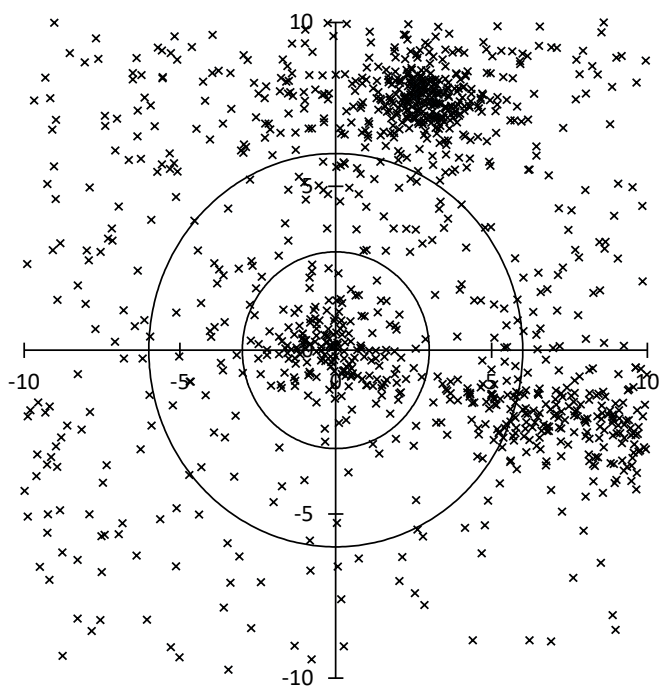
Year	N
2007	12
2008	12
2009	8
2010	9
2011	2
2012	5
2013	11
2014	2
2015	7
2016	6
2017	3
2018	5
Total	82



#0257ORS

Southern chi Orionids

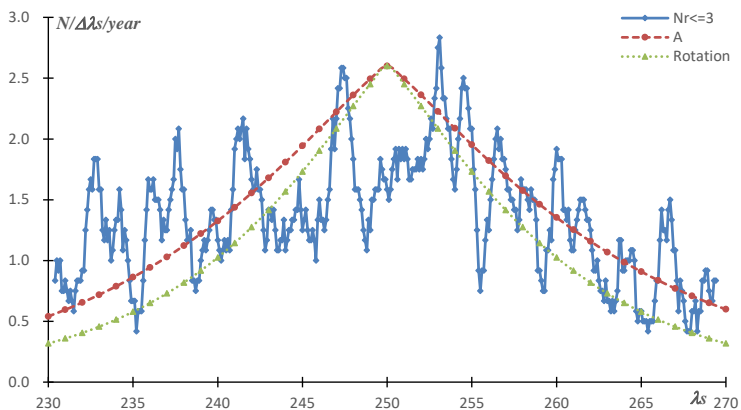
$\alpha=78.7, \delta=15.7, \lambda_s=260$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ORS04	247.6	190.3	-5.2
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	247.5	30	
DR3	249.5	5.7	
DR10	251.5	2.9	
DR15	241.5	3.9	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
230	193.8	-4.7	62.7	16.3	28.5	0.828	0.332	5.7	117.9	50.0	168.0	5.0	1.93
235	192.7	-4.7	66.8	16.9	28.0	0.821	0.351	5.5	115.5	55.0	170.6	5.0	1.96
240	191.6	-4.8	70.8	17.4	27.5	0.814	0.371	5.3	113.0	60.0	173.1	4.9	2.00
245	190.5	-4.9	74.8	17.8	27.0	0.807	0.391	5.2	110.5	65.0	175.6	4.9	2.03
246	190.3	-4.9	75.7	17.9	26.9	0.806	0.395	5.2	110.1	66.0	176.1	4.8	2.04
247	190.1	-4.9	76.5	17.9	26.8	0.805	0.399	5.1	109.6	67.0	176.6	4.8	2.05
248	189.9	-4.9	77.3	18.0	26.7	0.803	0.403	5.1	109.1	68.0	177.1	4.8	2.05
249	189.6	-4.9	78.1	18.0	26.6	0.802	0.407	5.1	108.6	69.0	177.7	4.8	2.06
250	189.4	-4.9	78.9	18.1	26.5	0.801	0.411	5.0	108.1	70.0	178.2	4.8	2.06
251	189.2	-5.0	79.7	18.1	26.4	0.800	0.415	5.0	107.6	71.0	178.7	4.8	2.07
252	189.0	-5.0	80.5	18.2	26.3	0.798	0.419	5.0	107.1	72.0	179.2	4.8	2.08
253	188.8	-5.0	81.4	18.2	26.2	0.797	0.423	5.0	106.7	73.0	179.7	4.8	2.08
254	188.5	-5.0	82.2	18.2	26.1	0.796	0.427	4.9	106.2	74.0	180.2	4.7	2.09
255	188.3	-5.0	83.0	18.3	26.0	0.794	0.431	4.9	105.7	75.0	180.7	4.7	2.10
256	188.1	-5.0	83.8	18.3	25.9	0.793	0.435	4.9	105.2	76.0	181.3	4.7	2.10
257	187.9	-5.0	84.6	18.3	25.8	0.792	0.439	4.9	104.7	77.0	181.8	4.7	2.11
258	187.7	-5.0	85.4	18.3	25.7	0.791	0.443	4.8	104.2	78.0	182.3	4.7	2.11
259	187.4	-5.1	86.3	18.3	25.6	0.789	0.447	4.8	103.8	79.0	182.8	4.7	2.12
260	187.2	-5.1	87.1	18.3	25.5	0.788	0.451	4.8	103.3	80.0	183.3	4.6	2.13
265	186.1	-5.1	91.2	18.3	25.0	0.782	0.471	4.6	100.9	85.0	185.9	4.6	2.15
270	185.0	-5.2	95.3	18.2	24.5	0.775	0.490	4.5	98.6	90.0	188.6	4.5	2.18

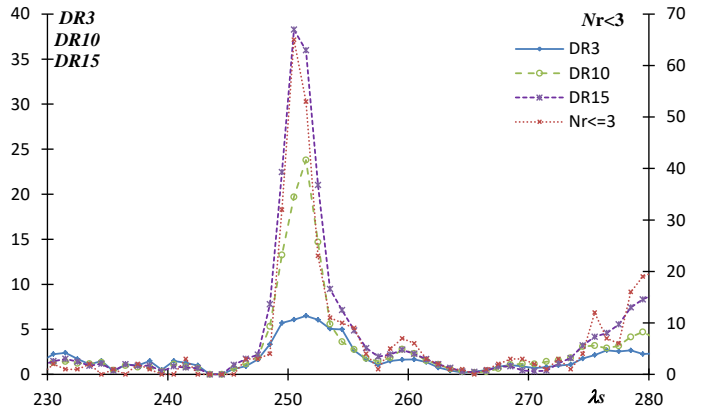
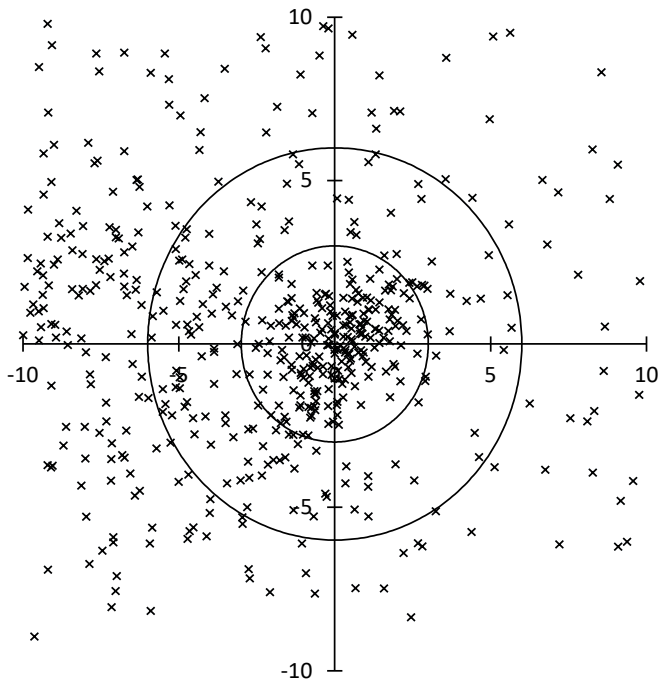
Year	N
2007	8
2008	24
2009	15
2010	26
2011	11
2012	9
2013	29
2014	9
2015	13
2016	14
2017	18
2018	15
Total	191



#0336DKD

December kappa Draconids

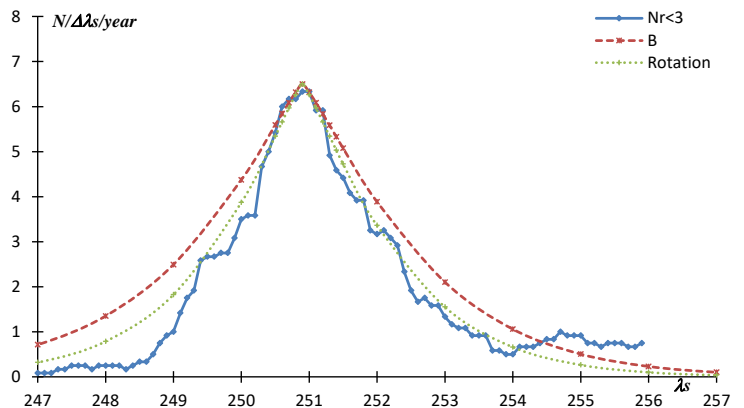
$\alpha=186.0, \delta=70.1, \lambda_s=250.2$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
DKD05	251.7	243.2	61.6
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	250.5	65	
DR3	251.5	6.5	
DR10	251.5	23.8	
DR15	250.5	38.3	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
247	240.7	60.9	179.1	72.7	43.4	0.888	0.917	72.7	211.8	247.0	77.5	-30.2	8.20
248	241.2	61.1	181.0	72.2	43.4	0.888	0.920	72.7	211.1	248.0	78.2	-29.5	8.22
249	241.8	61.3	182.8	71.7	43.4	0.888	0.922	72.7	210.4	249.0	78.9	-28.9	8.24
250	242.3	61.5	184.5	71.2	43.4	0.888	0.925	72.7	209.6	250.0	79.6	-28.2	8.27
250.5	242.6	61.6	185.4	70.9	43.4	0.888	0.927	72.7	209.3	250.5	80.0	-27.8	8.28
250.6	242.7	61.6	185.6	70.9	43.4	0.888	0.927	72.7	209.2	250.6	80.0	-27.8	8.28
250.7	242.7	61.6	185.7	70.8	43.4	0.888	0.927	72.7	209.1	250.7	80.1	-27.7	8.29
250.8	242.8	61.6	185.9	70.8	43.4	0.888	0.927	72.7	209.1	250.8	80.2	-27.6	8.29
250.9	242.8	61.6	186.1	70.7	43.4	0.888	0.928	72.7	209.0	250.9	80.2	-27.6	8.29
251	242.9	61.6	186.2	70.7	43.4	0.888	0.928	72.7	208.9	251.0	80.3	-27.5	8.29
251.1	242.9	61.7	186.4	70.6	43.4	0.888	0.928	72.7	208.8	251.1	80.4	-27.4	8.30
251.2	243.0	61.7	186.6	70.6	43.4	0.888	0.929	72.7	208.8	251.2	80.5	-27.4	8.30
251.3	243.0	61.7	186.7	70.5	43.4	0.888	0.929	72.7	208.7	251.3	80.5	-27.3	8.30
251.4	243.1	61.7	186.9	70.5	43.4	0.888	0.929	72.7	208.6	251.4	80.6	-27.2	8.31
251.5	243.2	61.7	187.0	70.4	43.4	0.888	0.929	72.7	208.5	251.5	80.7	-27.1	8.31
252	243.4	61.8	187.9	70.1	43.4	0.888	0.931	72.7	208.2	252.0	81.0	-26.8	8.33
253	244.0	62.0	189.4	69.6	43.4	0.888	0.933	72.7	207.5	253.0	81.8	-26.1	8.36
254	244.6	62.1	191.0	69.1	43.4	0.889	0.936	72.7	206.7	254.0	82.5	-25.4	8.40
255	245.1	62.3	192.5	68.6	43.4	0.889	0.938	72.7	206.0	255.0	83.2	-24.7	8.45
256	245.7	62.5	193.9	68.0	43.4	0.889	0.941	72.8	205.3	256.0	84.0	-24.1	8.50
257	246.3	62.6	195.3	67.5	43.4	0.890	0.943	72.8	204.5	257.0	84.7	-23.4	8.55

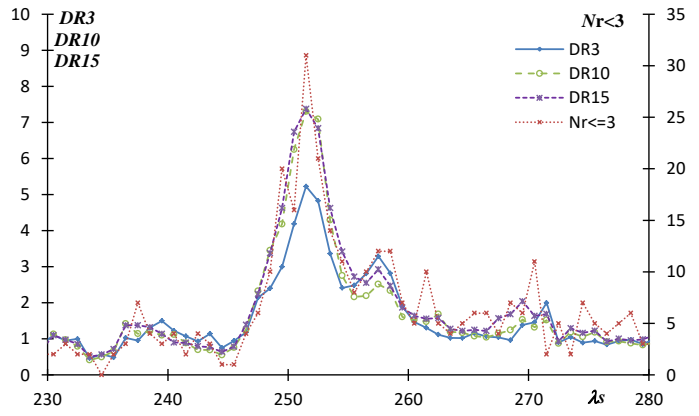
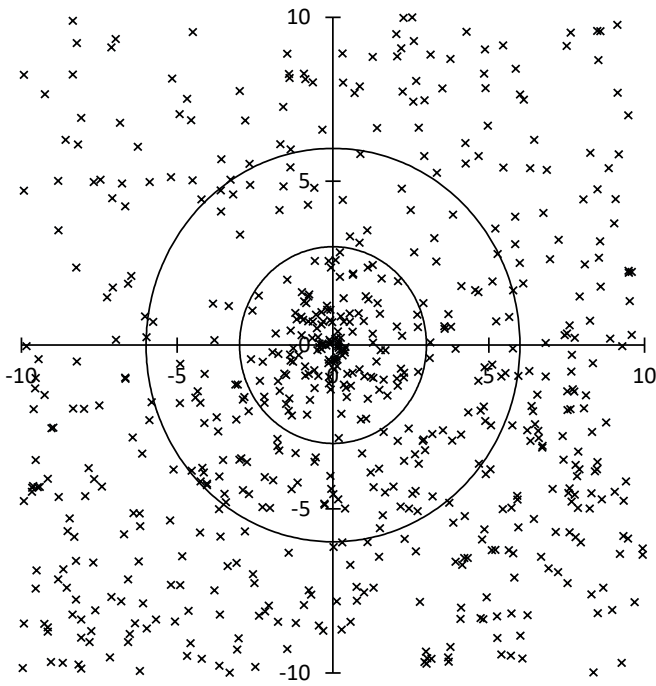
Year	N
2007	17
2008	34
2009	15
2010	18
2011	12
2012	16
2013	21
2014	13
2015	20
2016	24
2017	18
2018	6
Total	214



#0339PSU

psi Ursae Majorids

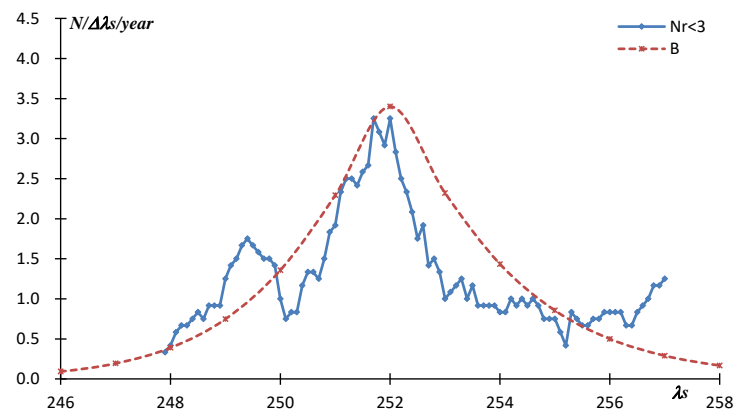
$\alpha=167.8, \delta=44.5, \lambda_s=252.9$

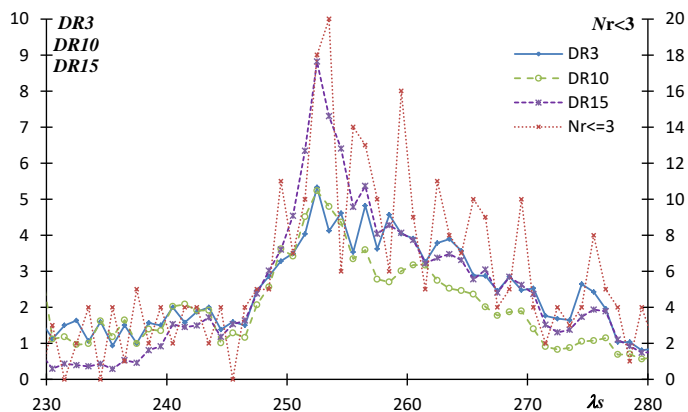
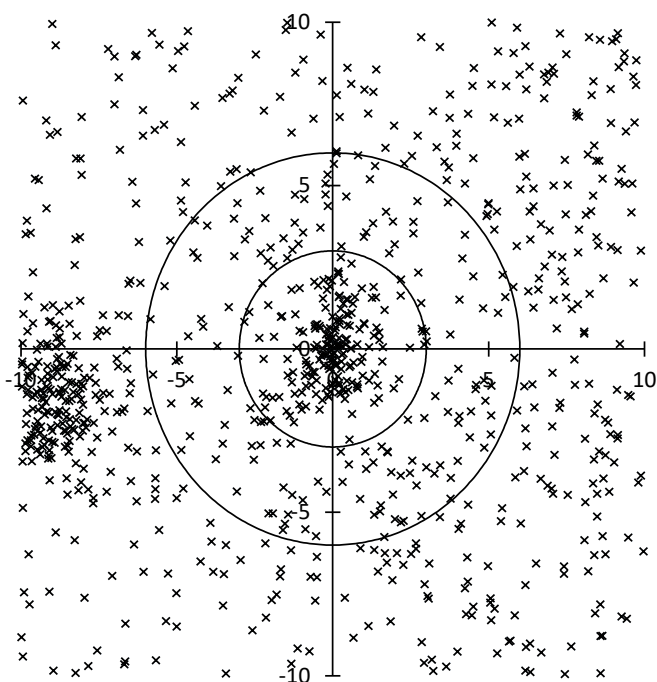


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
PSU02	252.6	258.4	34.9
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	251.5	31	
DR3	251.5	5.2	
DR10	251.5	7.3	
DR15	251.5	7.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
245	256.7	36.5	160.7	48.1	59.5	0.850	0.903	114.8	215.4	245.0	48.4	-31.7	6.01
246	256.9	36.4	161.9	47.5	59.7	0.855	0.905	115.2	214.7	246.0	49.6	-31.1	6.23
247	257.1	36.2	163.1	46.9	59.9	0.860	0.908	115.5	214.1	247.0	50.7	-30.4	6.47
248	257.4	36.1	164.3	46.3	60.1	0.865	0.910	115.9	213.5	248.0	51.9	-29.8	6.73
249	257.6	35.9	165.4	45.7	60.3	0.870	0.912	116.3	212.9	249.0	53.0	-29.2	7.01
250	257.8	35.8	166.6	45.1	60.4	0.875	0.915	116.6	212.3	250.0	54.2	-28.5	7.32
251	258.0	35.6	167.7	44.5	60.6	0.881	0.917	117.0	211.7	251.0	55.4	-27.9	7.67
252	258.3	35.5	168.8	43.9	60.8	0.886	0.919	117.4	211.1	252.0	56.5	-27.3	8.06
253	258.5	35.3	169.9	43.3	61.0	0.892	0.921	117.7	210.4	253.0	57.7	-26.7	8.50
254	258.7	35.2	171.0	42.7	61.2	0.897	0.924	118.1	209.8	254.0	58.9	-26.0	9.00
255	258.9	35.0	172.1	42.1	61.4	0.903	0.926	118.5	209.2	255.0	60.1	-25.4	9.57
256	259.1	34.9	173.2	41.5	61.6	0.909	0.928	118.8	208.6	256.0	61.3	-24.8	10.22
257	259.4	34.7	174.3	40.8	61.8	0.915	0.930	119.2	208.0	257.0	62.5	-24.2	10.98
258	259.6	34.6	175.3	40.2	62.0	0.922	0.932	119.5	207.4	258.0	63.7	-23.6	11.88
259	259.8	34.4	176.4	39.6	62.2	0.928	0.934	119.9	206.8	259.0	64.9	-23.0	12.96
260	260.0	34.3	177.4	39.0	62.4	0.934	0.936	120.3	206.2	260.0	66.1	-22.4	14.27

Year	N
2007	14
2008	22
2009	16
2010	18
2011	7
2012	8
2013	23
2014	5
2015	5
2016	17
2017	13
2018	2
Total	150

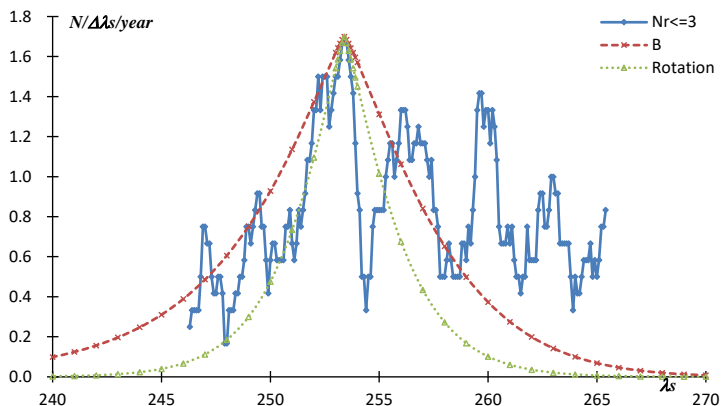




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
DRV02	256	285.6	14.9
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	253.5	20	
DR3	252.5	5.3	
DR10	252.5	5.2	
DR15	252.5	8.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
245	287.4	11.8	177.8	13.9	68.6	0.953	0.759	157.5	121.8	245.0	121.1	19.0	15.99
248	287.1	12.6	180.6	13.5	68.5	0.944	0.767	156.1	122.8	248.0	122.8	19.9	13.64
249	287.0	12.9	181.5	13.4	68.4	0.941	0.770	155.6	123.2	249.0	123.3	20.2	13.04
250	286.8	13.1	182.4	13.3	68.4	0.938	0.772	155.2	123.5	250.0	123.8	20.5	12.52
251	286.7	13.4	183.3	13.2	68.3	0.936	0.775	154.7	123.9	251.0	124.4	20.8	12.05
252	286.6	13.6	184.2	13.0	68.3	0.933	0.778	154.3	124.3	252.0	124.9	21.0	11.64
253	286.5	13.9	185.2	12.9	68.2	0.931	0.781	153.8	124.7	253.0	125.4	21.3	11.26
254	286.4	14.1	186.1	12.8	68.2	0.928	0.783	153.3	125.1	254.0	125.9	21.5	10.93
255	286.3	14.4	187.0	12.7	68.1	0.926	0.786	152.9	125.4	255.0	126.4	21.8	10.63
256	286.2	14.7	187.9	12.6	68.1	0.924	0.789	152.4	125.8	256.0	126.8	22.0	10.36
257	286.0	14.9	188.8	12.5	68.0	0.922	0.792	152.0	126.2	257.0	127.3	22.3	10.11
258	285.9	15.2	189.7	12.4	67.9	0.920	0.795	151.5	126.6	258.0	127.8	22.5	9.89
259	285.8	15.4	190.6	12.2	67.9	0.918	0.797	151.1	127.1	259.0	128.2	22.7	9.69
260	285.7	15.7	191.5	12.1	67.8	0.916	0.800	150.6	127.5	260.0	128.7	22.9	9.51
261	285.6	16.0	192.4	12.0	67.8	0.914	0.803	150.2	127.9	261.0	129.1	23.1	9.35
262	285.5	16.2	193.3	11.9	67.7	0.912	0.806	149.8	128.3	262.0	129.5	23.3	9.20
263	285.3	16.5	194.2	11.8	67.7	0.911	0.809	149.3	128.8	263.0	130.0	23.4	9.07
264	285.2	16.7	195.1	11.7	67.6	0.909	0.812	148.9	129.2	264.0	130.4	23.6	8.95
265	285.1	17.0	196.0	11.6	67.6	0.908	0.815	148.4	129.6	265.0	130.8	23.8	8.84
270	284.5	18.3	200.5	11.1	67.3	0.902	0.829	146.3	131.9	270.0	132.8	24.4	8.47
275	283.9	19.6	204.9	10.7	67.0	0.899	0.843	144.1	134.3	275.0	134.7	24.8	8.32

