

# VISUAL AND PHOTOGRAPHIC OBSERVATIONS OF METEORS

## by students of the Astronomical Observatory and Planetarium “Nicolaus Copernicus” in Varna, Bulgaria

**Observing site:** Avren village, Varna Province, Bulgaria



43°07'11.6"N 27°40'09.5"E  
Elevation: 299 m  
IMO code: 29504  
30 km southeast from Varna

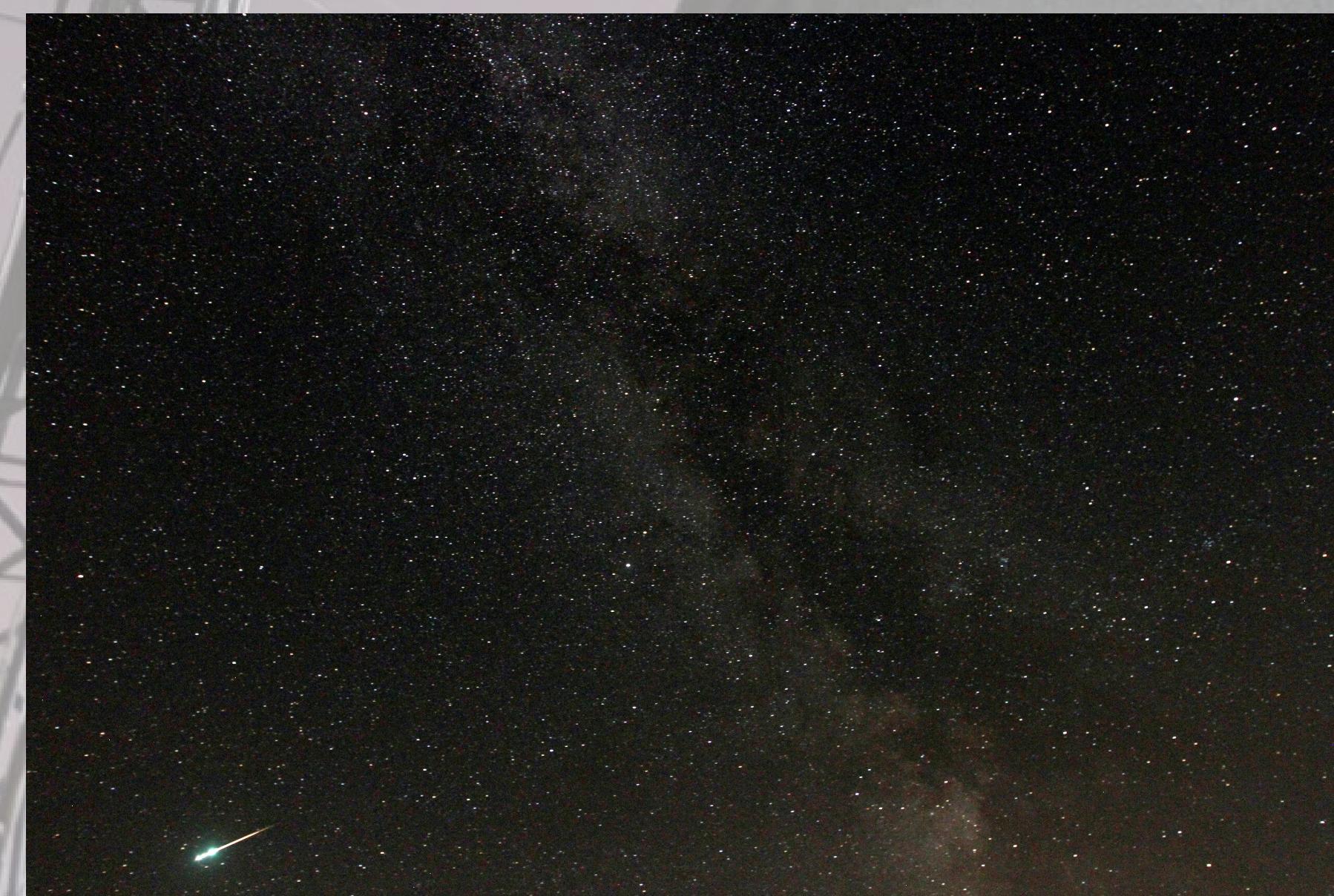


### Methods of observation: Counting (C) and Plotting (P)

When we use the method of Counting we use paper rolls, pencils and a rubber band to fix the roll in place as the night passes.  
When we use the method of Plotting we use the ATLAS BRNO 2000.0. The participants in the expeditions are between the age of 12 and 18.