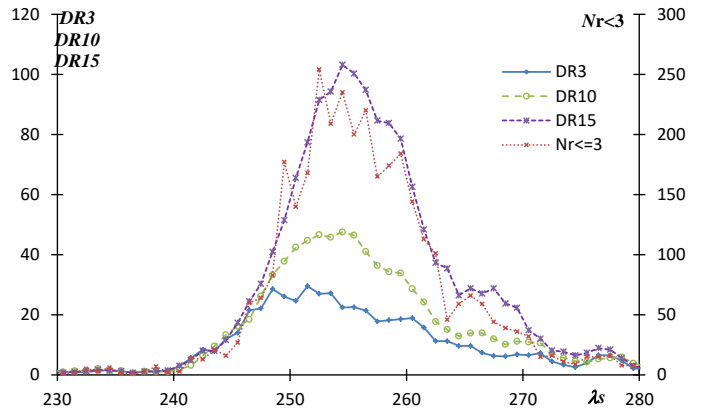
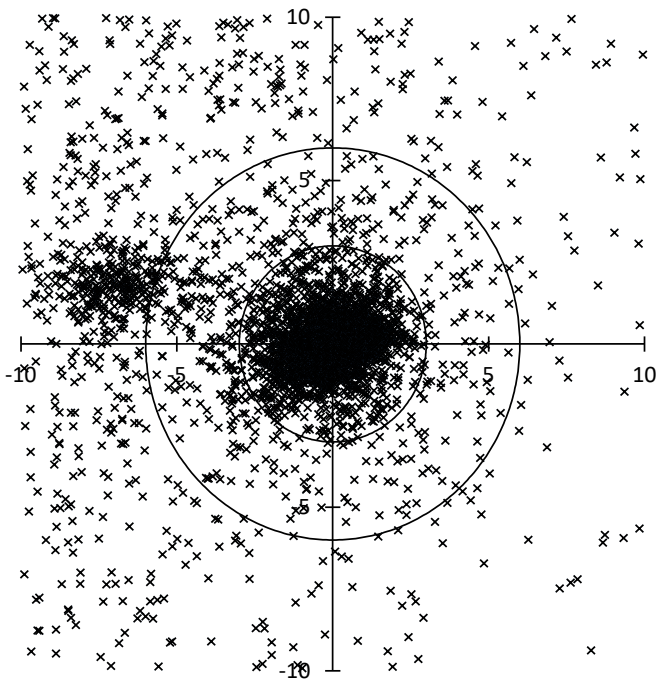
Year	N
2007	15
2008	20
2009	11
2010	22
2011	11
2012	18
2013	22
2014	7
2015	17
2016	17
2017	21
2018	14
Total	195



#0016HYD

sigma Hydrids

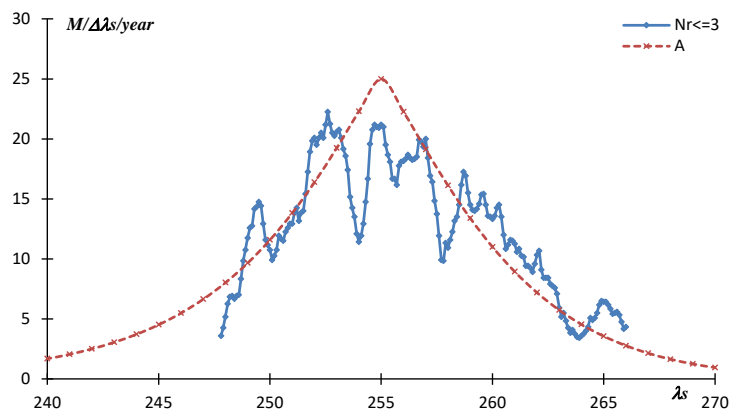
$\alpha=131.9, \delta=0.2, \lambda_s=265.5$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
HYD04	257.5	230.9	-16.8
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	252.5	254	
DR3	251.5	29.6	
DR10	254.5	47.6	
DR15	254.5	103.2	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
240	232.6	-16.4	111.7	5.4	59.9	0.991	0.290	132.5	114.8	60.0	295.7	42.0	33.38
245	232.0	-16.4	115.9	4.7	59.5	0.988	0.277	131.5	116.5	65.0	298.0	42.1	24.02
249	231.6	-16.4	119.3	4.0	59.2	0.986	0.268	130.6	117.8	69.0	299.9	42.2	19.73
250	231.5	-16.4	120.1	3.8	59.2	0.986	0.265	130.4	118.2	70.0	300.4	42.2	18.91
251	231.3	-16.4	120.9	3.6	59.1	0.986	0.263	130.1	118.5	71.0	300.9	42.2	18.15
252	231.2	-16.4	121.8	3.5	59.0	0.985	0.261	129.9	118.8	72.0	301.4	42.2	17.46
253	231.1	-16.4	122.6	3.3	59.0	0.985	0.258	129.7	119.2	73.0	301.8	42.2	16.83
254	231.0	-16.4	123.4	3.1	58.9	0.984	0.256	129.4	119.5	74.0	302.3	42.2	16.24
255	230.9	-16.4	124.3	2.9	58.8	0.984	0.254	129.2	119.8	75.0	302.8	42.2	15.70
256	230.8	-16.4	125.1	2.7	58.7	0.983	0.251	129.0	120.1	76.0	303.3	42.2	15.20
257	230.7	-16.4	125.9	2.5	58.7	0.983	0.249	128.7	120.5	77.0	303.8	42.3	14.73
258	230.6	-16.4	126.8	2.2	58.6	0.983	0.247	128.5	120.8	78.0	304.3	42.3	14.30
259	230.4	-16.4	127.6	2.0	58.5	0.982	0.245	128.3	121.1	79.0	304.8	42.3	13.89
260	230.3	-16.4	128.4	1.8	58.4	0.982	0.243	128.0	121.4	80.0	305.3	42.3	13.51
261	230.2	-16.4	129.2	1.6	58.4	0.982	0.240	127.8	121.7	81.0	305.8	42.3	13.15
262	230.1	-16.4	130.0	1.4	58.3	0.981	0.238	127.5	122.0	82.0	306.3	42.2	12.82
263	230.0	-16.4	130.9	1.1	58.2	0.981	0.236	127.3	122.3	83.0	306.8	42.2	12.50
264	229.9	-16.4	131.7	0.9	58.2	0.981	0.234	127.0	122.6	84.0	307.3	42.2	12.20
265	229.8	-16.4	132.5	0.7	58.1	0.981	0.232	126.8	122.9	85.0	307.8	42.2	11.92
270	229.2	-16.4	136.6	-0.6	57.7	0.979	0.222	125.5	124.4	90.0	310.3	42.2	10.73
275	228.7	-16.4	140.6	-1.9	57.4	0.978	0.212	124.2	125.8	95.0	312.9	42.1	9.80

Year	N
2007	233
2008	309
2009	252
2010	260
2011	187
2012	306
2013	352
2014	149
2015	194
2016	218
2017	247
2018	137
Total	2844

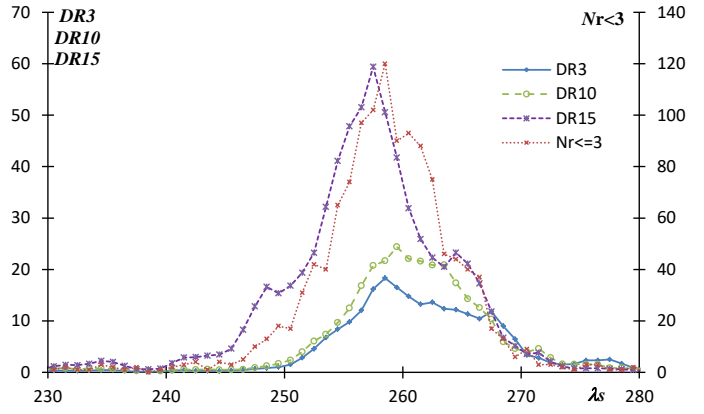
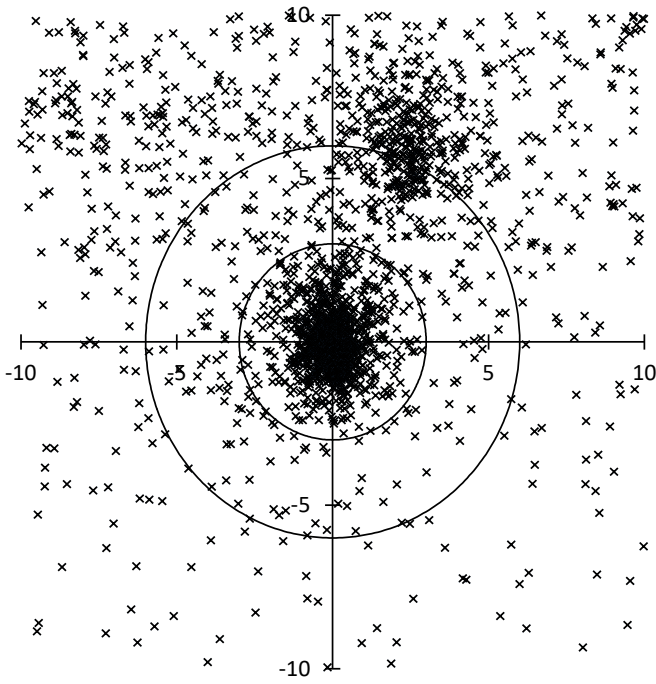




#0019MON

December Monocerotids

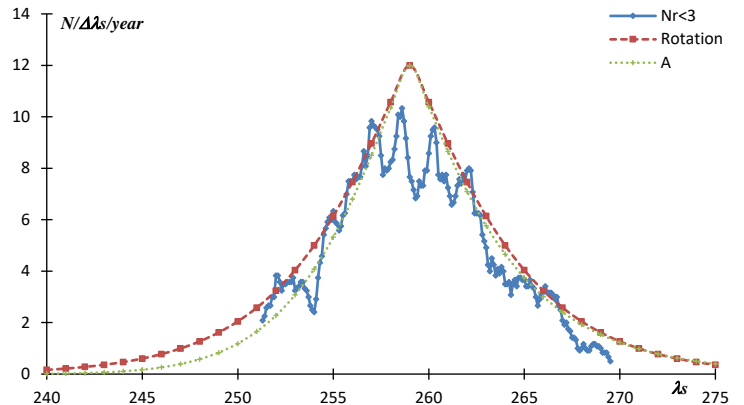
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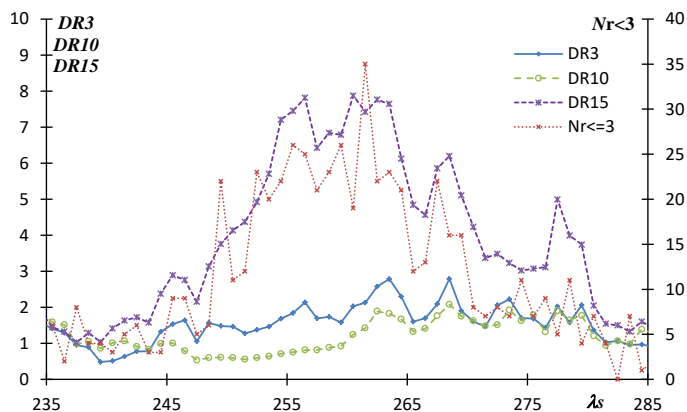
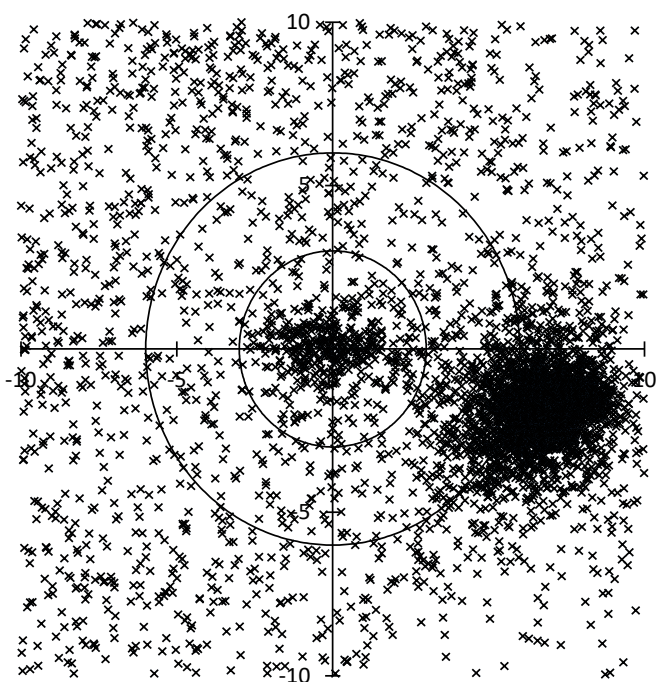


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
MON05	261	202.2	-15.0
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	258.5	120	
DR3	258.5	18.3	
DR10	259.5	24.4	
DR15	257.5	59.4	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
235	209.6	-12.6	84.6	10.8	45.6	0.989	0.092	50.5	145.5	55.0	211.4	25.9	8.71
240	208.1	-13.1	88.1	10.4	44.6	0.988	0.108	46.1	142.3	60.0	211.8	26.1	8.83
245	206.5	-13.5	91.5	9.9	43.7	0.986	0.127	42.4	139.0	65.0	212.3	26.2	8.97
250	205.0	-14.0	94.9	9.4	42.7	0.984	0.148	39.2	135.6	70.0	212.8	26.3	9.12
251	204.7	-14.1	95.6	9.2	42.6	0.983	0.152	38.6	134.9	71.0	212.9	26.3	9.14
252	204.4	-14.2	96.3	9.1	42.4	0.983	0.157	38.1	134.2	72.0	213.0	26.3	9.17
253	204.1	-14.3	97.0	9.0	42.2	0.982	0.161	37.5	133.5	73.0	213.1	26.2	9.20
254	203.8	-14.4	97.6	8.9	42.0	0.982	0.166	37.0	132.8	74.0	213.2	26.2	9.23
255	203.5	-14.5	98.3	8.7	41.8	0.982	0.170	36.5	132.1	75.0	213.3	26.2	9.26
256	203.2	-14.6	99.0	8.6	41.6	0.981	0.175	36.0	131.4	76.0	213.4	26.2	9.28
257	202.9	-14.6	99.7	8.5	41.4	0.981	0.179	35.5	130.7	77.0	213.6	26.2	9.31
258	202.6	-14.7	100.3	8.3	41.2	0.980	0.184	35.1	130.0	78.0	213.7	26.1	9.34
259	202.3	-14.8	101.0	8.2	41.0	0.980	0.189	34.6	129.3	79.0	213.8	26.1	9.36
260	202.0	-14.9	101.7	8.0	40.9	0.979	0.194	34.2	128.6	80.0	213.9	26.0	9.39
261	201.6	-15.0	102.3	7.9	40.7	0.979	0.199	33.7	127.9	81.0	214.1	26.0	9.41
262	201.3	-15.1	103.0	7.8	40.5	0.978	0.203	33.3	127.2	82.0	214.2	26.0	9.43
263	201.0	-15.2	103.7	7.6	40.3	0.978	0.208	32.9	126.5	83.0	214.4	25.9	9.45
264	200.7	-15.3	104.3	7.4	40.1	0.977	0.213	32.5	125.8	84.0	214.5	25.9	9.47
265	200.4	-15.4	105.0	7.3	39.9	0.977	0.218	32.1	125.1	85.0	214.6	25.8	9.49
270	198.9	-15.8	108.3	6.5	39.0	0.974	0.244	30.3	121.5	90.0	215.4	25.5	9.57
275	197.3	-16.2	111.5	5.6	38.0	0.972	0.271	28.7	118.0	95.0	216.3	25.0	9.61

Year	N
2007	58
2008	103
2009	68
2010	98
2011	93
2012	140
2013	133
2014	73
2015	75
2016	87
2017	135
2018	66
Total	1129

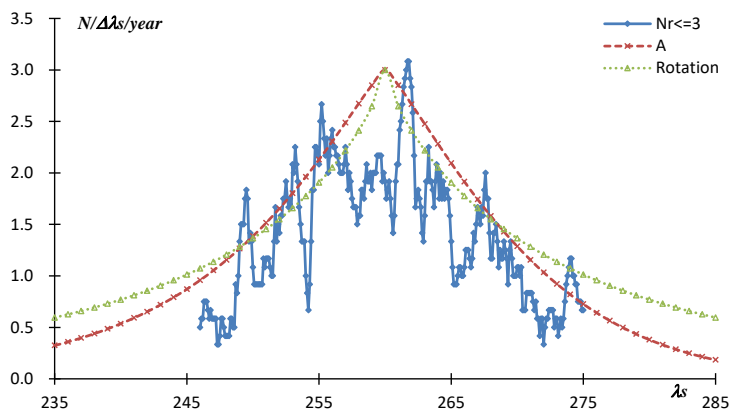


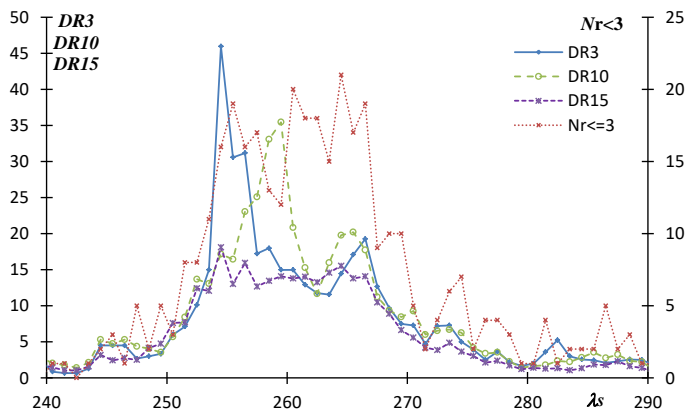
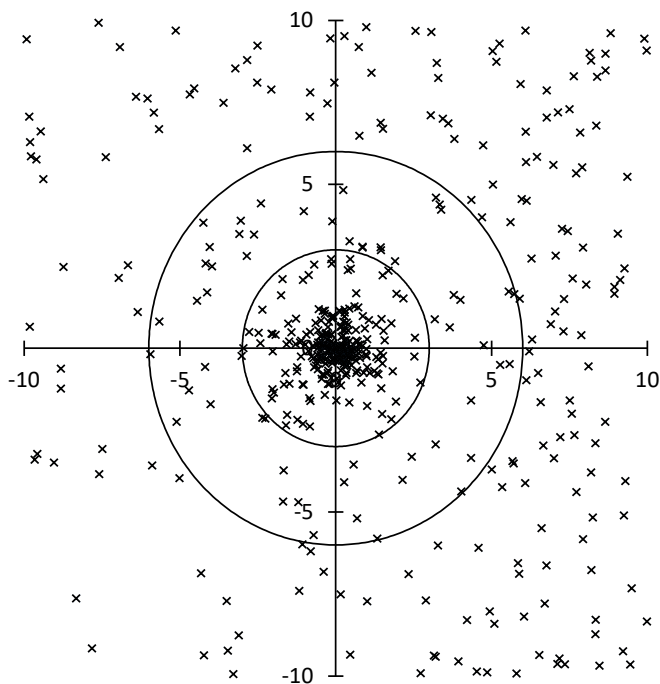


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
EHY03	260.7	237.3	-14.7
$\Delta r=$	3		
$\Delta \lambda_s=$	15		
	$\lambda_s$	max	
Nr<=3	261.5	35	
DR3	268.5	2.8	
DR10	268.5	2.1	
DR15	260.5	7.9	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
240	240.4	-15.7	119.2	4.7	62.6	0.950	0.443	142.6	97.6	60.0	320.4	37.0	8.78
245	239.6	-15.4	123.3	4.1	62.4	0.951	0.421	142.6	100.1	65.0	322.3	36.7	8.65
246	239.5	-15.4	124.1	4.0	62.4	0.952	0.417	142.6	100.6	66.0	322.7	36.7	8.63
247	239.3	-15.3	124.9	3.8	62.3	0.952	0.413	142.6	101.1	67.0	323.1	36.6	8.61
248	239.2	-15.3	125.7	3.7	62.3	0.952	0.408	142.6	101.6	68.0	323.5	36.6	8.60
249	239.0	-15.2	126.5	3.6	62.2	0.953	0.404	142.6	102.1	69.0	323.9	36.5	8.58
255	238.1	-14.8	131.4	2.6	62.0	0.956	0.380	142.5	104.9	75.0	326.4	36.0	8.56
256	238.0	-14.8	132.2	2.5	61.9	0.956	0.376	142.5	105.4	76.0	326.8	36.0	8.56
257	237.8	-14.7	133.0	2.3	61.9	0.957	0.372	142.5	105.9	77.0	327.3	35.9	8.57
258	237.7	-14.6	133.8	2.1	61.9	0.957	0.368	142.5	106.4	78.0	327.7	35.8	8.58
259	237.5	-14.6	134.6	2.0	61.8	0.958	0.364	142.4	106.8	79.0	328.1	35.7	8.59
260	237.4	-14.5	135.4	1.8	61.8	0.958	0.360	142.4	107.3	80.0	328.6	35.6	8.60
261	237.2	-14.4	136.2	1.6	61.7	0.959	0.356	142.4	107.8	81.0	329.0	35.5	8.62
262	237.1	-14.4	137.0	1.4	61.7	0.959	0.352	142.4	108.2	82.0	329.5	35.4	8.64
263	236.9	-14.3	137.9	1.2	61.6	0.960	0.348	142.4	108.7	83.0	329.9	35.3	8.66
264	236.8	-14.2	138.7	1.0	61.6	0.960	0.344	142.4	109.1	84.0	330.4	35.2	8.68
265	236.6	-14.2	139.5	0.8	61.6	0.961	0.340	142.4	109.6	85.0	330.8	35.1	8.71
266	236.5	-14.1	140.3	0.6	61.5	0.962	0.336	142.4	110.0	86.0	331.3	35.0	8.74
270	235.9	-13.9	143.5	-0.2	61.3	0.960	0.315	141.8	112.8	90.0	331.9	34.7	7.95
275	235.1	-13.5	147.5	-1.3	61.1	0.967	0.303	142.2	114.0	95.0	335.6	34.0	9.13
280	234.4	-13.2	151.5	-2.4	60.9	0.970	0.285	142.1	116.2	100.0	338.0	33.4	9.47

Year	N
2007	44
2008	32
2009	38
2010	45
2011	46
2012	61
2013	44
2014	25
2015	35
2016	32
2017	55
2018	40
Total	497

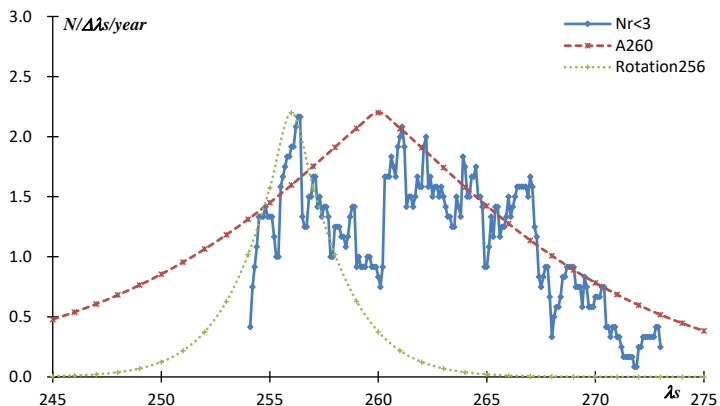




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
XVI02	263.7	291.4	-5.1
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	264.5	21	
DR3	254.5	46.0	
DR10	259.5	35.4	
DR15	254.5	18.1	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
250	295.0	-4.1	182.9	-5.8	67.9	1.000	0.547	171.1	276.3	70.0	153.7	-8.8	3311.20
252	294.4	-4.3	184.2	-6.5	68.0	0.994	0.559	170.9	277.6	72.0	154.3	-9.1	88.98
253	294.2	-4.3	184.9	-6.8	68.0	0.990	0.565	170.7	278.2	73.0	154.7	-9.2	59.31
254	293.9	-4.4	185.5	-7.2	68.0	0.987	0.571	170.6	278.9	74.0	155.0	-9.3	44.68
255	293.7	-4.5	186.2	-7.6	68.0	0.984	0.578	170.5	279.5	75.0	155.3	-9.3	35.96
256	293.4	-4.6	186.8	-7.9	68.1	0.981	0.584	170.4	280.2	76.0	155.6	-9.4	30.19
257	293.1	-4.6	187.5	-8.3	68.1	0.977	0.590	170.3	280.9	77.0	156.0	-9.5	26.07
258	292.9	-4.7	188.1	-8.6	68.1	0.974	0.596	170.2	281.6	78.0	156.3	-9.6	23.00
259	292.6	-4.8	188.8	-9.0	68.2	0.971	0.603	170.1	282.2	79.0	156.6	-9.7	20.62
260	292.4	-4.9	189.4	-9.3	68.2	0.967	0.609	170.0	282.9	80.0	156.9	-9.8	18.72
261	292.1	-4.9	190.1	-9.7	68.2	0.964	0.615	169.9	283.6	81.0	157.2	-9.9	17.17
262	291.8	-5.0	190.8	-10.1	68.2	0.961	0.621	169.7	284.3	82.0	157.4	-9.9	15.89
263	291.6	-5.1	191.4	-10.4	68.3	0.958	0.628	169.6	285.0	83.0	157.7	-10.0	14.80
264	291.3	-5.1	192.1	-10.8	68.3	0.954	0.634	169.5	285.7	84.0	158.0	-10.1	13.87
265	291.1	-5.2	192.8	-11.1	68.3	0.951	0.640	169.4	286.5	85.0	158.3	-10.1	13.08
266	290.8	-5.3	193.4	-11.5	68.3	0.948	0.647	169.3	287.2	86.0	158.5	-10.2	12.38
267	290.5	-5.4	194.1	-11.8	68.4	0.945	0.653	169.2	287.9	87.0	158.8	-10.3	11.77
268	290.3	-5.4	194.7	-12.2	68.4	0.941	0.659	169.1	288.6	88.0	159.0	-10.3	11.22
269	290.0	-5.5	195.4	-12.5	68.4	0.938	0.666	169.0	289.4	89.0	159.3	-10.4	10.74
270	289.8	-5.6	196.1	-12.9	68.5	0.908	0.660	168.7	288.0	90.0	161.7	-10.7	7.20
275	288.4	-5.9	199.4	-14.6	68.6	0.919	0.703	168.4	293.9	95.0	160.6	-10.6	8.71

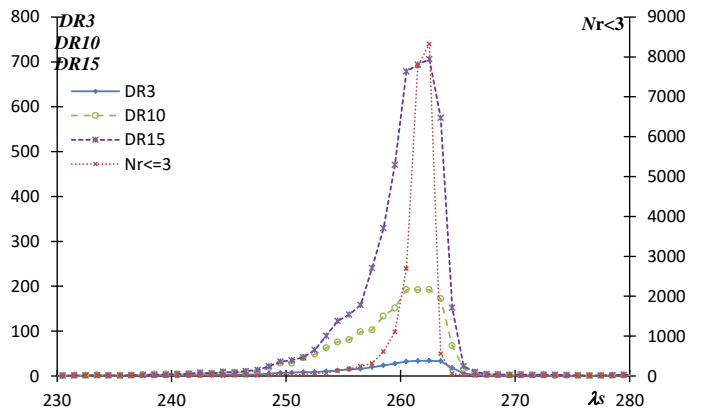
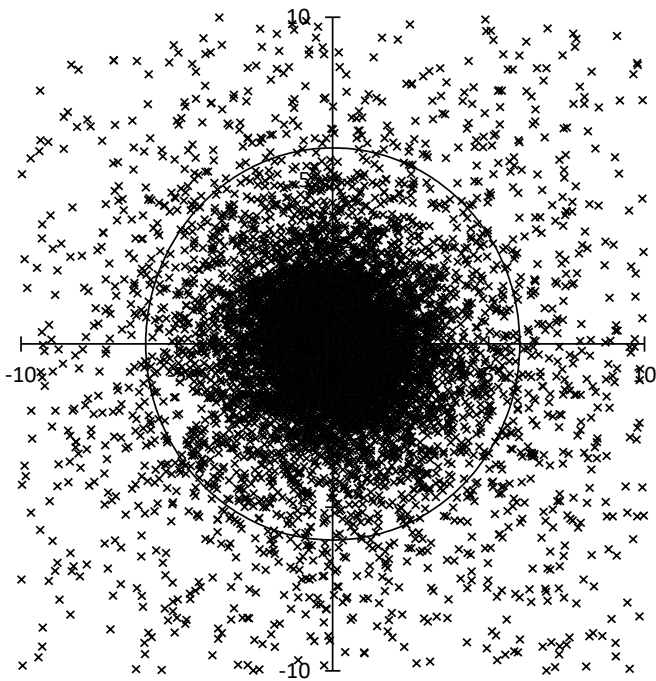
Year	N
2007	18
2008	25
2009	25
2010	17
2011	30
2012	26
2013	27
2014	21
2015	14
2016	15
2017	24
2018	23
Total	265



#0004GEM

Geminids

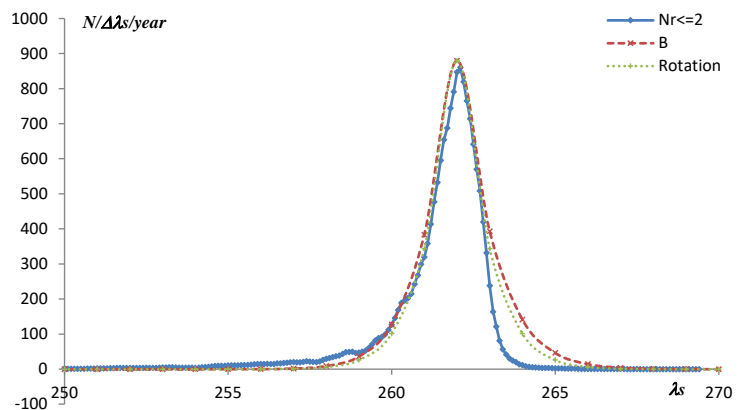
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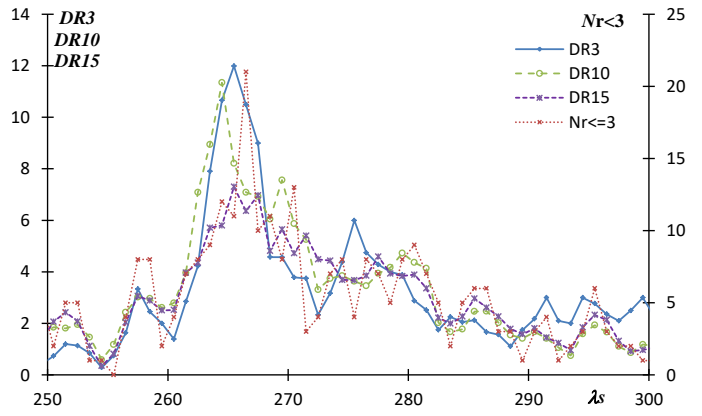
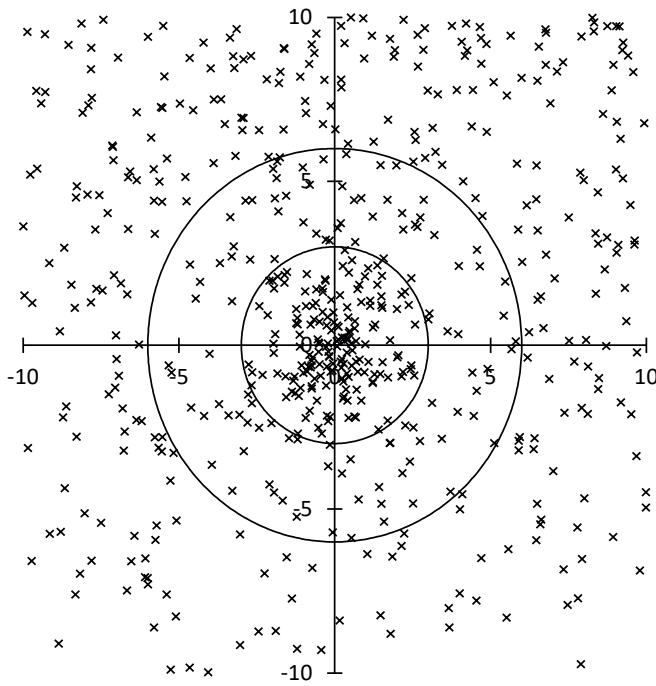


Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
GEM03	*260	208.1	10.4
$\Delta r =$	2		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
Nr<=3	262.5	8321	
DR3	262.5	34.0	
DR10	262.5	192.2	
DR15	262.5	705.9	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
230	211.3	12.0	79.6	35.1	30.7	0.856	0.149	23.8	327.5	230.0	199.7	-12.5	1.03
235	210.8	11.7	85.0	35.1	31.2	0.861	0.148	23.7	327.0	235.0	204.2	-12.6	1.06
240	210.3	11.5	90.3	34.9	31.7	0.866	0.148	23.5	326.4	240.0	208.7	-12.8	1.10
245	209.8	11.3	95.7	34.6	32.2	0.871	0.147	23.4	325.9	245.0	213.2	-12.9	1.14
250	209.3	11.0	101.0	34.1	32.6	0.876	0.147	23.2	325.4	250.0	217.6	-12.9	1.18
251	209.2	11.0	102.0	34.0	32.7	0.877	0.147	23.2	325.3	251.0	218.5	-13.0	1.19
252	209.0	10.9	103.1	33.9	32.8	0.878	0.147	23.1	325.2	252.0	219.4	-13.0	1.20
253	208.9	10.9	104.1	33.8	32.9	0.879	0.147	23.1	325.1	253.0	220.3	-13.0	1.21
254	208.8	10.9	105.2	33.6	33.0	0.880	0.147	23.1	325.0	254.0	221.2	-13.0	1.22
255	208.7	10.8	106.2	33.5	33.1	0.881	0.147	23.0	324.9	255.0	222.1	-13.0	1.23
256	208.6	10.8	107.3	33.3	33.2	0.882	0.147	23.0	324.8	256.0	223.0	-13.0	1.24
257	208.5	10.7	108.3	33.2	33.3	0.883	0.146	22.9	324.7	257.0	223.8	-13.0	1.25
258	208.4	10.7	109.4	33.0	33.4	0.884	0.146	22.9	324.5	258.0	224.7	-13.0	1.26
259	208.3	10.6	110.4	32.8	33.5	0.885	0.146	22.9	324.4	259.0	225.6	-13.1	1.27
260	208.2	10.6	111.4	32.7	33.6	0.886	0.146	22.8	324.3	260.0	226.5	-13.1	1.28
261	208.1	10.5	112.4	32.5	33.7	0.887	0.146	22.8	324.2	261.0	227.4	-13.1	1.29
262	208.0	10.5	113.5	32.3	33.8	0.888	0.146	22.7	324.1	262.0	228.3	-13.1	1.31
263	207.9	10.4	114.5	32.1	33.8	0.889	0.146	22.7	324.0	263.0	229.2	-13.1	1.32
264	207.8	10.4	115.5	31.9	33.9	0.890	0.146	22.6	323.9	264.0	230.0	-13.1	1.33
265	207.7	10.3	116.5	31.7	34.0	0.891	0.146	22.6	323.8	265.0	230.9	-13.1	1.34
270	207.2	10.1	121.5	30.6	34.5	0.896	0.146	22.3	323.2	270.0	235.3	-13.2	1.41

Year	N
2007	1357
2008	533
2009	1110
2010	1160
2011	2103
2012	3613
2013	2593
2014	1994
2015	468
2016	706
2017	2233
2018	2068
Total	19938

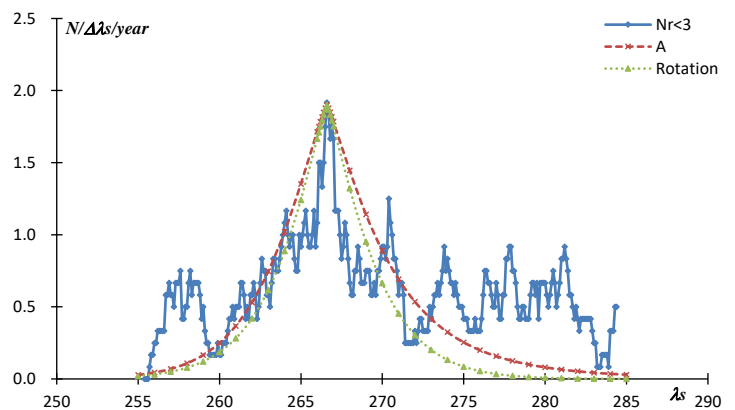


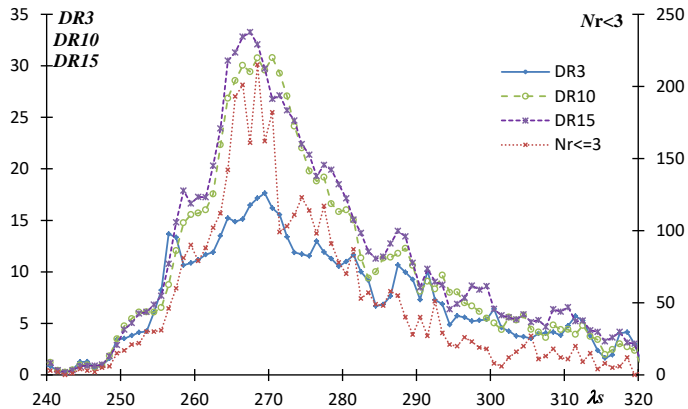
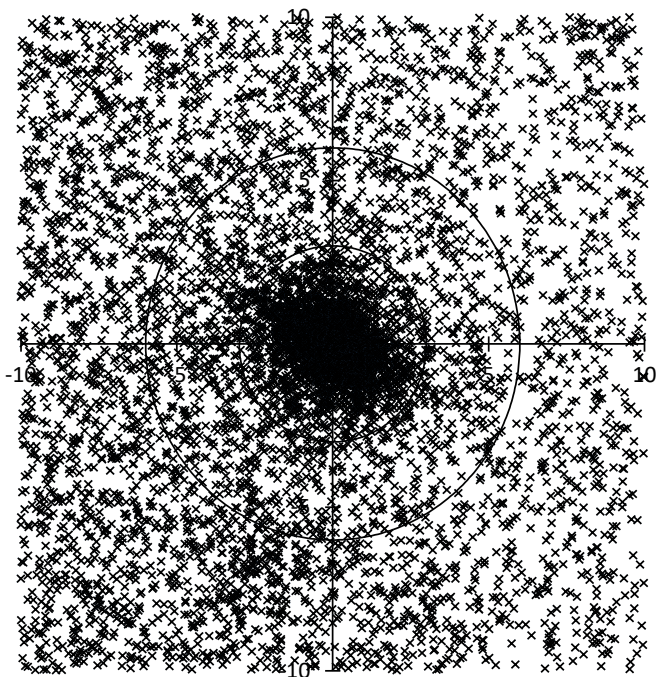


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
TPY03	272	260.3	-31.4
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	266.5	21	
DR3	265.5	12.0	
DR10	264.5	11.3	
DR15	265.5	7.3	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
255	259.1	-34.7	143.1	-22.3	61.0	0.855	0.925	118.7	29.9	75.0	59.6	25.9	6.39
260	259.5	-33.7	147.9	-23.2	61.6	0.862	0.926	120.5	29.3	80.0	64.1	25.0	6.69
261	259.5	-33.5	148.9	-23.3	61.7	0.863	0.926	120.8	29.2	81.0	65.0	24.8	6.76
262	259.6	-33.3	149.8	-23.5	61.9	0.864	0.927	121.2	29.1	82.0	65.9	24.6	6.83
263	259.6	-33.1	150.8	-23.7	62.0	0.866	0.927	121.5	29.0	83.0	66.8	24.4	6.91
264	259.7	-33.0	151.8	-23.9	62.1	0.867	0.927	121.9	28.9	84.0	67.8	24.2	6.99
265	259.8	-32.8	152.7	-24.1	62.2	0.869	0.928	122.3	28.8	85.0	68.7	24.0	7.08
266	259.8	-32.6	153.7	-24.3	62.4	0.871	0.928	122.6	28.6	86.0	69.6	23.8	7.18
266	259.8	-32.6	153.7	-24.3	62.4	0.871	0.928	122.6	28.6	86.0	69.6	23.8	7.18
267	259.9	-32.4	154.7	-24.5	62.5	0.872	0.928	123.0	28.5	87.0	70.5	23.6	7.28
268	259.9	-32.2	155.7	-24.7	62.6	0.874	0.929	123.3	28.4	88.0	71.5	23.4	7.38
269	260.0	-32.0	156.7	-24.9	62.8	0.876	0.929	123.7	28.3	89.0	72.4	23.2	7.49
270	260.1	-31.8	157.7	-25.1	62.9	1.837	0.958	138.4	16.3	90.0	77.6	10.8	-1.14
271	260.1	-31.6	158.7	-25.4	63.0	0.880	0.930	124.4	28.0	91.0	74.3	22.8	7.74
272	260.2	-31.4	159.6	-25.6	63.1	0.882	0.930	124.8	27.9	92.0	75.2	22.6	7.87
273	260.2	-31.2	160.6	-25.8	63.3	0.884	0.930	125.1	27.7	93.0	76.2	22.4	8.02
274	260.3	-31.0	161.6	-26.0	63.4	0.886	0.931	125.5	27.6	94.0	77.1	22.2	8.17
275	260.4	-30.8	162.7	-26.3	63.5	0.888	0.931	125.8	27.5	95.0	78.1	22.0	8.33
276	260.4	-30.6	163.7	-26.5	63.6	0.891	0.932	126.2	27.3	96.0	79.0	21.8	8.51
280	260.7	-29.8	167.7	-27.4	64.2	0.900	0.933	127.6	26.8	100.0	82.9	20.9	9.35
285	260.9	-28.9	172.9	-28.6	64.8	0.914	0.936	129.5	26.0	105.0	87.8	19.8	10.85

Year	N
2007	7
2008	13
2009	21
2010	10
2011	14
2012	12
2013	15
2014	19
2015	15
2016	9
2017	20
2018	18
Total	173

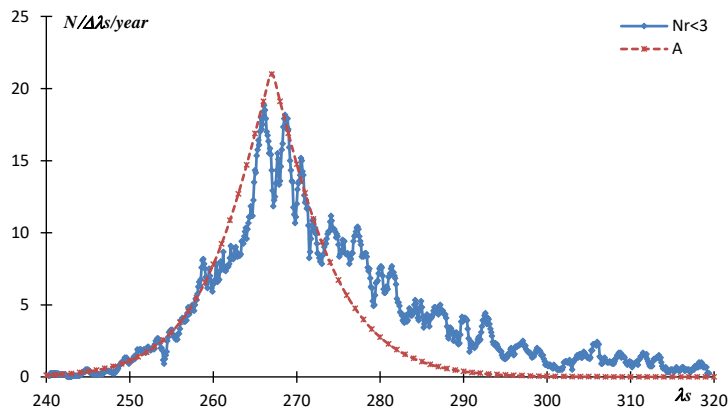


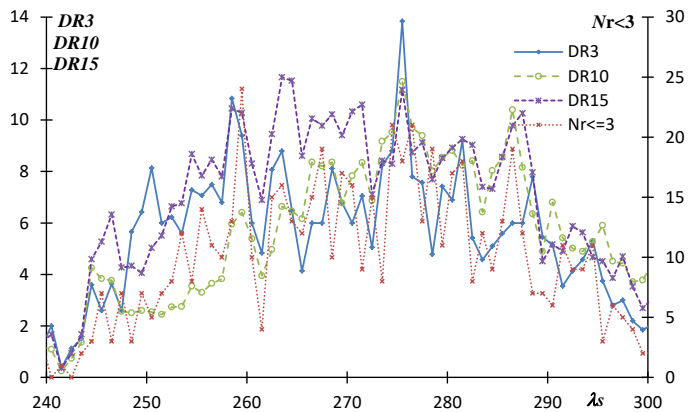
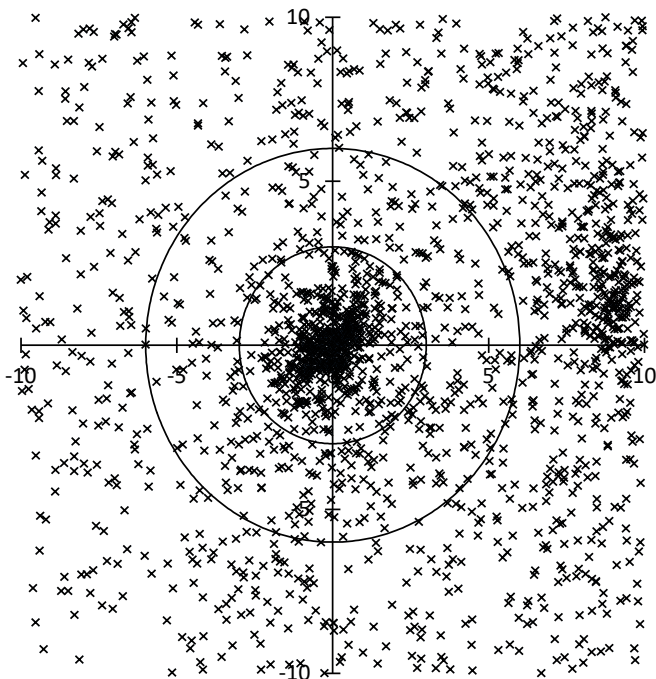


Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
COM*	280	242.3	20.1
$\Delta r =$	3		
$\Delta \lambda_s =$	40		
	$\lambda_s$	max	
$N_{r \leq 3}$	268.5	215	
DR3	269.5	17.6	
DR10	270.5	30.8	
DR15	267.5	33.3	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
240	244.3	22.9	133.7	41.3	63.2	0.978	0.615	132.1	256.3	240.0	350.0	-46.1	27.61
245	244.0	22.6	139.0	39.6	63.2	0.972	0.605	132.5	257.6	245.0	353.0	-46.1	21.72
250	243.7	22.3	144.1	37.8	63.2	0.967	0.594	132.9	258.9	250.0	356.0	-46.0	18.02
255	243.5	21.9	149.1	35.9	63.1	0.962	0.584	133.3	260.3	255.0	359.1	-45.9	15.50
260	243.2	21.6	153.9	34.0	63.1	0.958	0.574	133.7	261.6	260.0	2.1	-45.7	13.68
265	243.0	21.2	158.6	31.9	63.0	0.954	0.564	134.1	262.8	265.0	5.3	-45.5	12.31
268	242.8	21.0	161.4	30.7	63.0	0.952	0.558	134.3	263.6	268.0	7.1	-45.3	11.64
269	242.8	20.9	162.3	30.2	63.0	0.951	0.556	134.4	263.8	269.0	7.8	-45.3	11.44
270	242.7	20.9	163.2	29.8	63.0	0.951	0.554	134.5	264.1	270.0	8.4	-45.2	11.25
271	242.7	20.8	164.1	29.4	63.0	0.950	0.552	134.6	264.3	271.0	9.0	-45.2	11.07
272	242.6	20.7	165.0	29.0	63.0	0.950	0.550	134.6	264.6	272.0	9.7	-45.1	10.90
275	242.5	20.5	167.6	27.7	62.9	0.948	0.544	134.9	265.3	275.0	11.6	-44.9	10.42
280	242.2	20.2	172.0	25.5	62.9	0.945	0.534	135.3	266.5	280.0	14.8	-44.6	9.75
285	242.0	19.8	176.3	23.3	62.9	0.943	0.525	135.8	267.7	285.0	18.1	-44.2	9.22
290	241.7	19.5	180.5	21.1	62.8	0.941	0.516	136.2	268.9	290.0	21.5	-43.8	8.78
295	241.5	19.1	184.7	18.9	62.8	0.940	0.506	136.7	270.1	295.0	24.9	-43.3	8.43
300	241.2	18.8	188.8	16.7	62.7	0.939	0.498	137.2	271.2	300.0	28.4	-42.8	8.15
305	241.0	18.4	192.9	14.5	62.7	0.938	0.489	137.7	272.3	305.0	31.9	-42.3	7.92
310	240.7	18.1	197.0	12.4	62.6	0.938	0.480	138.2	273.4	310.0	35.5	-41.8	7.75
315	240.5	17.7	201.1	10.3	62.6	0.938	0.472	138.7	274.4	315.0	39.1	-41.2	7.62
320	240.2	17.4	205.2	8.2	62.6	0.938	0.464	139.2	275.5	320.0	42.8	-40.6	7.53

Year	N
2007	220
2008	374
2009	372
2010	377
2011	406
2012	286
2013	335
2014	322
2015	282
2016	342
2017	446
2018	330
Total	4092

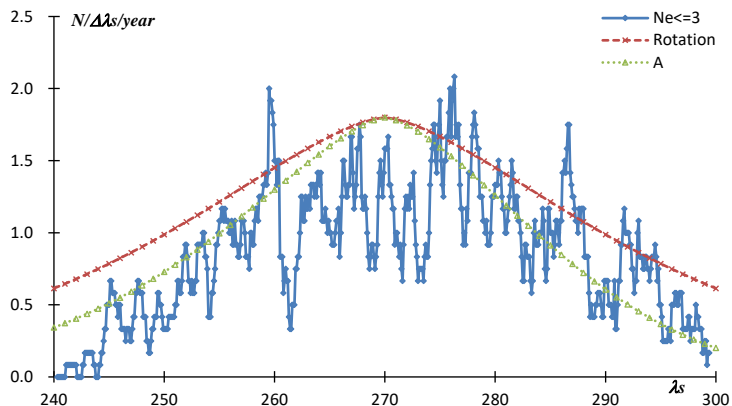




Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
DSV*	270	293.7	14.8
$\Delta r =$	3		
$\Delta \lambda_s =$	30		
	$\lambda_s$	max	
$N_{r \leq 3}$	259.5	24	
DR3	275.5	13.8	
DR10	275.5	11.5	
DR15	263.5	11.7	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
240	297.3	11.5	182.2	11.6	66.1	0.998	0.511	154.3	91.9	240.0	147.9	25.7	247.19
245	296.7	12.1	186.4	10.4	66.1	0.990	0.526	153.4	93.6	245.0	151.0	26.6	51.08
250	296.0	12.6	190.6	9.2	66.1	0.982	0.542	152.5	95.3	250.0	154.1	27.4	29.52
255	295.4	13.2	194.7	8.0	66.1	0.974	0.559	151.7	97.0	255.0	157.0	28.1	21.30
260	294.8	13.7	198.9	6.8	66.1	0.966	0.575	150.8	98.9	260.0	159.9	28.8	17.01
262	294.5	13.9	200.6	6.4	66.1	0.963	0.582	150.5	99.6	262.0	161.0	29.0	15.83
264	294.3	14.1	202.2	5.9	66.1	0.960	0.589	150.2	100.3	264.0	162.1	29.3	14.85
266	294.0	14.4	203.9	5.5	66.1	0.958	0.595	149.9	101.1	266.0	163.2	29.5	14.02
268	293.7	14.6	205.5	5.1	66.1	0.955	0.602	149.6	101.9	268.0	164.3	29.7	13.31
270	293.5	14.8	207.2	4.6	66.1	0.952	0.609	149.2	102.6	270.0	165.4	29.9	12.70
272	293.2	15.0	208.8	4.2	66.1	0.949	0.616	148.9	103.4	272.0	166.4	30.1	12.17
274	293.0	15.2	210.5	3.8	66.1	0.947	0.623	148.6	104.2	274.0	167.5	30.3	11.72
276	292.7	15.4	212.1	3.4	66.1	0.944	0.630	148.3	105.0	276.0	168.5	30.5	11.32
278	292.4	15.6	213.8	3.1	66.1	0.942	0.637	148.0	105.8	278.0	169.5	30.6	10.97
280	292.2	15.9	215.4	2.7	66.1	0.940	0.644	147.7	106.7	280.0	170.5	30.8	10.66
282	291.9	16.1	217.1	2.3	66.1	0.937	0.650	147.4	107.5	282.0	171.5	30.9	10.39
285	291.5	16.4	219.5	1.8	66.1	0.934	0.661	147.0	108.7	285.0	173.0	31.1	10.05
290	290.9	16.9	223.7	1.0	66.1	0.929	0.679	146.3	110.9	290.0	175.3	31.3	9.61
295	290.2	17.5	227.8	0.3	66.1	0.925	0.696	145.5	113.1	295.0	177.7	31.4	9.31
300	289.5	18.0	231.9	-0.3	66.1	0.922	0.714	144.9	115.3	300.0	179.9	31.4	9.12
305	288.9	18.5	236.0	-0.8	66.1	0.919	0.732	144.2	117.6	305.0	182.2	31.2	9.03

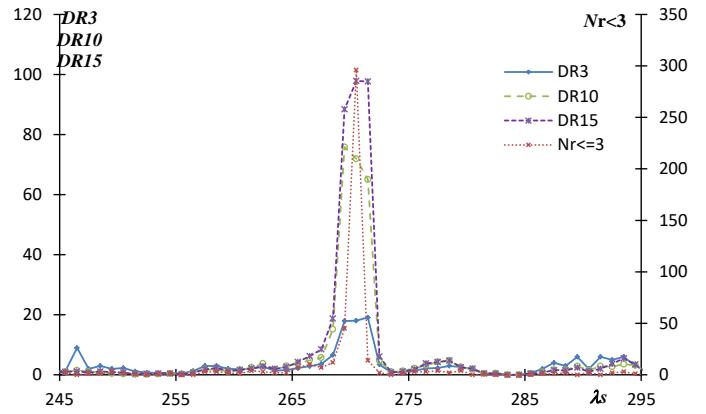
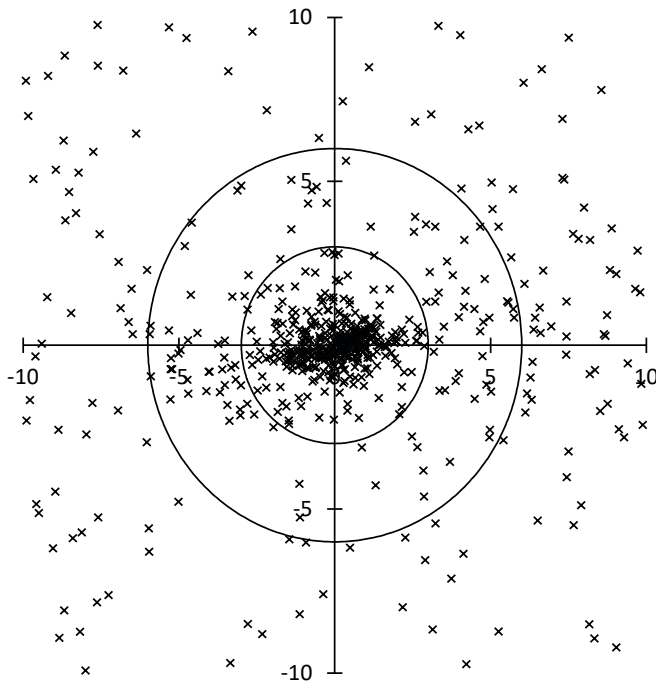
Year	N
2007	33
2008	59
2009	50
2010	55
2011	78
2012	39
2013	49
2014	46
2015	48
2016	44
2017	63
2018	51
Total	615



#0015URS

Ursids

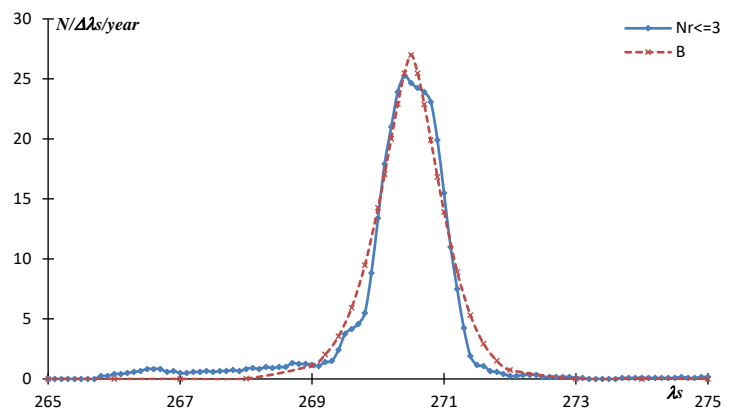
$\alpha=219.35, \delta=75.34, \lambda_s=271$



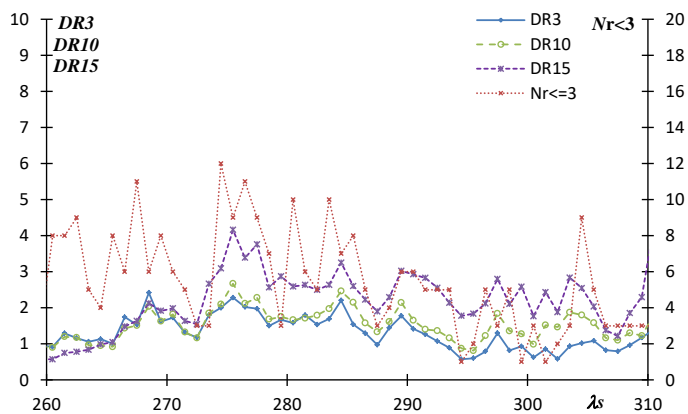
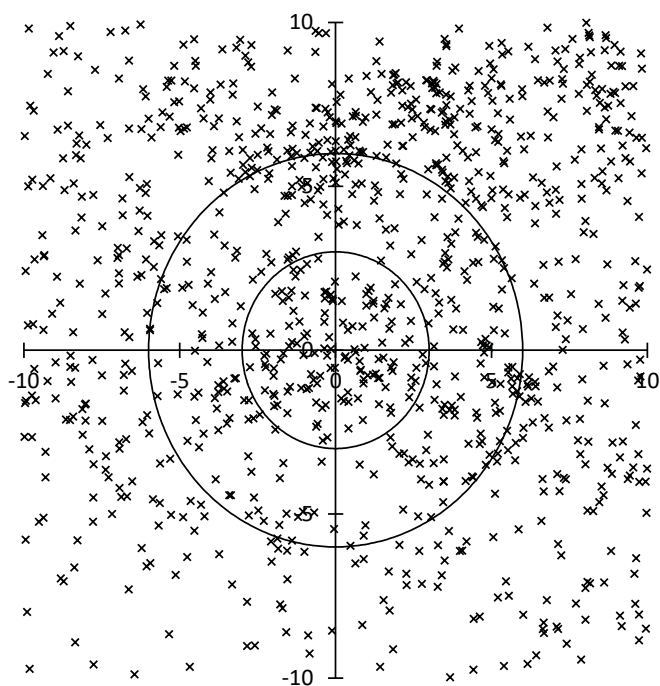
Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
URS00	271	218.5	72.1
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	270.5	296	
DR3	271.5	19.1	
DR10	269.5	75.8	
DR15	270.5	97.8	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
265	221.1	68.6	205.0	76.3	34.9	0.825	0.921	56.0	211.0	265.0	103.5	-25.3	5.27
266	220.7	69.2	207.7	76.1	34.6	0.822	0.924	55.5	210.0	266.0	104.1	-24.3	5.21
267	220.4	69.9	210.3	76.0	34.2	0.819	0.928	54.9	209.1	267.0	104.7	-23.4	5.14
268	220.0	70.5	212.9	75.8	33.9	0.816	0.932	54.3	208.1	268.0	105.3	-22.5	5.07
269	219.6	71.1	215.4	75.6	33.6	0.813	0.935	53.7	207.2	269.0	105.9	-21.6	5.01
270	219.2	71.7	217.8	75.4	33.2	0.810	0.938	53.1	206.3	270.0	106.5	-20.8	4.94
270.1	219.2	71.7	218.1	75.4	33.2	0.810	0.938	53.0	206.2	270.1	106.6	-20.7	4.94
270.2	219.1	71.8	218.3	75.4	33.1	0.810	0.939	53.0	206.1	270.2	106.7	-20.6	4.93
270.3	219.1	71.9	218.5	75.4	33.1	0.809	0.939	52.9	206.0	270.3	106.7	-20.5	4.92
270.4	219.0	71.9	218.8	75.4	33.1	0.809	0.939	52.9	205.9	270.4	106.8	-20.4	4.92
270.5	219.0	72.0	219.0	75.3	33.0	0.809	0.940	52.8	205.9	270.5	106.8	-20.3	4.91
270.6	218.9	72.0	219.2	75.3	33.0	0.808	0.940	52.7	205.8	270.6	106.9	-20.2	4.90
270.7	218.9	72.1	219.5	75.3	33.0	0.808	0.940	52.7	205.7	270.7	106.9	-20.2	4.90
270.8	218.8	72.2	219.7	75.3	32.9	0.808	0.941	52.6	205.6	270.8	107.0	-20.1	4.89
270.9	218.8	72.2	220.0	75.3	32.9	0.807	0.941	52.6	205.5	270.9	107.1	-20.0	4.88
270	219.2	71.7	217.8	75.4	33.2	0.810	0.938	53.1	206.3	270.0	106.5	-20.8	4.94
271	218.7	72.3	220.2	75.2	32.9	0.807	0.941	52.5	205.4	271.0	107.1	-19.9	4.88
272	218.3	72.9	222.5	75.1	32.5	0.804	0.944	51.9	204.5	272.0	107.7	-19.1	4.81
273	217.8	73.5	224.8	74.9	32.2	0.801	0.947	51.4	203.6	273.0	108.3	-18.2	4.75
274	217.2	74.1	227.0	74.7	31.8	0.797	0.950	50.8	202.7	274.0	108.8	-17.4	4.69
275	216.6	74.7	229.2	74.5	31.5	0.794	0.952	50.2	201.9	275.0	109.4	-16.6	4.62

Year	N
2007	2
2008	11
2009	45
2010	45
2011	81
2012	6
2013	19
2014	18
2015	5
2016	14
2017	124
2018	20
Total	390



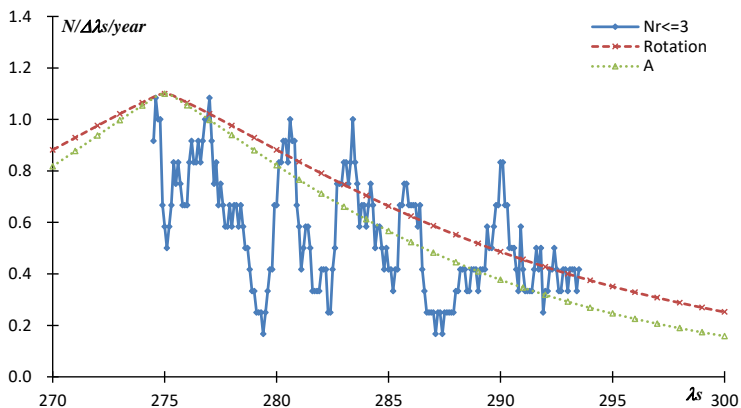




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
SCC04	284.1	188.7	-5.4
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	274.5	12	
DR3	275.5	2.3	
DR10	275.5	2.7	
DR15	275.5	4.2	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
270	189.8	-5.7	100.3	17.4	26.7	0.799	0.406	5.9	108.8	90.0	198.9	5.6	2.02
272	189.7	-5.4	102.3	17.5	26.8	0.800	0.406	5.6	108.7	92.0	200.8	5.3	2.04
274	189.7	-5.2	104.3	17.6	26.9	0.802	0.407	5.3	108.6	94.0	202.6	5.1	2.05
276	189.6	-4.9	106.3	17.7	26.9	0.803	0.407	5.1	108.4	96.0	204.5	4.8	2.07
278	189.5	-4.6	108.3	17.7	27.0	0.805	0.407	4.8	108.3	98.0	206.4	4.6	2.09
280	189.4	-4.4	110.3	17.7	27.0	0.807	0.407	4.6	108.2	100.0	208.2	4.3	2.11
281	189.4	-4.3	111.4	17.7	27.0	0.807	0.408	4.4	108.1	101.0	209.2	4.2	2.11
282	189.3	-4.1	112.4	17.7	27.1	0.808	0.408	4.3	108.0	102.0	210.1	4.1	2.12
283	189.3	-4.0	113.4	17.6	27.1	0.809	0.408	4.2	108.0	103.0	211.0	4.0	2.13
284	189.2	-3.9	114.4	17.6	27.1	0.810	0.408	4.0	107.9	104.0	212.0	3.8	2.14
285	189.2	-3.8	115.4	17.6	27.1	0.810	0.408	3.9	107.9	105.0	212.9	3.7	2.15
286	189.1	-3.6	116.4	17.5	27.2	0.811	0.408	3.8	107.8	106.0	213.8	3.6	2.16
287	189.1	-3.5	117.4	17.5	27.2	0.812	0.409	3.7	107.7	107.0	214.8	3.5	2.17
288	189.1	-3.4	118.4	17.4	27.2	0.813	0.409	3.5	107.7	108.0	215.7	3.4	2.18
289	189.0	-3.2	119.4	17.4	27.2	0.813	0.409	3.4	107.6	109.0	216.6	3.2	2.19
290	189.0	-3.1	120.4	17.3	27.3	0.814	0.409	3.3	107.5	110.0	217.6	3.1	2.20
292	188.9	-2.9	122.5	17.2	27.3	0.816	0.410	3.0	107.4	112.0	219.4	2.9	2.22
294	188.8	-2.6	124.5	17.0	27.4	0.817	0.410	2.7	107.3	114.0	221.3	2.6	2.24
296	188.7	-2.3	126.5	16.8	27.4	0.819	0.410	2.5	107.1	116.0	223.1	2.4	2.27
298	188.6	-2.1	128.5	16.6	27.5	0.821	0.411	2.2	107.0	118.0	225.0	2.1	2.29
300	188.5	-1.8	130.5	16.4	27.5	0.822	0.411	1.9	106.8	120.0	226.8	1.8	2.31

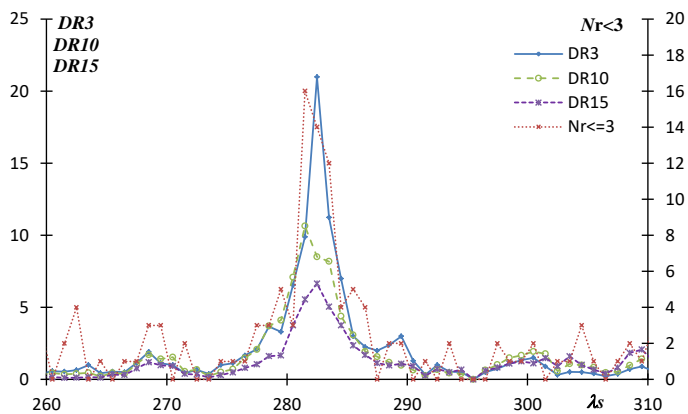
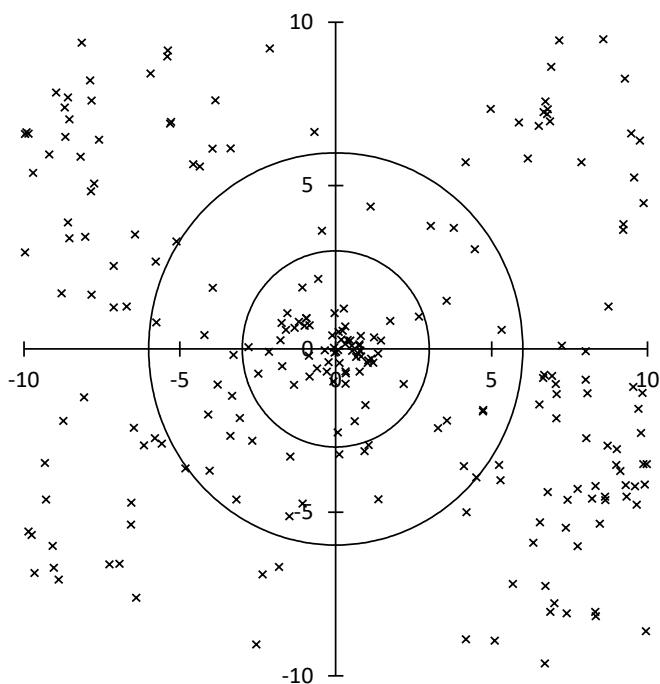
Year	N
2007	4
2008	13
2009	7
2010	8
2011	13
2012	10
2013	14
2014	7
2015	14
2016	11
2017	15
2018	19
Total	135