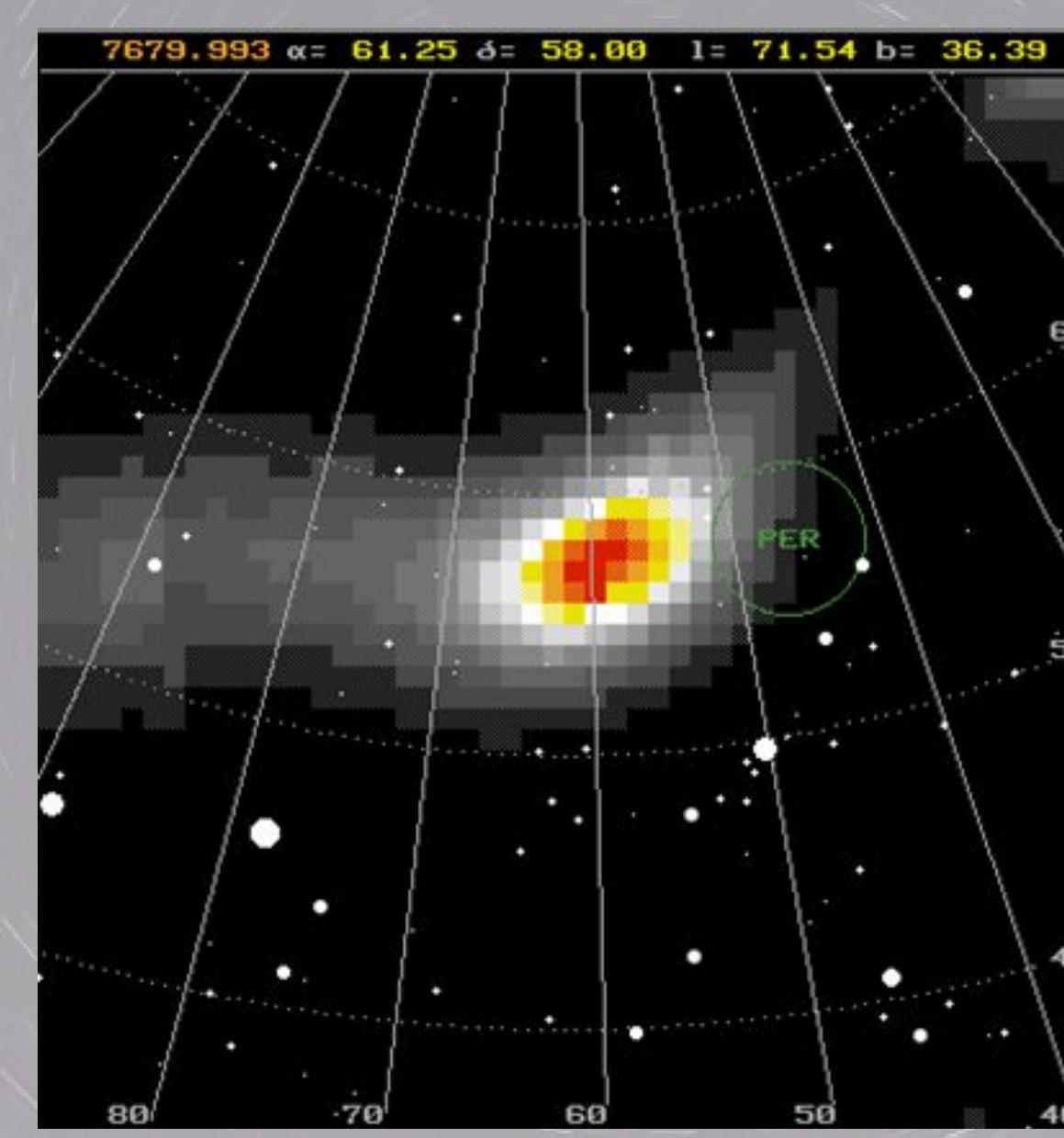
### CAPRICORNIDS



Petar Petrov  
Canon EOS 7D  
f/2.8  
25 sec  
ISO-1600  