#0319JLE

January Leonids

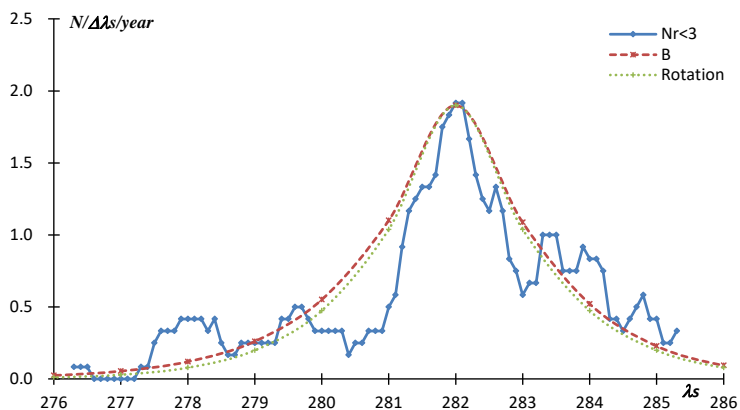
$\alpha=148.3, \delta=23.9, \lambda_s=282.5$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
JLE01	281	219.6	10.3
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$Nr \leq 3$	281.5	16	
DR3	282.5	21.0	
DR10	281.5	10.6	
DR15	282.5	6.7	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
270	223.5	10.7	139.4	27.0	51.4	0.976	0.062	115.3	333.8	270.0	281.9	-23.5	2.60
271	223.2	10.7	140.1	26.7	51.5	0.978	0.060	114.5	334.0	271.0	282.5	-23.5	2.72
272	222.9	10.6	140.8	26.5	51.5	0.979	0.059	113.7	334.1	272.0	283.1	-23.6	2.85
273	222.5	10.6	141.5	26.2	51.6	0.981	0.058	112.9	334.2	273.0	283.6	-23.6	3.00
274	222.2	10.5	142.2	26.0	51.6	0.982	0.057	112.1	334.4	274.0	284.2	-23.6	3.16
275	221.9	10.5	142.8	25.7	51.7	0.983	0.056	111.2	334.5	275.0	284.8	-23.7	3.34
276	221.6	10.4	143.5	25.5	51.7	0.985	0.055	110.3	334.6	276.0	285.4	-23.7	3.55
277	221.2	10.4	144.2	25.2	51.8	0.986	0.054	109.4	334.7	277.0	285.9	-23.7	3.79
278	220.9	10.3	144.9	24.9	51.8	0.987	0.053	108.5	334.9	278.0	286.5	-23.8	4.05
279	220.6	10.3	145.5	24.7	51.9	0.988	0.052	107.5	335.0	279.0	287.0	-23.8	4.37
280	220.3	10.2	146.2	24.4	51.9	0.989	0.051	106.5	335.1	280.0	287.5	-23.8	4.74
281	219.9	10.2	146.9	24.1	52.0	0.990	0.050	105.5	335.2	281.0	288.0	-23.8	5.17
282	219.6	10.1	147.5	23.9	52.0	0.991	0.049	104.5	335.3	282.0	288.6	-23.8	5.71
283	219.3	10.1	148.2	23.6	52.1	0.992	0.048	103.4	335.4	283.0	289.1	-23.9	6.36
284	219.0	10.0	148.9	23.3	52.1	0.993	0.047	102.4	335.5	284.0	289.6	-23.9	7.20
285	218.6	10.0	149.5	23.0	52.2	0.994	0.046	101.3	335.6	285.0	290.1	-23.9	8.29
286	218.3	9.9	150.2	22.8	52.2	0.995	0.046	100.1	335.7	286.0	290.5	-23.9	9.79
287	218.0	9.9	150.8	22.5	52.3	0.996	0.045	99.0	335.8	287.0	291.0	-23.9	11.95
288	217.7	9.8	151.5	22.2	52.3	0.997	0.044	97.8	335.9	288.0	291.5	-23.9	15.38
289	217.3	9.8	152.1	21.9	52.4	0.998	0.044	96.6	335.9	289.0	291.9	-23.9	21.62
290	217.0	9.7	152.8	21.6	52.4	0.999	0.043	95.3	336.0	290.0	292.4	-23.9	36.53

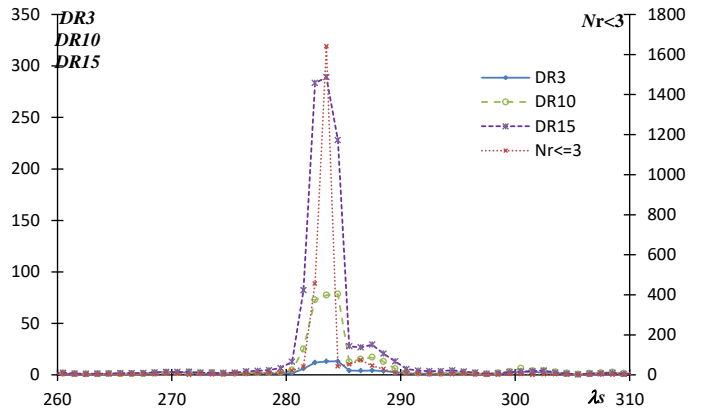
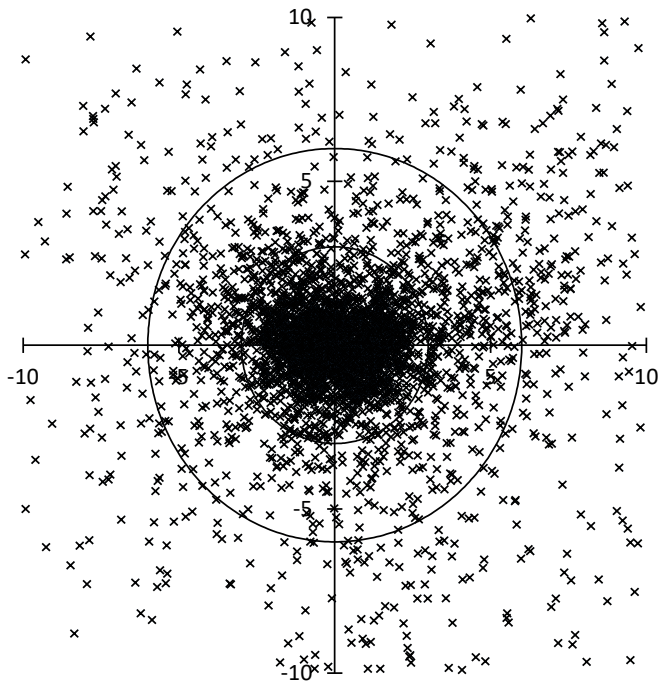
Year	N
2007	1
2008	4
2009	7
2010	5
2011	9
2012	4
2013	8
2014	5
2015	4
2016	6
2017	5
2018	8
Total	66



#0010QUA

Quadrantids

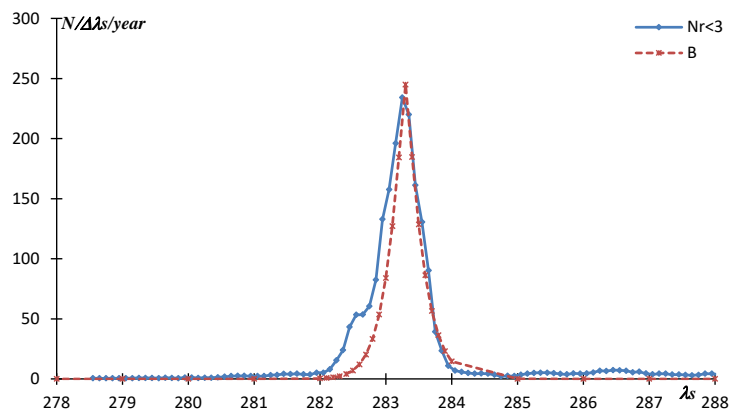
$\alpha=230.0$ ,  $\delta=49.5$ ,  $\lambda_s=283.28$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
QUA01	283.2	277.7	63.4
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
$Nr_{<=3}$	283.5	1641	
DR3	284.5	13.2	
DR10	284.5	78.4	
DR15	283.5	289.1	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
277	277.2	62.1	225.2	49.9	41.0	0.603	0.978	72.7	170.5	277.0	94.2	9.0	2.46
278	277.1	62.3	226.0	49.9	40.8	0.606	0.979	72.4	170.8	278.0	95.2	8.8	2.48
279	277.1	62.6	226.7	49.8	40.7	0.610	0.979	72.1	171.0	279.0	96.2	8.6	2.51
280	277.0	62.9	227.5	49.8	40.6	0.613	0.979	71.8	171.2	280.0	97.2	8.4	2.53
281	276.9	63.1	228.3	49.7	40.5	0.617	0.979	71.5	171.4	281.0	98.2	8.2	2.55
282	276.8	63.4	229.0	49.7	40.4	0.620	0.979	71.1	171.6	282.0	99.3	7.9	2.58
282.2	276.8	63.4	229.2	49.7	40.3	0.621	0.979	71.1	171.6	282.2	99.5	7.9	2.58
282.4	276.8	63.5	229.3	49.7	40.3	0.621	0.979	71.0	171.7	282.4	99.7	7.9	2.59
282.6	276.8	63.5	229.5	49.7	40.3	0.622	0.979	71.0	171.7	282.6	99.9	7.8	2.59
282.8	276.8	63.6	229.6	49.7	40.3	0.623	0.979	70.9	171.8	282.8	100.1	7.8	2.60
283	276.7	63.6	229.8	49.7	40.3	0.624	0.979	70.8	171.8	283.0	100.3	7.7	2.60
283.1	276.7	63.6	229.8	49.7	40.2	0.624	0.979	70.8	171.8	283.1	100.4	7.7	2.60
283.2	276.7	63.7	229.9	49.7	40.2	0.624	0.979	70.8	171.8	283.2	100.5	7.7	2.61
283.3	276.7	63.7	230.0	49.7	40.2	0.625	0.979	70.7	171.9	283.3	100.6	7.7	2.61
283.4	276.7	63.7	230.0	49.7	40.2	0.625	0.980	70.7	171.9	283.4	100.7	7.7	2.61
283.6	276.7	63.8	230.2	49.6	40.2	0.626	0.980	70.7	171.9	283.6	100.9	7.6	2.62
283.8	276.7	63.8	230.3	49.6	40.2	0.626	0.980	70.6	172.0	283.8	101.1	7.6	2.62
284	276.7	63.9	230.5	49.6	40.1	0.627	0.980	70.5	172.0	284.0	101.3	7.5	2.63
285	276.6	64.1	231.2	49.6	40.0	0.631	0.980	70.2	172.2	285.0	102.3	7.3	2.65
286	276.5	64.4	232.0	49.6	39.9	0.634	0.980	69.9	172.4	286.0	103.4	7.1	2.68
287	276.4	64.6	232.7	49.6	39.8	0.638	0.980	69.6	172.6	287.0	104.4	6.9	2.70

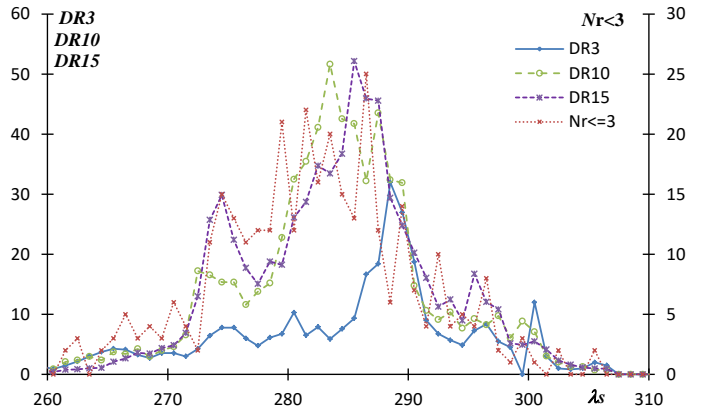
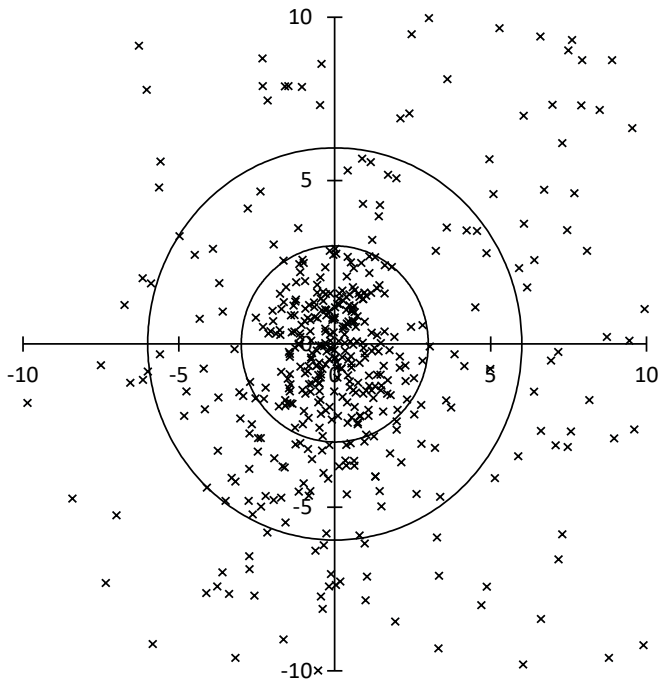
Year	N
2007	71
2008	124
2009	471
2010	138
2011	98
2012	159
2013	238
2014	469
2015	47
2016	247
2017	112
2018	230
Total	2404



#0331AHY

alpha Hydrids

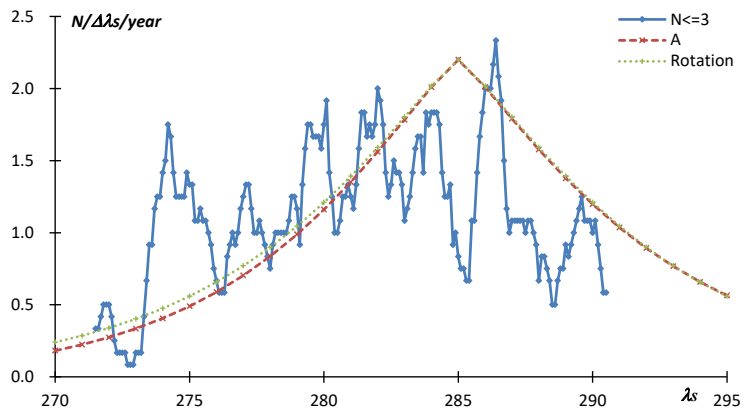
$\alpha=127.6, \delta=-7.9, \lambda_s=285.5$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
AHY05	281.2	207.9	-26.6
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$N_{r \leq 3}$	286.5	25	
DR3	288.5	32.0	
DR10	283.5	51.6	
DR15	285.5	52.2	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
265	212.8	-26.1	114.8	-5.0	45.7	0.962	0.261	68.3	119.9	85.0	232.2	53.6	6.92
270	211.5	-26.2	118.1	-5.8	45.1	0.963	0.265	65.8	119.3	90.0	233.9	52.7	7.11
275	210.3	-26.3	121.4	-6.6	44.5	0.964	0.273	62.8	118.1	95.0	234.4	51.7	7.65
277	209.8	-26.3	122.7	-6.9	44.3	0.965	0.276	61.7	117.7	97.0	234.9	51.2	7.82
278	209.5	-26.3	123.4	-7.1	44.2	0.965	0.278	61.2	117.5	98.0	235.2	51.0	7.91
279	209.3	-26.3	124.0	-7.3	44.1	0.965	0.279	60.7	117.3	99.0	235.5	50.8	8.00
280	209.0	-26.3	124.7	-7.5	43.9	0.965	0.281	60.2	117.1	100.0	235.8	50.6	8.09
281	208.8	-26.4	125.3	-7.7	43.8	0.965	0.282	59.7	116.8	101.0	236.0	50.4	8.18
282	208.5	-26.4	126.0	-7.9	43.7	0.966	0.284	59.1	116.6	102.0	236.3	50.1	8.28
283	208.3	-26.4	126.6	-8.0	43.6	0.966	0.286	58.6	116.4	103.0	236.6	49.9	8.37
284	208.0	-26.4	127.3	-8.2	43.5	0.966	0.287	58.2	116.1	104.0	236.9	49.7	8.47
285	207.8	-26.4	127.9	-8.4	43.3	0.966	0.289	57.7	115.9	105.0	237.2	49.5	8.58
286	207.5	-26.4	128.6	-8.6	43.2	0.967	0.291	57.2	115.7	106.0	237.5	49.2	8.68
287	207.3	-26.4	129.2	-8.8	43.1	0.967	0.293	56.7	115.4	107.0	237.9	49.0	8.79
288	207.0	-26.5	129.9	-9.0	43.0	0.967	0.294	56.2	115.2	108.0	238.2	48.8	8.90
289	206.8	-26.5	130.5	-9.2	42.9	0.967	0.296	55.7	114.9	109.0	238.5	48.5	9.02
290	206.5	-26.5	131.2	-9.4	42.7	0.967	0.298	55.3	114.7	110.0	238.8	48.3	9.13
291	206.3	-26.5	131.8	-9.6	42.6	0.968	0.300	54.8	114.4	111.0	239.2	48.1	9.25
292	206.0	-26.5	132.5	-9.9	42.5	0.968	0.302	54.3	114.1	112.0	239.5	47.8	9.38
295	205.2	-26.5	134.4	-10.5	42.1	0.968	0.308	53.0	113.3	115.0	240.6	47.1	9.77
300	204.0	-26.6	137.6	-11.6	41.5	0.970	0.319	50.8	111.9	120.0	242.4	45.9	10.49

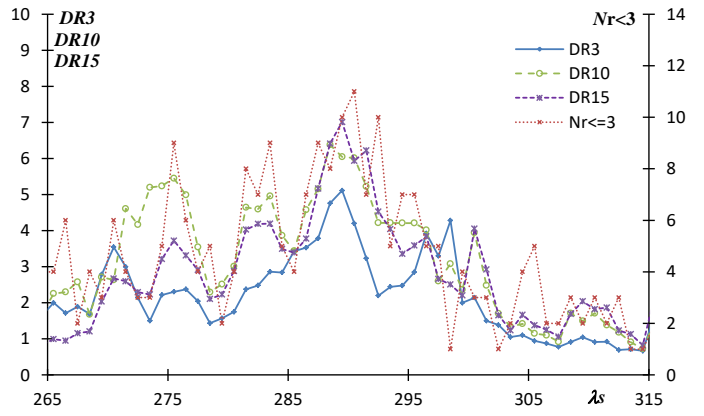
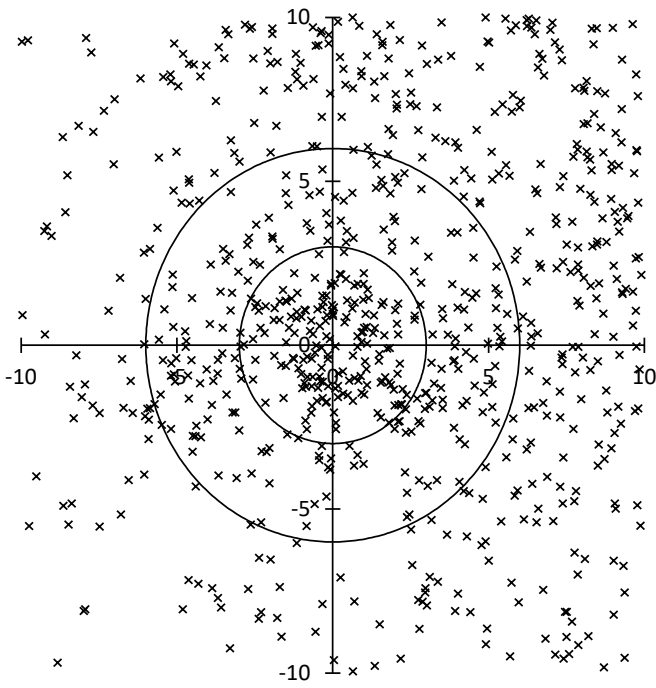
Year	N
2007	11
2008	18
2009	26
2010	27
2011	28
2012	15
2013	24
2014	22
2015	16
2016	22
2017	26
2018	29
Total	264



#0515OLE

omicron Leonids

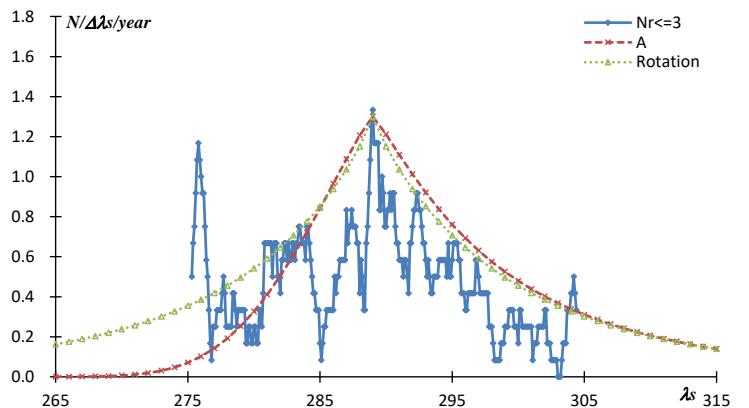
$\alpha=144, \delta=7, \lambda_s=296$

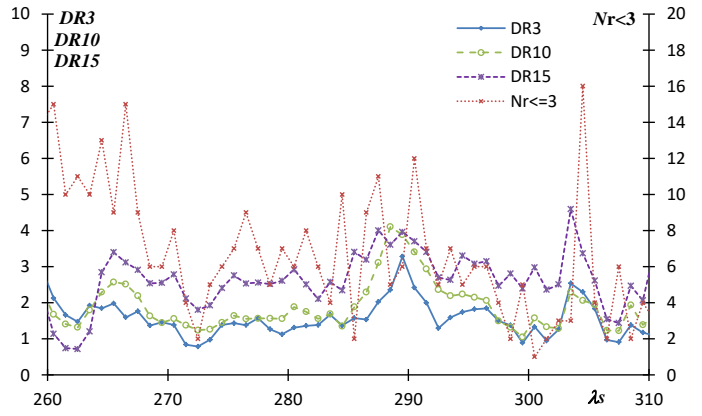
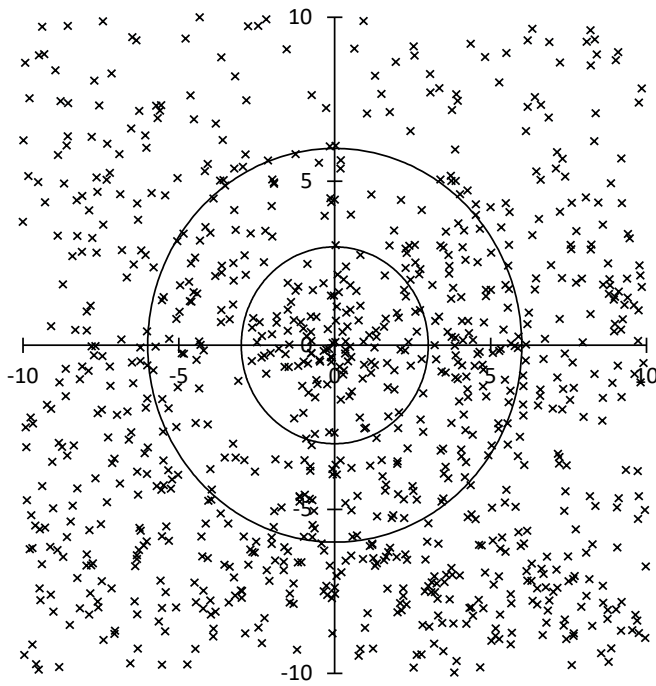


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
OLE00	290	208.0	-6.9
$\Delta r=$	3		
$\Delta \lambda_s=$	15		
	$\lambda_s$	max	
Nr<=3	290.5	11	
DR3	289.5	5.1	
DR10	288.5	6.4	
DR15	289.5	7.0	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
265	209.9	-9.7	115.0	11.6	37.5	0.933	0.102	28.1	149.0	85.0	237.0	14.0	1.52
270	209.5	-9.0	119.8	11.4	38.3	0.943	0.094	27.8	149.8	90.0	242.8	13.5	1.64
275	209.2	-8.3	124.5	11.1	39.2	0.950	0.090	26.6	149.8	95.0	247.5	13.0	1.82
280	208.9	-7.6	129.3	10.7	40.1	0.958	0.084	25.6	150.2	100.0	252.7	12.4	2.03
284	208.6	-7.1	133.0	10.2	40.8	0.964	0.080	24.7	150.6	104.0	256.9	11.9	2.25
285	208.5	-6.9	134.0	10.1	41.0	0.966	0.079	24.5	150.7	105.0	257.9	11.7	2.31
286	208.5	-6.8	134.9	10.0	41.2	0.967	0.078	24.2	150.7	106.0	258.9	11.6	2.38
287	208.4	-6.7	135.9	9.9	41.3	0.969	0.077	24.0	150.8	107.0	260.0	11.4	2.45
288	208.3	-6.5	136.8	9.7	41.5	0.970	0.076	23.7	150.9	108.0	261.0	11.3	2.53
289	208.3	-6.4	137.7	9.6	41.7	0.971	0.075	23.5	151.0	109.0	262.1	11.1	2.62
290	208.2	-6.2	138.7	9.4	41.9	0.973	0.074	23.2	151.1	110.0	263.1	11.0	2.71
291	208.1	-6.1	139.6	9.3	42.0	0.974	0.073	22.9	151.2	111.0	264.1	10.8	2.80
292	208.1	-6.0	140.6	9.1	42.2	0.975	0.072	22.6	151.3	112.0	265.2	10.6	2.91
293	208.0	-5.8	141.5	9.0	42.4	0.977	0.071	22.3	151.4	113.0	266.2	10.5	3.02
294	207.9	-5.7	142.4	8.8	42.6	0.978	0.070	22.0	151.5	114.0	267.3	10.3	3.15
295	207.9	-5.5	143.4	8.7	42.7	0.979	0.069	21.6	151.6	115.0	268.3	10.1	3.29
296	207.8	-5.4	144.3	8.5	42.9	0.980	0.068	21.3	151.7	116.0	269.3	9.9	3.44
300	207.5	-4.8	148.0	7.8	43.6	0.985	0.065	19.9	152.0	120.0	273.5	9.2	4.24
305	207.2	-4.1	152.7	6.8	44.5	0.990	0.060	17.9	152.5	125.0	278.6	8.2	6.05
310	206.9	-3.4	157.3	5.8	45.4	0.995	0.057	15.6	152.9	130.0	283.7	7.0	10.89
315	206.5	-2.7	161.9	4.7	46.3	0.999	0.053	13.0	153.3	135.0	288.9	5.8	63.69

Year	N
2007	6
2008	11
2009	17
2010	10
2011	14
2012	9
2013	18
2014	13
2015	22
2016	10
2017	25
2018	17
Total	172

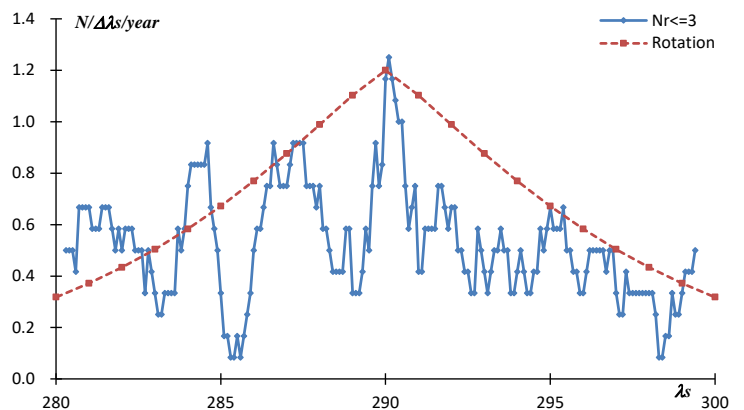


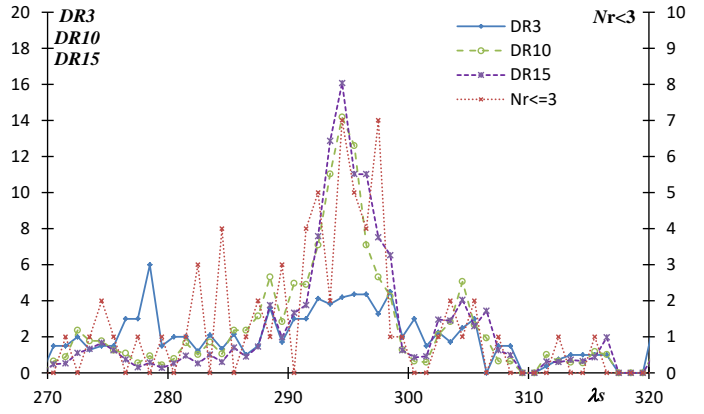
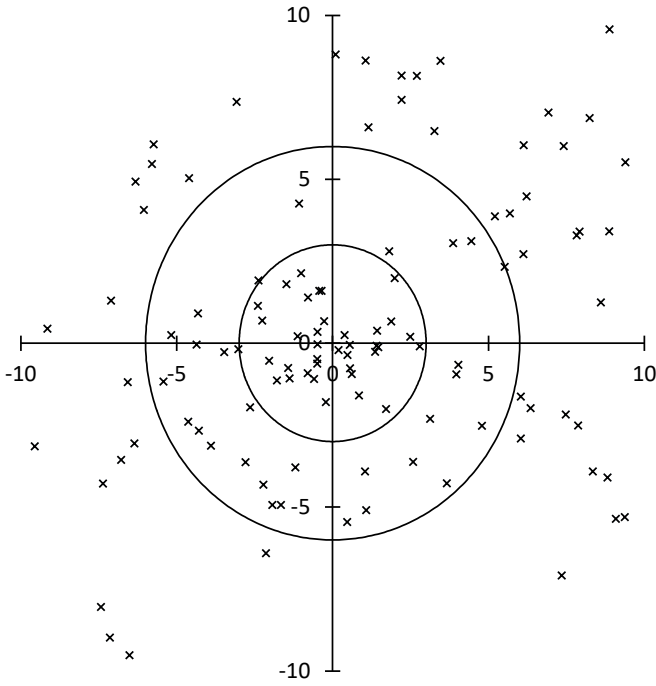


Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
NCC03	*290	189.4	1.2
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
Nr<=3	290.5	12	
DR3	289.5	3.3	
DR10	288.5	4.1	
DR15	287.5	4.0	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
270	190.8	2.4	102.0	25.4	26.9	0.799	0.387	2.6	291.4	270.0	201.4	-2.4	1.93
275	190.4	2.4	107.1	24.9	27.1	0.804	0.390	2.5	290.7	275.0	205.7	-2.4	1.99
280	190.1	2.3	112.1	24.3	27.3	0.809	0.393	2.5	289.9	280.0	210.0	-2.3	2.06
283	189.9	2.3	115.1	23.8	27.4	0.813	0.395	2.5	289.5	283.0	212.5	-2.3	2.11
284	189.8	2.3	116.1	23.6	27.4	0.814	0.396	2.5	289.3	284.0	213.4	-2.3	2.13
285	189.7	2.3	117.1	23.5	27.4	0.815	0.397	2.5	289.2	285.0	214.2	-2.3	2.14
286	189.6	2.3	118.1	23.3	27.5	0.816	0.397	2.5	289.1	286.0	215.1	-2.3	2.16
287	189.6	2.3	119.1	23.1	27.5	0.817	0.398	2.5	288.9	287.0	215.9	-2.3	2.17
288	189.5	2.3	120.1	22.9	27.5	0.818	0.399	2.4	288.8	288.0	216.8	-2.3	2.19
289	189.4	2.3	121.0	22.7	27.6	0.819	0.399	2.4	288.6	289.0	217.6	-2.3	2.21
290	189.4	2.3	122.0	22.5	27.6	0.820	0.400	2.4	288.5	290.0	218.5	-2.3	2.23
291	189.3	2.3	123.0	22.3	27.6	0.822	0.400	2.4	288.3	291.0	219.3	-2.3	2.24
292	189.2	2.3	124.0	22.1	27.7	0.823	0.401	2.4	288.2	292.0	220.2	-2.3	2.26
293	189.1	2.3	124.9	21.9	27.7	0.824	0.402	2.4	288.0	293.0	221.1	-2.3	2.28
294	189.1	2.3	125.9	21.7	27.7	0.825	0.402	2.4	287.9	294.0	221.9	-2.3	2.30
295	189.0	2.2	126.9	21.4	27.8	0.826	0.403	2.4	287.7	295.0	222.8	-2.3	2.32
296	188.9	2.2	127.8	21.2	27.8	0.827	0.404	2.4	287.6	296.0	223.6	-2.3	2.34
297	188.8	2.2	128.8	21.0	27.8	0.829	0.404	2.4	287.5	297.0	224.5	-2.3	2.36
300	188.6	2.2	131.7	20.2	27.9	0.832	0.406	2.4	287.0	300.0	227.0	-2.3	2.42
305	188.3	2.2	136.4	18.9	28.1	0.839	0.409	2.3	286.3	305.0	231.3	-2.2	2.54
310	187.9	2.1	141.0	17.5	28.3	0.845	0.413	2.3	285.6	310.0	235.6	-2.2	2.66

Year	N
2007	4
2008	10
2009	11
2010	9
2011	14
2012	6
2013	15
2014	8
2015	9
2016	14
2017	18
2018	8
Total	126

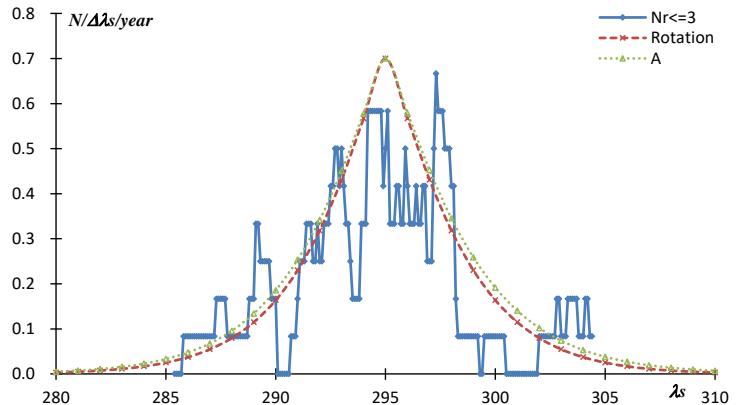




Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
XCB03	295	305.3	51.1
$\Delta r=$	3		
$\Delta \lambda_s=$	5		
	$\lambda_s$	max	
Nr<=3	294.5	7	
DR3	298.5	4.5	
DR10	294.5	14.2	
DR15	294.5	16.1	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
285	304.5	51.3	241.4	31.8	45.1	0.770	0.795	78.8	124.1	285.0	88.9	54.3	3.45
286	304.7	51.3	242.3	31.6	45.2	0.776	0.795	78.7	124.1	286.0	89.9	54.3	3.54
287	304.9	51.3	243.1	31.4	45.2	0.782	0.794	78.6	124.1	287.0	90.8	54.3	3.63
288	305.1	51.3	244.0	31.2	45.3	0.788	0.793	78.6	124.1	288.0	91.7	54.2	3.73
289	305.3	51.3	244.8	31.0	45.3	0.794	0.793	78.5	124.2	289.0	92.7	54.2	3.84
290	305.5	51.4	245.7	30.8	45.3	0.800	0.792	78.5	124.2	290.0	93.6	54.1	3.95
291	305.7	51.4	246.5	30.6	45.4	0.806	0.791	78.4	124.2	291.0	94.5	54.1	4.07
292	305.9	51.4	247.4	30.4	45.4	0.812	0.791	78.3	124.2	292.0	95.5	54.1	4.20
293	306.1	51.4	248.2	30.3	45.4	0.818	0.790	78.3	124.2	293.0	96.4	54.0	4.34
294	306.3	51.4	249.1	30.1	45.5	0.824	0.789	78.2	124.3	294.0	97.3	54.0	4.48
295	306.5	51.4	249.9	30.0	45.5	0.830	0.789	78.2	124.3	295.0	98.2	54.0	4.64
296	306.7	51.4	250.8	29.8	45.6	0.836	0.788	78.1	124.3	296.0	99.2	53.9	4.81
297	306.9	51.4	251.6	29.7	45.6	0.842	0.788	78.0	124.3	297.0	100.1	53.9	4.99
298	307.1	51.5	252.5	29.5	45.6	0.848	0.787	78.0	124.3	298.0	101.0	53.9	5.19
299	307.3	51.5	253.3	29.4	45.7	0.855	0.786	77.9	124.4	299.0	102.0	53.8	5.41
300	307.5	51.5	254.2	29.3	45.7	0.861	0.786	77.9	124.4	300.0	102.9	53.8	5.64
301	307.7	51.5	255.0	29.2	45.7	0.867	0.785	77.8	124.4	301.0	103.8	53.8	5.90
302	307.9	51.5	255.9	29.0	45.8	0.873	0.785	77.7	124.4	302.0	104.8	53.7	6.18
303	308.2	51.5	256.7	28.9	45.8	0.879	0.784	77.7	124.4	303.0	105.7	53.7	6.49
304	308.4	51.5	257.6	28.8	45.9	0.885	0.784	77.6	124.4	304.0	106.6	53.7	6.84
305	308.6	51.5	258.4	28.8	45.9	0.892	0.783	77.6	124.5	305.0	107.6	53.6	7.23

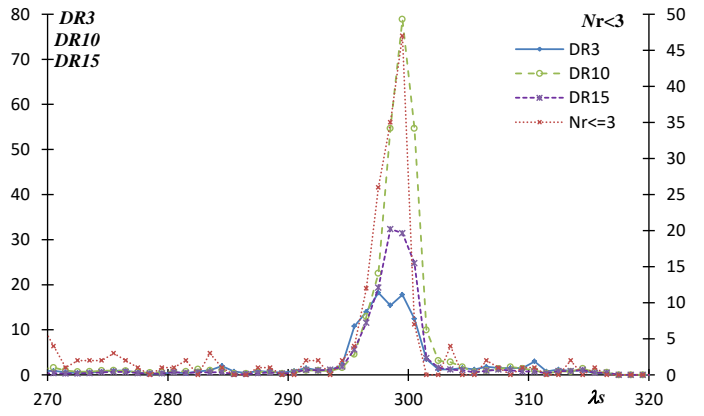
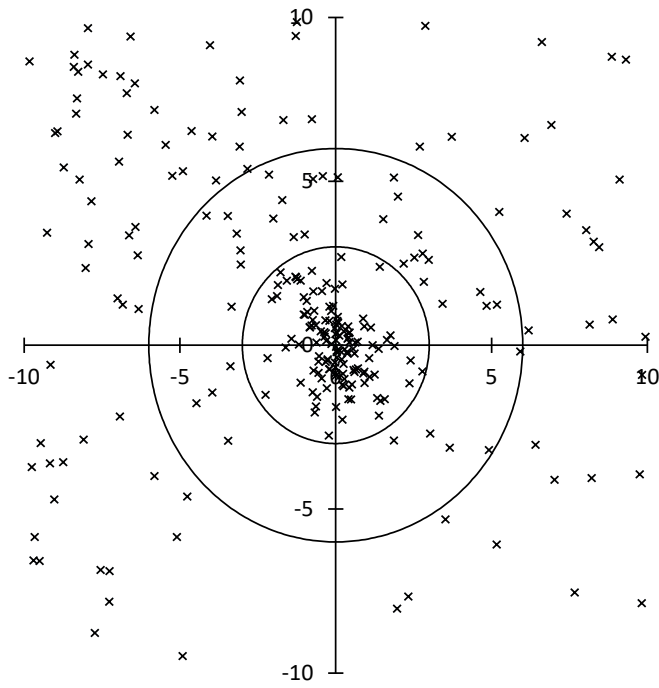
Year	N
2007	1
2008	0
2009	6
2010	8
2011	2
2012	3
2013	3
2014	2
2015	3
2016	2
2017	5
2018	1
Total	36



#0341XUM

January xi Ursae Majorids

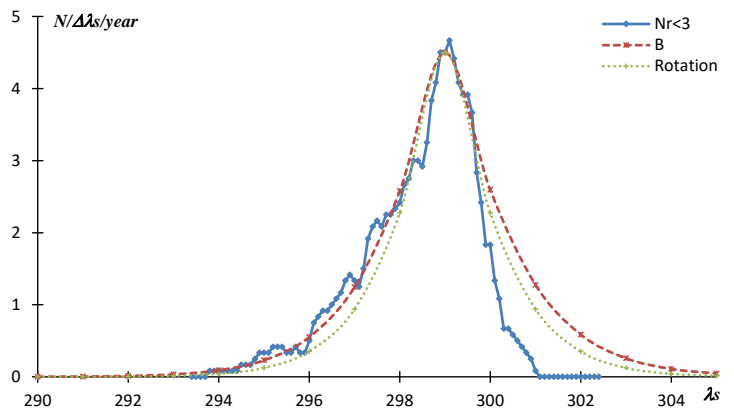
$\alpha=169.0, \delta=33.0, \lambda_s=300.6$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
XUM02	298	217.9	25.7
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	299.5	47	
DR3	297.5	18.2	
DR10	299.5	78.9	
DR15	298.5	32.3	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
290	221.5	26.7	164.8	35.6	43.4	0.850	0.237	76.7	310.7	290.0	275.0	-47.6	1.58
291	221.1	26.6	165.4	35.2	43.1	0.851	0.234	75.7	311.1	291.0	275.2	-46.9	1.57
292	220.7	26.4	165.9	34.9	42.9	0.852	0.231	74.6	311.5	292.0	275.3	-46.2	1.56
293	220.3	26.3	166.4	34.5	42.6	0.853	0.229	73.5	311.9	293.0	275.5	-45.5	1.55
294	219.9	26.2	167.0	34.2	42.3	0.853	0.226	72.4	312.3	294.0	275.6	-44.9	1.54
295	219.5	26.1	167.5	33.8	42.0	0.854	0.224	71.3	312.6	295.0	275.8	-44.2	1.53
296	219.1	25.9	168.0	33.5	41.8	0.854	0.222	70.2	312.9	296.0	276.0	-43.6	1.52
297	218.8	25.8	168.6	33.1	41.5	0.854	0.220	69.1	313.2	297.0	276.2	-42.9	1.51
298	218.4	25.7	169.1	32.8	41.2	0.855	0.219	68.0	313.5	298.0	276.5	-42.3	1.50
299	218.0	25.6	169.6	32.4	40.9	0.855	0.217	66.9	313.7	299.0	276.7	-41.7	1.49
300	217.6	25.4	170.2	32.1	40.7	0.855	0.216	65.8	313.9	300.0	276.9	-41.1	1.49
301	217.2	25.3	170.7	31.7	40.4	0.859	0.201	68.9	316.2	301.0	281.9	-40.2	1.43
302	216.9	25.2	171.2	31.3	40.1	0.855	0.214	63.6	314.3	302.0	277.5	-39.9	1.47
303	216.5	25.0	171.7	31.0	39.8	0.854	0.213	62.5	314.5	303.0	277.8	-39.3	1.46
304	216.1	24.9	172.3	30.6	39.6	0.854	0.213	61.3	314.6	304.0	278.1	-38.7	1.46
305	215.7	24.8	172.8	30.2	39.3	0.854	0.212	60.2	314.7	305.0	278.4	-38.1	1.45

Year	N
2007	4
2008	7
2009	10
2010	15
2011	8
2012	8
2013	26
2014	12
2015	9
2016	8
2017	11
2018	15
Total	133

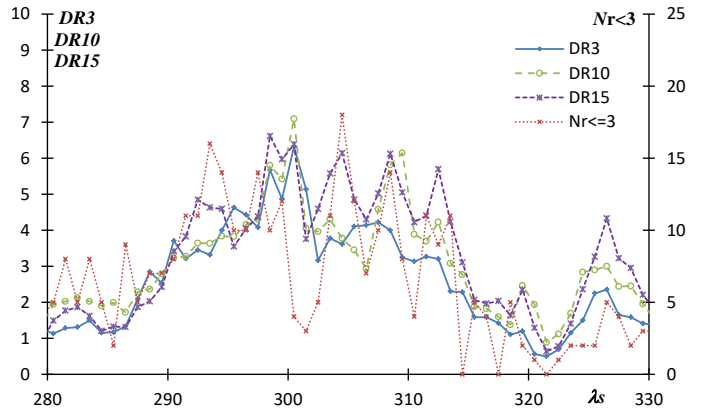
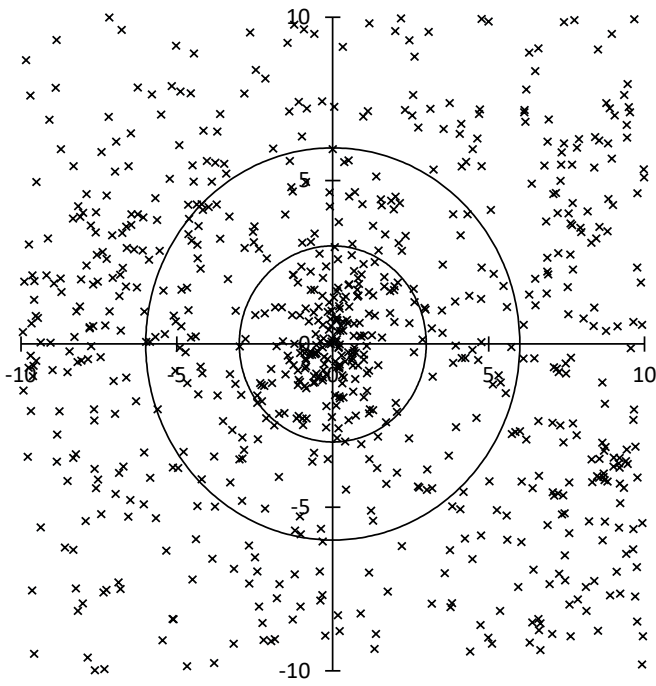




#0530ECV

eta Corvids

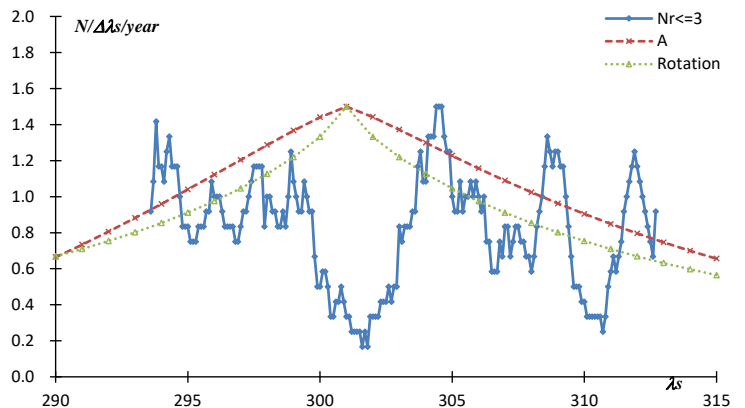
$\alpha=193.8, \delta=-17.0, \lambda_s=303$