Focal length:  
16 mm

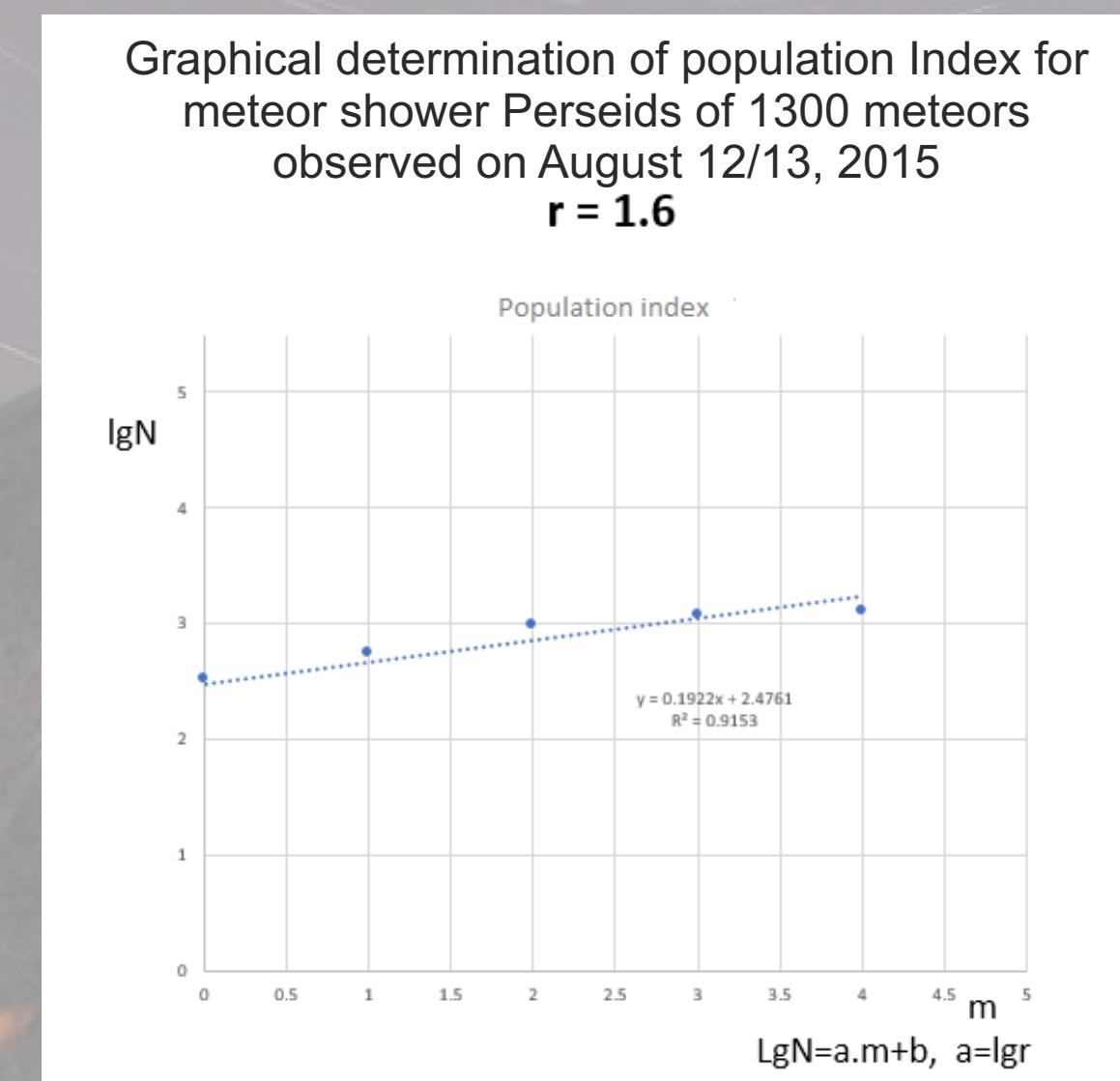
Meteor: Alpha Capricornid  
Edited in  
Photoshop