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
ECV03	303.3	255.3	-11.5
$\Delta r=$	3		
$\Delta \lambda_s=$	10		
	$\lambda_s$	max	
$Nr \leq 3$	304.5	18	
DR3	300.5	6.3	
DR10	300.5	7.1	
DR15	298.5	6.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
285	259.1	-15.0	177.6	-15.4	67.3	0.780	0.875	152.5	41.4	105.0	66.9	17.8	3.97
290	258.1	-14.1	181.7	-16.1	67.4	0.788	0.855	154.0	45.2	110.0	67.8	18.1	4.03
293	257.5	-13.5	184.1	-16.5	67.4	0.794	0.843	155.0	47.4	113.0	68.4	18.2	4.08
294	257.3	-13.3	184.9	-16.7	67.4	0.796	0.838	155.3	48.2	114.0	68.6	18.2	4.11
295	257.1	-13.1	185.8	-16.8	67.5	0.798	0.834	155.6	48.9	115.0	68.8	18.1	4.13
296	256.9	-12.9	186.6	-17.0	67.5	0.800	0.830	155.9	49.6	116.0	69.0	18.1	4.16
297	256.7	-12.7	187.4	-17.1	67.5	0.803	0.826	156.2	50.3	117.0	69.2	18.1	4.19
298	256.5	-12.6	188.3	-17.2	67.5	0.805	0.821	156.5	51.0	118.0	69.4	18.0	4.22
299	256.3	-12.4	189.1	-17.4	67.5	0.808	0.817	156.8	51.7	119.0	69.7	18.0	4.26
300	256.1	-12.2	189.9	-17.5	67.5	0.811	0.812	157.2	52.4	120.0	69.9	17.9	4.29
301	255.9	-12.0	190.7	-17.7	67.6	0.814	0.808	157.5	53.1	121.0	70.1	17.8	4.33
302	255.7	-11.8	191.6	-17.8	67.6	0.816	0.803	157.8	53.7	122.0	70.4	17.7	4.38
303	255.5	-11.6	192.4	-17.9	67.6	0.819	0.799	158.1	54.4	123.0	70.6	17.6	4.42
304	255.3	-11.4	193.3	-18.1	67.6	0.822	0.795	158.4	55.1	124.0	70.9	17.5	4.47
305	255.1	-11.2	194.1	-18.2	67.6	0.825	0.790	158.8	55.7	125.0	71.2	17.4	4.52
306	254.9	-11.0	194.9	-18.3	67.6	0.829	0.786	159.1	56.4	126.0	71.5	17.3	4.58
307	254.7	-10.8	195.8	-18.5	67.7	0.832	0.781	159.4	57.0	127.0	71.7	17.2	4.64
308	254.5	-10.6	196.6	-18.6	67.7	0.835	0.777	159.7	57.6	128.0	72.0	17.0	4.71
310	254.1	-10.3	198.3	-18.8	67.7	0.842	0.768	160.4	58.9	130.0	72.6	16.7	4.85
315	253.1	-9.3	202.6	-19.5	67.8	0.860	0.745	162.1	61.9	135.0	74.3	15.8	5.30
320	252.1	-8.3	206.9	-20.0	67.9	0.879	0.722	163.8	64.7	140.0	76.2	14.6	5.95

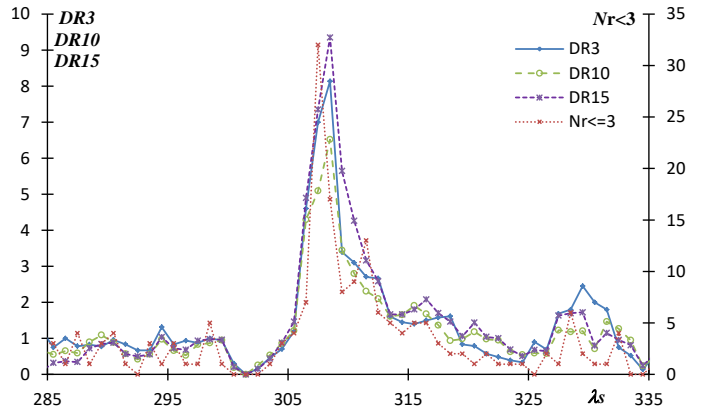
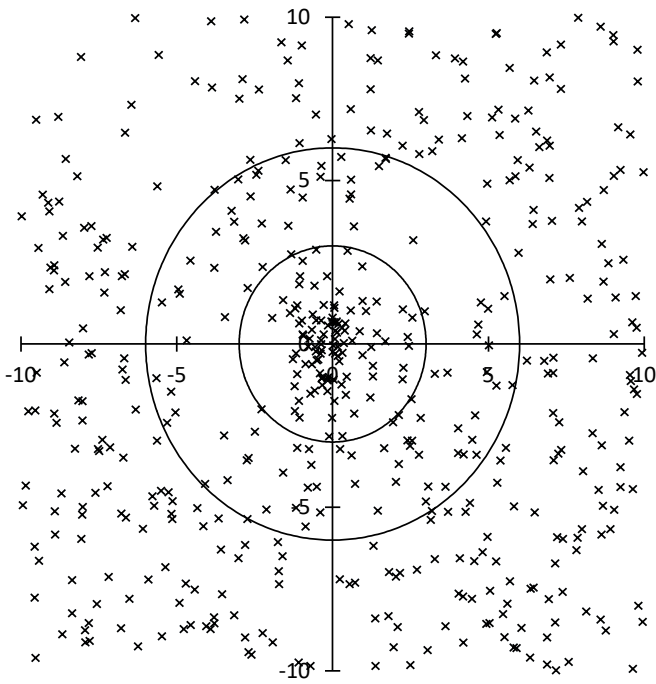
Year	N
2007	8
2008	9
2009	13
2010	38
2011	12
2012	14
2013	15
2014	18
2015	16
2016	16
2017	17
2018	25
Total	201



#0429ACB

alpha Coronae Borealis

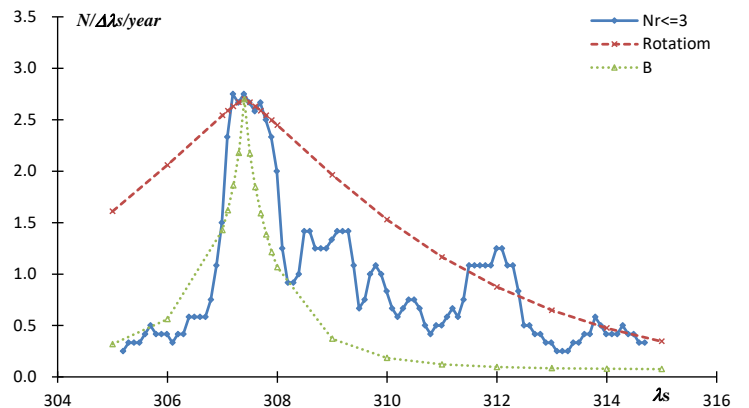
$\alpha=233.282, \delta=27.007, \lambda_s=309.890$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
ACB00	309.89	271.8	44.5
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$Nr \leq 3$	307.5	32	
DR3	308.5	8.1	
DR10	308.5	6.5	
DR15	308.5	9.3	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
300	267.0	48.0	224.0	34.2	53.4	0.787	0.982	97.7	185.6	300.0	119.2	-5.5	4.60
301	267.6	47.6	224.9	33.3	53.8	0.797	0.983	98.6	184.4	301.0	120.3	-4.3	4.84
302	268.2	47.2	225.9	32.5	54.2	0.808	0.984	99.4	183.1	302.0	121.5	-3.1	5.12
303	268.8	46.7	226.8	31.6	54.7	0.819	0.984	100.2	181.9	303.0	122.7	-1.9	5.45
304	269.4	46.3	227.8	30.8	55.1	0.831	0.984	101.1	180.7	304.0	123.9	-0.7	5.83
305	269.9	45.9	228.8	30.0	55.5	0.843	0.984	101.9	179.5	305.0	125.1	0.5	6.28
306	270.5	45.4	229.8	29.2	55.9	0.856	0.984	102.7	178.3	306.0	126.4	1.6	6.84
307	271.1	45.0	230.7	28.4	56.4	0.869	0.984	103.6	177.2	307.0	127.7	2.7	7.52
308	271.6	44.6	231.7	27.6	56.8	0.883	0.984	104.4	176.0	308.0	129.0	3.9	8.38
309	272.1	44.1	232.7	26.8	57.2	0.897	0.983	105.2	174.9	309.0	130.4	5.0	9.50
310	272.7	43.7	233.7	26.0	57.6	0.911	0.982	106.0	173.7	310.0	131.7	6.0	11.02
311	273.2	43.2	234.7	25.2	58.1	0.926	0.981	106.8	172.6	311.0	133.2	7.1	13.20
312	273.7	42.7	235.7	24.4	58.5	0.797	0.979	82.2	170.3	312.0	130.7	9.6	4.82
313	274.2	42.3	236.7	23.7	58.9	0.957	0.979	108.5	170.4	313.0	136.1	9.1	22.54
314	274.7	41.8	237.7	22.9	59.3	0.973	0.977	109.3	169.3	314.0	137.6	10.1	35.75
315	275.2	41.4	238.7	22.2	59.8	0.989	0.975	110.1	168.2	315.0	139.1	11.1	90.19
316	275.7	40.9	239.8	21.4	60.2	1.006	0.974	110.9	167.2	316.0	140.7	12.0	158.94
317	276.1	40.4	240.8	20.7	60.6	1.023	0.972	111.7	166.1	317.0	142.2	12.9	-41.36
318	276.6	40.0	241.8	19.9	61.0	1.041	0.969	112.5	165.1	318.0	143.8	13.7	-23.49
319	277.1	39.5	242.9	19.2	61.5	1.059	0.967	113.3	164.1	319.0	145.4	14.6	-16.26
320	277.5	39.0	243.9	18.5	61.9	1.078	0.964	114.1	163.1	320.0	147.1	15.4	-12.35

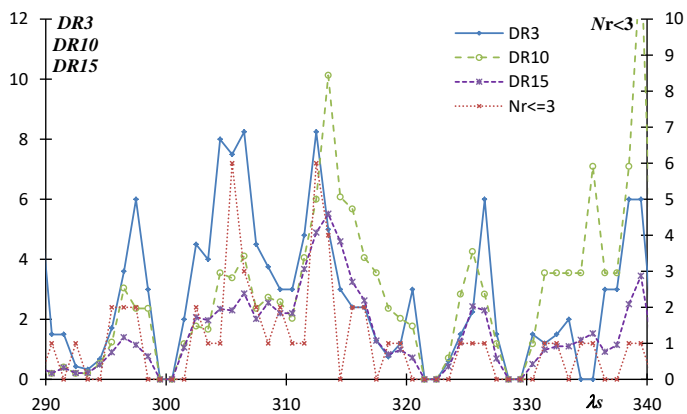
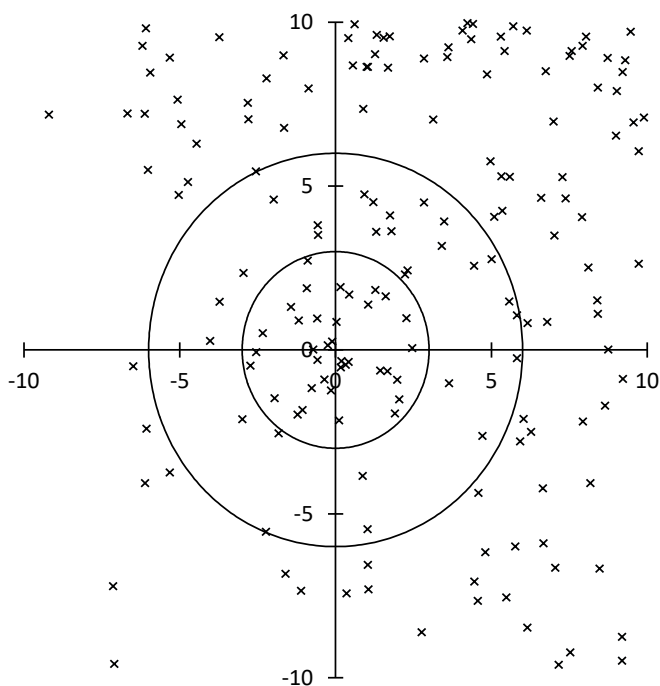
Year	N
2007	5
2008	4
2009	14
2010	8
2011	17
2012	8
2013	8
2014	14
2015	7
2016	3
2017	6
2018	12
Total	106



#0110AAN

alpha Antliids

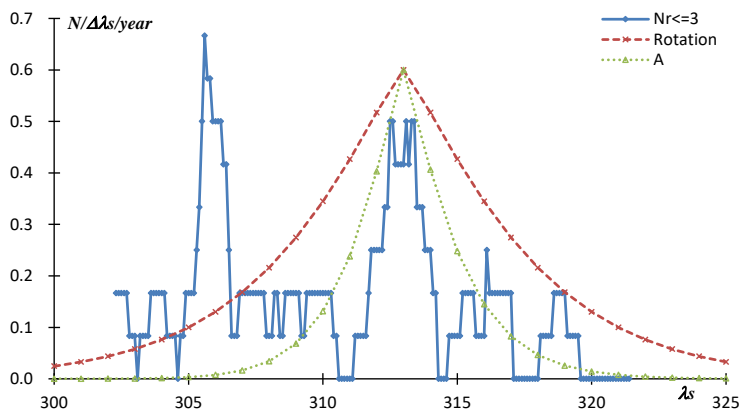
$\alpha=140, \delta=-10, \lambda_s=313.1$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
AAN04	312	210.6	-17.7
$\Delta r =$	3		
$\Delta \lambda_s =$	10		
	$\lambda_s$	max	
$Nr \leq 3$	305.5	6	
DR3	306.5	8.2	
DR10	313.5	10.1	
DR15	313.5	5.5	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
300	211.0	-16.7	147.2	-4.5	44.0	0.960	0.130	55.8	140.6	120.0	275.2	31.6	3.23
301	211.0	-16.7	148.0	-4.9	44.0	0.960	0.131	55.9	140.4	121.0	276.2	31.8	3.26
302	211.0	-16.8	148.9	-5.3	44.0	0.960	0.131	56.0	140.3	122.0	277.1	32.0	3.28
303	210.9	-16.9	149.7	-5.7	44.1	0.960	0.132	56.1	140.1	123.0	278.0	32.2	3.31
304	210.9	-17.0	150.6	-6.1	44.1	0.960	0.133	56.2	139.9	124.0	278.9	32.4	3.33
305	210.9	-17.0	151.5	-6.5	44.1	0.960	0.134	56.3	139.7	125.0	279.8	32.6	3.36
306	210.9	-17.1	152.3	-6.9	44.1	0.960	0.135	56.5	139.5	126.0	280.8	32.7	3.39
307	210.9	-17.2	153.2	-7.3	44.1	0.960	0.136	56.6	139.4	127.0	281.7	32.9	3.42
308	210.8	-17.3	154.0	-7.8	44.2	0.960	0.137	56.7	139.2	128.0	282.6	33.1	3.45
309	210.8	-17.3	154.8	-8.2	44.2	0.960	0.138	56.8	139.0	129.0	283.5	33.3	3.48
310	210.8	-17.4	155.7	-8.6	44.2	0.960	0.139	56.9	138.8	130.0	284.4	33.5	3.51
311	210.8	-17.5	156.5	-9.0	44.2	0.960	0.140	57.0	138.6	131.0	285.4	33.7	3.54
312	210.8	-17.6	157.4	-9.5	44.3	0.960	0.141	57.1	138.4	132.0	286.3	33.9	3.57
313	210.7	-17.6	158.2	-9.9	44.3	0.960	0.143	57.2	138.2	133.0	287.2	34.0	3.61
314	210.7	-17.7	159.1	-10.3	44.3	0.961	0.144	57.3	138.1	134.0	288.1	34.2	3.64
315	210.7	-17.8	159.9	-10.8	44.3	0.961	0.145	57.4	137.9	135.0	289.0	34.4	3.67
316	210.7	-17.9	160.8	-11.2	44.4	0.961	0.146	57.5	137.7	136.0	289.9	34.6	3.71
317	210.7	-17.9	161.6	-11.6	44.4	0.961	0.147	57.6	137.5	137.0	290.9	34.8	3.75
318	210.6	-18.0	162.5	-12.1	44.4	0.961	0.148	57.7	137.3	138.0	291.8	35.0	3.78
319	210.6	-18.1	163.3	-12.5	44.4	0.961	0.149	57.8	137.1	139.0	292.7	35.2	3.82
320	210.6	-18.2	164.1	-13.0	44.4	0.961	0.150	57.9	136.9	140.0	293.6	35.4	3.86

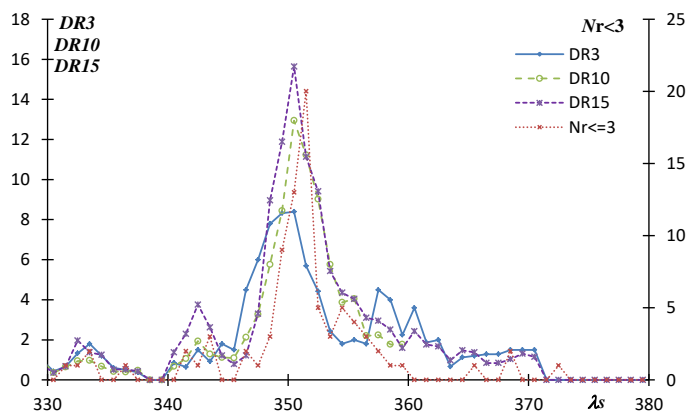
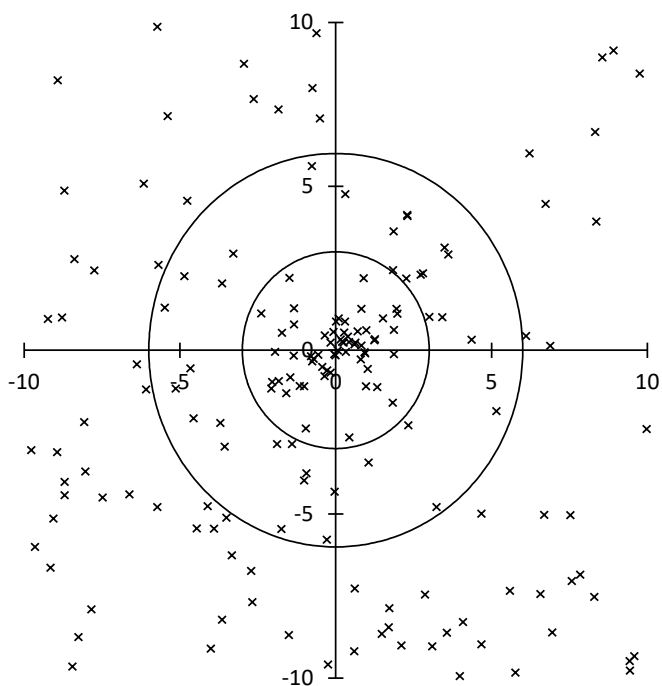
Year	N
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2009	4
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2011	5
2012	7
2013	3
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2015	1
2016	3
2017	6
2018	0
Total	36



#0346XHE

x Herculids

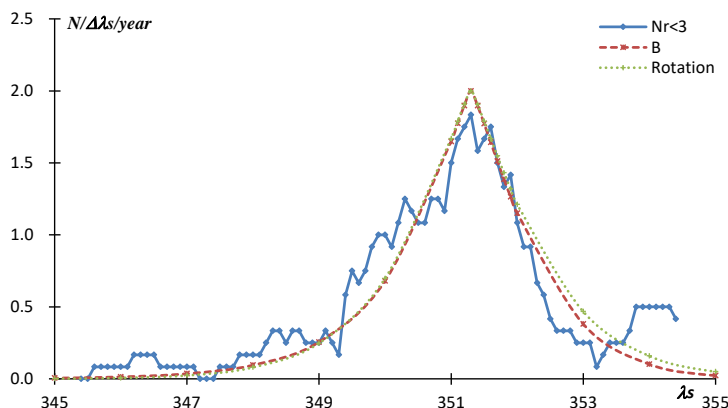
$\alpha=254, \delta=48, \lambda_s=352$



Code	$\lambda_s$	$\lambda - \lambda_s$	$\beta$
XHE01	350	244.9	70.6
$\Delta r =$	3		
$\Delta \lambda_s =$	5		
	$\lambda_s$	max	
$N_{r \leq 3}$	351.5	20	
DR3	350.5	8.4	
DR10	350.5	12.9	
DR15	350.5	15.6	

$\lambda_s$	$\lambda - \lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
345	240.9	70.1	248.4	50.0	36.8	0.789	0.969	61.1	198.5	345.0	174.2	-16.1	4.59
346	241.8	70.2	249.4	49.7	36.6	0.771	0.971	61.0	198.0	346.0	175.0	-15.7	4.24
347	242.7	70.2	250.3	49.5	36.4	0.753	0.973	60.9	197.6	347.0	175.8	-15.3	3.94
348	243.7	70.2	251.3	49.3	36.1	0.736	0.974	60.7	197.1	348.0	176.6	-14.9	3.69
349	244.6	70.3	252.2	49.1	35.9	0.718	0.976	60.6	196.7	349.0	177.4	-14.5	3.46
350	245.6	70.3	253.2	48.9	35.7	0.701	0.977	60.5	196.2	350.0	178.1	-14.0	3.27
351	246.5	70.3	254.1	48.7	35.5	0.684	0.978	60.3	195.7	351.0	178.9	-13.6	3.09
351.1	246.6	70.3	254.2	48.7	35.5	0.682	0.979	60.3	195.7	351.1	179.0	-13.6	3.08
351.2	246.7	70.4	254.3	48.7	35.4	0.680	0.979	60.3	195.6	351.2	179.1	-13.5	3.06
351.3	246.8	70.4	254.4	48.6	35.4	0.679	0.979	60.3	195.6	351.3	179.2	-13.5	3.05
351.4	246.9	70.4	254.5	48.6	35.4	0.677	0.979	60.3	195.5	351.4	179.2	-13.4	3.03
351.5	247.0	70.4	254.6	48.6	35.4	0.675	0.979	60.3	195.5	351.5	179.3	-13.4	3.02
351.6	247.1	70.4	254.7	48.6	35.4	0.674	0.979	60.3	195.4	351.6	179.4	-13.3	3.00
351.7	247.2	70.4	254.8	48.6	35.3	0.672	0.979	60.2	195.4	351.7	179.5	-13.3	2.98
351.8	247.3	70.4	254.9	48.5	35.3	0.670	0.980	60.2	195.3	351.8	179.5	-13.2	2.97
351.9	247.4	70.4	255.0	48.5	35.3	0.668	0.980	60.2	195.3	351.9	179.6	-13.2	2.96
352	247.5	70.4	255.1	48.5	35.3	0.667	0.980	60.2	195.2	352.0	179.7	-13.2	2.94
353	248.4	70.4	256.0	48.3	35.0	0.650	0.981	60.1	194.7	353.0	180.5	-12.7	2.80
354	249.4	70.4	257.0	48.2	34.8	0.633	0.983	59.9	194.2	354.0	181.2	-12.2	2.68
355	250.3	70.4	257.9	48.0	34.6	0.617	0.984	59.8	193.6	355.0	182.0	-11.7	2.57
360	255.1	70.4	262.7	47.3	33.5	0.536	0.990	58.9	190.7	0.0	185.6	-9.2	2.13

Year	N
2007	4
2008	0
2009	7
2010	1
2011	8
2012	3
2013	6
2014	4
2015	10
2016	2
2017	4
2018	12
Total	61

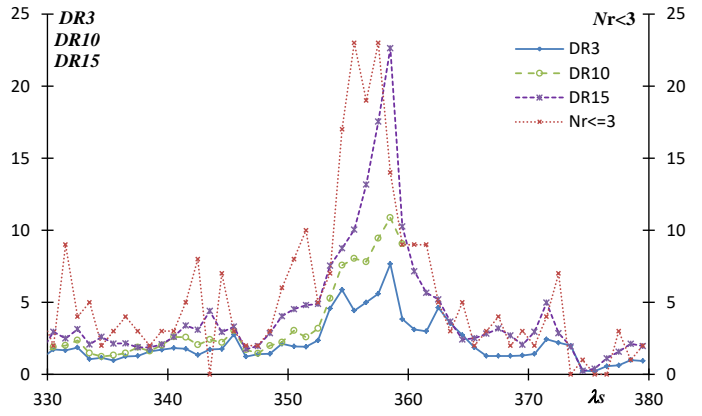
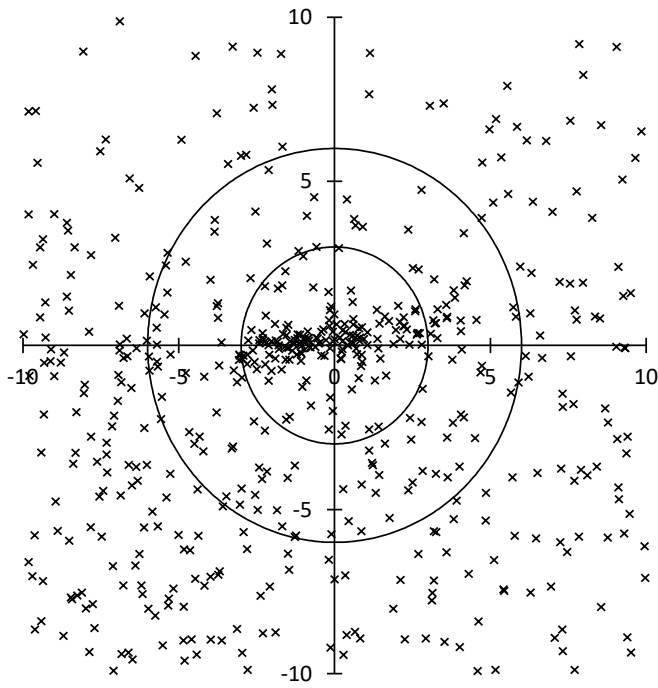


#0011EVI

eta Virginids

$\alpha=182.1, \delta=2.6, \lambda_s=354$

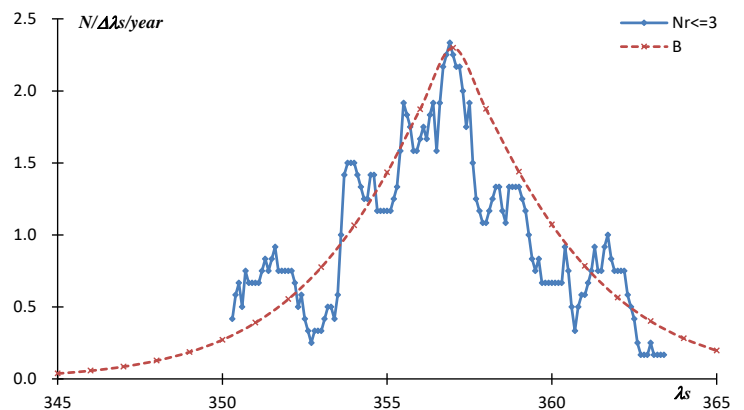
[注釈を読む](#)



Code	$\lambda_s$	$\lambda-\lambda_s$	$\beta$
EVI02	357	185.9	5.5
$\Delta r =$	3		
$\Delta \lambda_s =$	7		
	$\lambda_s$	max	
$Nr \leq 3$	355.5	23	
DR3	358.5	7.7	
DR10	358.5	10.9	
DR15	358.5	22.6	

$\lambda_s$	$\lambda-\lambda_s$	$\beta$	$\alpha$	$\delta$	Vg	e	q	i	$\omega$	$\Omega$	$\lambda_{\Pi}$	$\beta_{\Pi}$	a
345	192.8	4.3	179.7	4.8	30.1	0.850	0.331	5.5	296.8	345.0	281.9	-4.9	2.21
346	192.3	4.3	180.1	4.7	29.9	0.847	0.340	5.5	295.6	346.0	281.7	-4.9	2.23
347	191.7	4.4	180.6	4.6	29.6	0.844	0.350	5.4	294.4	347.0	281.5	-4.9	2.25
348	191.2	4.5	181.1	4.4	29.4	0.841	0.360	5.4	293.3	348.0	281.4	-5.0	2.27
349	190.7	4.6	181.6	4.3	29.1	0.839	0.369	5.4	292.1	349.0	281.2	-5.0	2.29
350	190.2	4.6	182.0	4.2	28.9	0.836	0.379	5.4	291.0	350.0	281.1	-5.0	2.31
351	189.7	4.7	182.5	4.1	28.6	0.833	0.389	5.3	289.8	351.0	280.9	-5.0	2.33
352	189.2	4.8	183.0	3.9	28.3	0.830	0.398	5.3	288.7	352.0	280.8	-5.0	2.35
353	188.7	4.9	183.4	3.8	28.1	0.828	0.408	5.3	287.6	353.0	280.6	-5.0	2.37
354	188.1	4.9	183.9	3.7	27.8	0.825	0.418	5.2	286.4	354.0	280.5	-5.0	2.38
355	187.6	5.0	184.4	3.5	27.6	0.822	0.427	5.2	285.3	355.0	280.4	-5.0	2.40
356	187.1	5.1	184.9	3.4	27.3	0.819	0.437	5.2	284.2	356.0	280.2	-5.0	2.42
357	186.6	5.1	185.3	3.3	27.0	0.817	0.447	5.2	283.1	357.0	280.1	-5.0	2.44
358	186.1	5.2	185.8	3.2	26.8	0.814	0.456	5.1	281.9	358.0	280.0	-5.0	2.45
359	185.5	5.3	186.3	3.0	26.5	0.811	0.466	5.1	280.8	359.0	279.9	-5.0	2.47
360	185.0	5.4	186.7	2.9	26.3	0.808	0.476	5.1	279.7	0.0	279.8	-5.0	2.48
361	184.5	5.4	187.2	2.8	26.0	0.806	0.485	5.0	278.6	1.0	279.7	-5.0	2.49
362	184.0	5.5	187.7	2.7	25.8	0.803	0.495	5.0	277.5	2.0	279.6	-5.0	2.51
363	183.5	5.6	188.1	2.5	25.5	0.800	0.504	5.0	276.4	3.0	279.5	-4.9	2.52
364	183.0	5.6	188.6	2.4	25.2	0.797	0.513	4.9	275.4	4.0	279.4	-4.9	2.53
365	182.4	5.7	189.1	2.3	25.0	0.794	0.523	4.9	274.3	5.0	279.3	-4.9	2.54

Year	N
2007	3
2008	0
2009	45
2010	16
2011	2
2012	2
2013	24
2014	15
2015	1
2016	5
2017	37
2018	11
Total	161



## 流星群データ集への注釈

本稿で取り上げた流星群のうち、特に注意が必要な4群については、少し詳しく解説する。また、図表に説明が必要と思われるものについても補足する。

### #0027KSE

シュミットカメラの観測から指摘された‘ $\kappa$ -Serpentids’とは異なる活動である。

### #0021AVB

元来の‘ $\alpha$ -Virginids’は Harvard の写真観測によるものであるが、この活動はまったくそれと異なり、別の名称を与えることがふさわしい。

### #0343HVI

この群も EVI 同様に、年変化が明瞭に認められる。

### #0372PPS

IAUMDC のリストでは極大が太陽黄経 4~109.6 と大きく異なっている。ここでは太陽黄経 94 度付近の活動 PPS\_0 と太陽黄経 108 度付近の活動 PPS\_1 に分けた。

### #0165SZC

SZC0 と SZC1 は太陽黄経 80 度付近を極大としているが、これらに該当する活動は見られない。DR3 は中心から 3~6 度の範囲の輻射点数が少ないために算出できない。また、中心から 3 度以内の「群流星」と判定される数も少なく、 $N/\Delta\lambda s/year$  は最大で 1 以下である。

### #0164NZC

IAUMDC の最初に掲げられているのは Havard の電波観測であるが、現在、ビデオで捉えられているのは、それよりも半月後に活動する別群である。周囲の活動も活発で散在流星との区別は難しい。

### #0444ZCS

太陽黄経 117 度以降はペルセウス群の影響を大きく受けて活動曲線を正確に描くことは困難であるが、活動度推定のグラフからは太陽黄経 120 度で終息していると考えられる。

### #0183PAU

ここに示した活動は、以前に「みなみのうお群」と呼ばれていた 7 月末に活動するとされてきたものとは別と考えられる。現在、旧来の「みなみのうお群」の活動は認められない。

### #0007PER

活動の前半は一般的に推定される活動曲線から外れ、流星群の構造が 2 層だと推測される。

### #0012KCG, #0197AUD(ZDR), AXD

SonotaCo ネットは AXD を KCG と判定しており、EDMOND の群判定は SonotaCo ネットのものを引き継いでいるので同様である。一方、CAMS は AXD の活動を AUD の一部としている。このように状況は複雑である (図 1 参照)。

このように、流星群データ集の各ページで、[KCG](#) の輻射点分布の右側が [AXD](#) である。反対に AXD の輻射

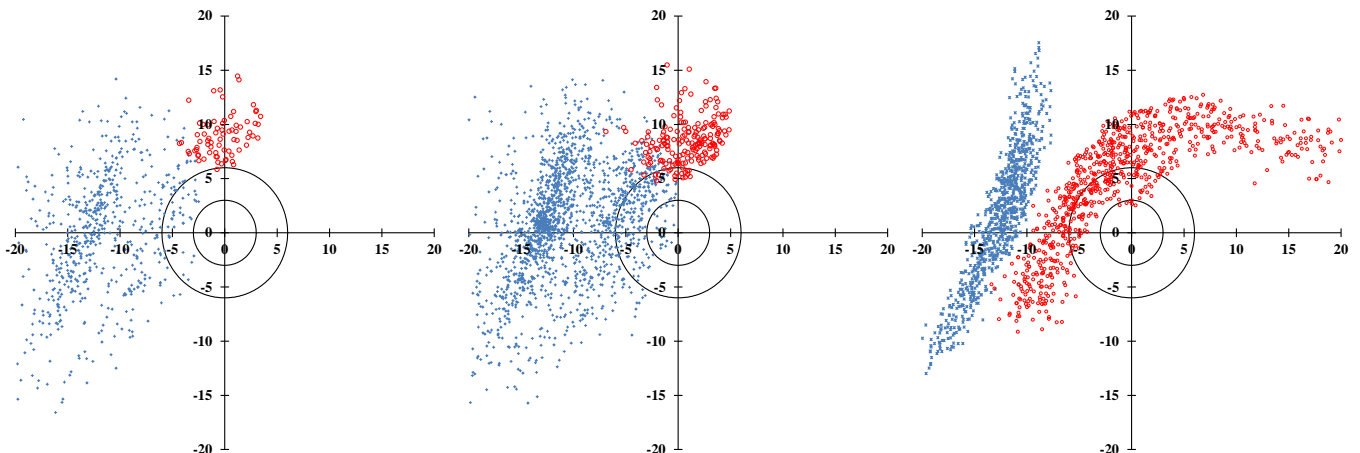


図 1 左から SonotaCo ネット、EDMOND、CAMS による KCG(+)と ZDR(○)の輻射点分布。

点分布の左側に見えているのが KCG であり、仮称 AXD(August  $\xi$ -Draconids)の上側にあるのが [AUD\(ZDR\)](#)である。

実はここで ZDR と呼んでいるのには根拠があり、AXD の輻射点分布で上側に見えている活動については IAUMDC で AUD と名付けられるより先に、Terentjeva、Lindblad により  $\xi$ -Draconids(ZDR)と呼称されていた。それにもかかわらず、Jenniskens が別に#0073ZDR という群を設定し、Rendtel が単点のビデオ観測から求めた活動がそれを引き継いでいる。この単点観測によって見出された活動は SonotaCo ネットではまったく確認できない。

IAUMDC で AUD は「確定群」とされている。Harvard の電波観測を CAMS のビデオ観測で確認したとされているが、Harvard の電波観測と CAMS のデータには極大期、地心速度の違いがかなりあることから別物と考えた方がよい (Harvard の観測自体も散在流星と判別が困難な程度の活動である)。「AUD」とくくられているが、先に述べたように CAMS の AUD は AXD と別群 (ここでは ZDR と呼んでいる) の混成である。

この KCG、AXD、ZDR の活動は SonotaCo ネットだけでなく、EDMOND、CAMS の輻射点分布からも確認される。KCG の観測においてはこれら3つの活動をしっかり区別する必要がある。また、[GDR](#)の活動を KCG と混同しないように注意することも重要である。GDR の輻射点は KCG の輻射点移動の推算経路と交差するが、活動期が太陽黄経 125 度前後の 2、3 日に限られ、地心速度も KCG より数 km/s 速いので注意すれば区別は可能である。

KCG の活動曲線には 2 つの極大が見られるが、これは恐らく見せかけのものである。残念ながら 2014 年の極大期は天候が悪く、SonotaCo ネットでは観測の空白があるために生じたと考えられる。しかし、EDMOND や CAMS の観測を合わせても極大はそれぞれ異なる太陽黄経になっているので、2021 年の観測では太陽黄経 140~145 度の範囲で注意する必要がある。輻射点域は細長いことに注意する必要がある。

#### #0026NDA

DR10 或いは DR15 のグラフでは極大が分かるが、 $Nr \leq 3$  のグラフでは極大がはっきりせず、輻射点の分散具合と併せて、複数の活動が混在している可能性もある。

#### #0033NIA

7 月末から 8 月にかけて活動するとされていた旧来のものとは全く異なるもので NIA と呼ぶことが適当なのか疑問である。

#### #0337NUE

太陽黄経 150 度以前で活動が活発になるように見えるのは、#191ERI によるものである。本群は「オリオン群のしっぽ」と呼ばれる活動の一部にあたり、周囲の活動との区別は難しい。

#### #0081SLY

SLY は 2 つの異なる活動を含んでいるため、ここでは SLY0 及び SLY2 を SLY0、SLY1 を SLY1 と表記して区別している。

#### #0023EGE

太陽黄経 210 度以降で DR15 は#8ORI の影響を強く受けている。このため、極大をみるには DR3 または  $Nr \leq 3$  のグラフを見るほうがよい。

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## #0002STA

IAUMDC における STA は非常に混乱した状態にある。極大ひとつを取り上げても、太陽黄経 196 度から 224 度まで大きな差がある。それに輪をかけたのが Jenniskens らによる CAMS の報告である。彼らは STA の中に数グループの分枝があると主張している。本稿では最近の筆者の分析に基づいて STA を SE と SF という成分に分解している。SE が先に活動を始めるが、SF は STA 後を追うように活動して、SF の輻射点は SE の輻射点移動に追いつき、重なった状態になる。SE は平年の STA の活動、SF は木星の摂動による共鳴で活発化する活動に相当する。

「おうし群」に関連する #2STA\_SE、#2STA\_SF、#17NTA、#257ORS の輻射点移動の様子を図 2 に示したので、相互の関係を確かめたい。#256ORN(Northern chi Orionids)は NTA の一部と考えられる。また、太陽黄経 230 度付近の活動を独立の #286FTA として区別する考えもあるが、ここでは FTA を STA\_SF の一部としている。

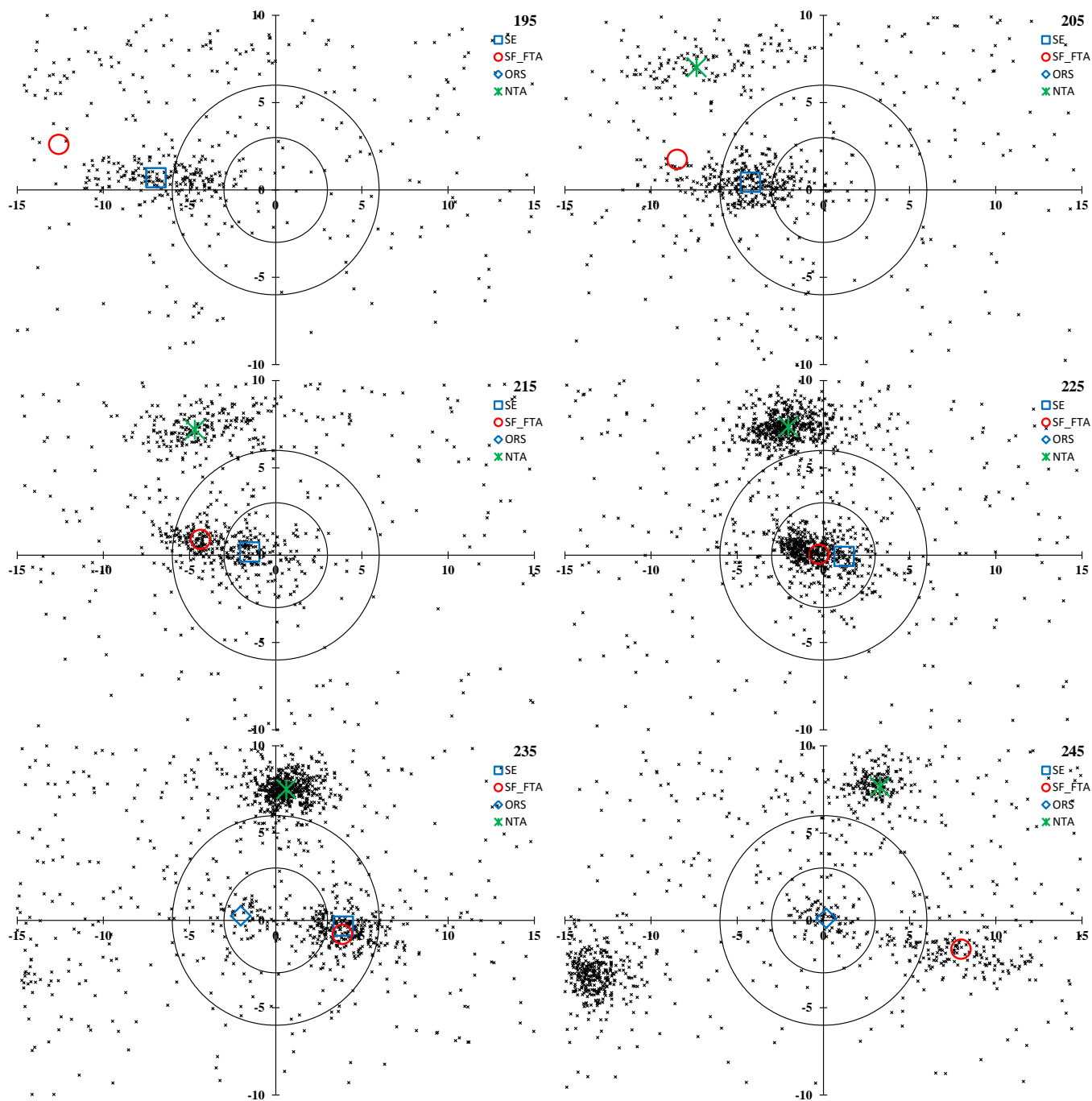


図 2 おうし群の輻射点移動。

## #0008ORI

流星群データ集の右下に示したグラフはオリオン群が活発であった 2007~09 年の時期とそれ以降の平年とを比較したものである。

## #0018AND



太陽黄経 215~245 度の範囲でかなり長期にわたって活動する。極大は推定方法によって ( $Nr \leq 3$  か DR のいずれか) 差があり、複数の極大をもつかもしいない。輻射点移動は赤経よりも赤緯方向に大きく、過去の大出現当時の輻射点に向かうことが興味深い。

#### #0017NTA

$Nr \leq 3$  のグラフで極大が 2 つあるように見えるが、DR15 のように補正すると 1 つになる。STA のような輻射点移動速度の異なる活動は見られていないので、2 つの極大は見かけのものであろう。

#### #0246AMO

活動グラフの右側が急増するのは別群の活動によるもので、従来は突発的で短時間の活動とされてきたが、増減はあるものの毎年捕らえられ、3、4 日は出現するようである。

#### #0340TPY

TPY は 2 つの異なる活動を含んでいるため、ここでは TPY0、TPY1、TPY2 を TPY0、TPY3 を TPY3 と表記して区別している。

#### #0020COM

IAUMDC では COM とひとくくりにされているが、削除された DLM(#0032December Leonis Minorids)から旧来の COM を経て JCO(#0090January Comae Berenicids)、さらには FEV(#506February epsilon Virginids)まで活動が続くように見える。Super Schmidt の観測により最初に見出されたのは JCO であり、続いて DLM が検出された。両者の類似性から、その間に COM の活動が認められるようになったのである。当時の写真観測は休止期間があり(当時は主要流星群、ふたご群、しぶんぎ群が重要な観測対象であり、その間が観測の休止期間になっていた)、この 3 者の間には空白期間がある。3 者の空白を埋めたのはビデオ観測である。

初期の IAUMDC では DLM は独立した扱いであったが、COM に統合され、DLM は削除されているが、JCO と FEV はそのまま残されている。今回の  $Nr \leq 3$  と DR の 3 つのグラフは DLM から FEV までの活動を連続するものとして示している。一方で軌道からの出現数推算では極大までは観測と一致しているが、極大後は観測値の方が大分大きくなっている。これは JCO、FEV 等が別群として活動していることを示すものか、今後の課題である。なお、この群を COM と称するのか、DLM とするのかは議論されていいように思われる。

非常に長期にわたり活動するように見えるが、輻射点移動を考慮すると輻射点の半径は 3 度以下であることがわかる。輻射点分布に見られるように周囲では散在流星の活動も活発である。

#### #0428DSV

今まで指摘されていなかったが、DSV も COM 同様に非常に長期にわたり活動が連続しているように見える。#500JPV(January phi Virginids)、#513EPV(epsilon Virginids)は DSV の輻射点移動の延長上にあり、本稿では統合して DSV としている。太陽黄経で 245~295 度にわたり、明瞭な極大を見せないまま活動が続く。輻射点分布で右側に見えているのは#502DRV である。

#### #0335XVI

太陽黄経 256 度付近の活動 XVI0 と 265 度付近の XVI1、XVI2 の 2 つの活動があるのかもしれない。

#### #0097SCC

SCC は IAUMDC の中での混乱が大きく、同一の活動を指しているとは思われない。ここに掲げたものは、その中で最も輻射点の集中が良いものであるが、活動曲線からは ANT の一部とも思える。

#### #0096NCC

IAUMDC の中で NCC は報告によりデータがまちまちであり、本稿で示したものは、その中で最も流星群の活動として認められそうなものである。IAUMDC に掲載されている他の NCC はこれ以下の活動レベルであり、そもそも NCC を ANT から区別する必要があるか問題がある。

#### #0011EVI

輻射点移動を考慮しても輻射点が黄緯線方向にかなり長く伸びている。活動の年変化が明瞭に認められる。