12 August 2013  
19:24 UT



Radiant position for the Perseids in 2012  
64 plotted meteors

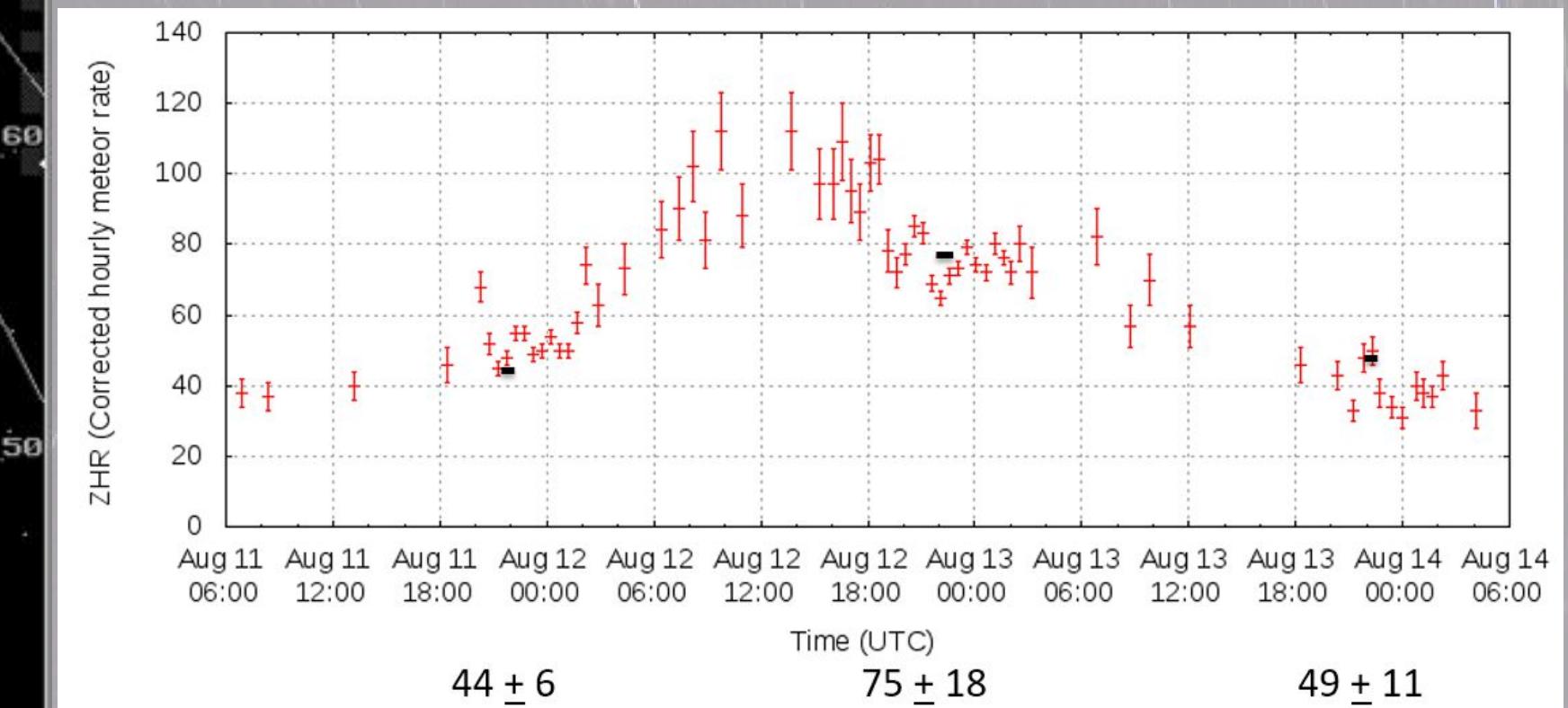
Observer: Stoil Iliev  
RA = 59°.46 Dec = +57°.58



PER' 2017					
12/13 August 2017					
Observer	PER	SPO	T <sub>eff</sub>	Lm	ZHR
Ivanka Getsova	12	9	1.08	5.9	56
Ivaylo Belchev	43	9	1.94	5.3	131
Miroslava Petrova	37	9	1.96	5.6	113
<b>ZHR<sub>avg</sub> = 100 ± 18</b>					

### PERSEIDS

ZHR profile for Perseids in 2013 - our average results superimposed on the IMO graph

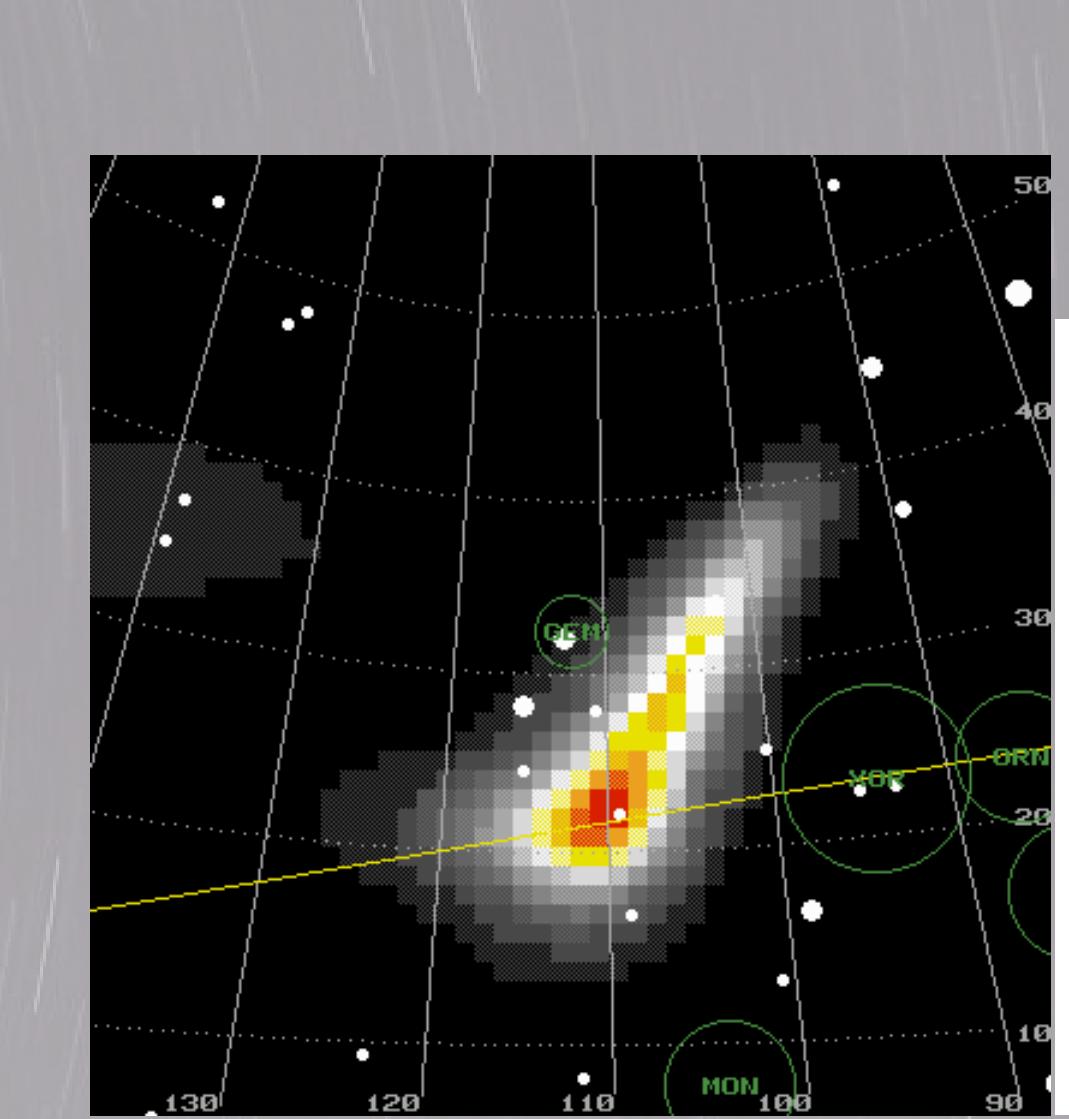
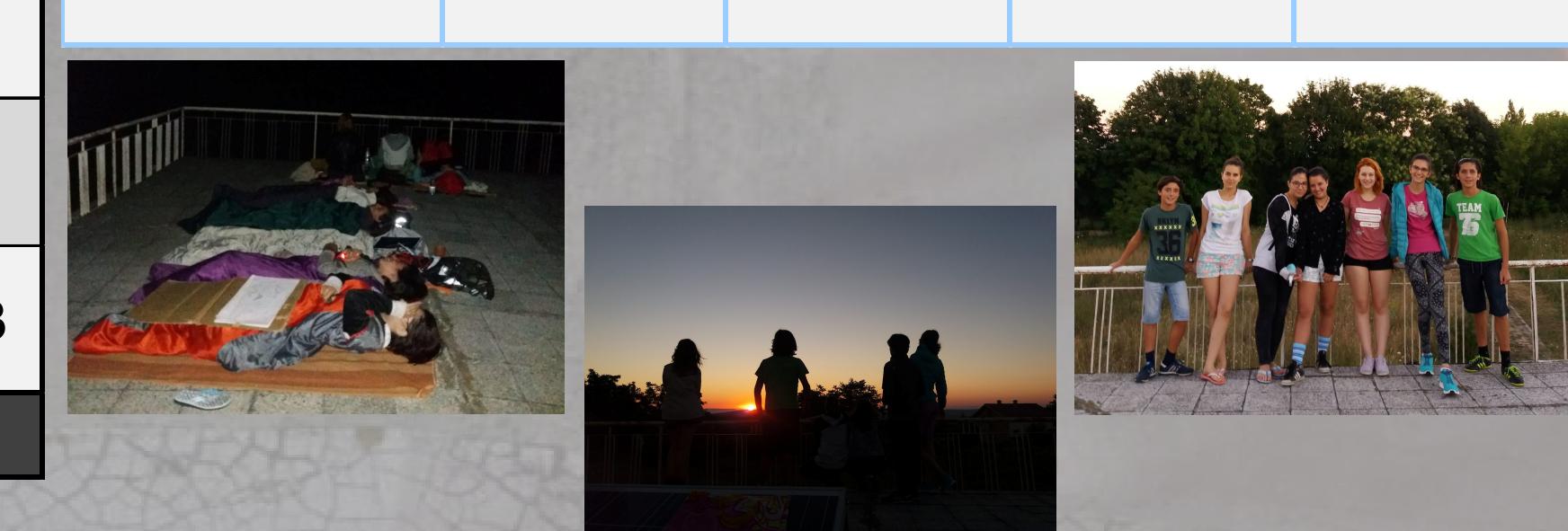


Observations of Perseids, 9-14 August 2015

Observer	Teff	Lm	PER	Spor	ANT	KCG
Galin Genchev	01,00	6,2-6,3	38	3	1	0
Gabriela Stoyanova	05,75	5,9	106	56	0	0
Ivanka Getsova	18,24	5,76-6,2	122	48	12	3
Bozhena Varbanova	13,40	5,7-6,5	134	110	5	2
Peter Kostadinov	15,10	5,7-6,12	185	310	8	2
Ivan Kolev	16,92	5,7	213	119	5	1
Kalina Georgieva	18,49	5,7-6,12	307	176	13	4
Savina Ivanova	16,30	5,7-6,5	314	374	19	2
Katerina Ruseva	20,59	5,7-6,12	329	208	10	0
Yuliya Moralyiska	24,77	5,7-6,12	348	452	41	2

PER' 2015 ZHR average

Date:	9/10 August	10/11 August	12/13 August	13/14 August
ZHR <sub>avg</sub>	30±10	19±12	66±22	37±14

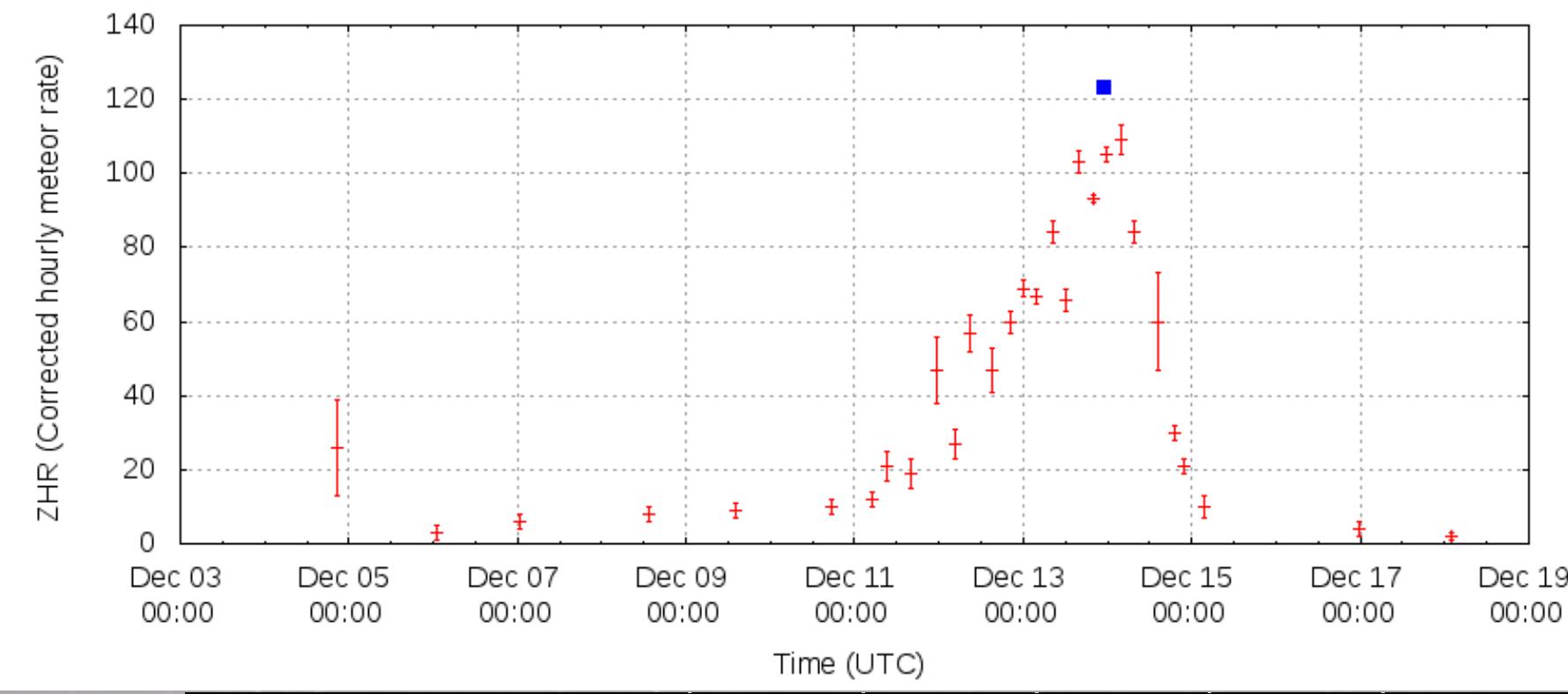


Radiant position of Geminids in 2012  
40 plotted meteors

Observer: Alexander Nachev  
Coordiantes: RA=110° Dec+=23°

### GEMINIDS

ZHR profile of Geminids in 2012 - our average results (only for the night of the maximum) superimposed on the IMO graph



13/14 December 2012

18:30 - 02:30 UT

Observer	T <sub>eff</sub> [h]	Lm	GEM	SPO	ZHR <sub>avg</sub>
Alexander Nachev	5,17	5,39	255	23	152
Galin Genchev	3,25	6,17	331	23	146
Elena Kolisheva	3,83	5,54	172	57	135
Maria-Magdalena Arnaudova	4,75	5,54	217	132	116
Ivanka Getsova	6,30	5,93	312	117	94

ZHR<sub>avg</sub> = 76 ± 2

Observer	Lm	Teff	GEM	SPO	ZHR
Ivanka Getsova	5,8	2,75	104	64	90
Eleonora Floreva	5,9	2,5	54	38	96
Kalina Georgieva	5,9	2,75	64	27	93
Savina Ivanova	6,12	2,3	77	76	85

ZHR avg = 91 ± 2

Observer	Lm	Teff	GEM	SPO	ZHR
Ivanka Getsova	5,8	2,75	104	64	90
Eleonora Floreva	5,9	2,5	54	38	96
Kalina Georgieva	5,9	2,75	64	27	93
Savina Ivanova	6,12	2,3	77	76	85

ZHR avg = 129 ± 11

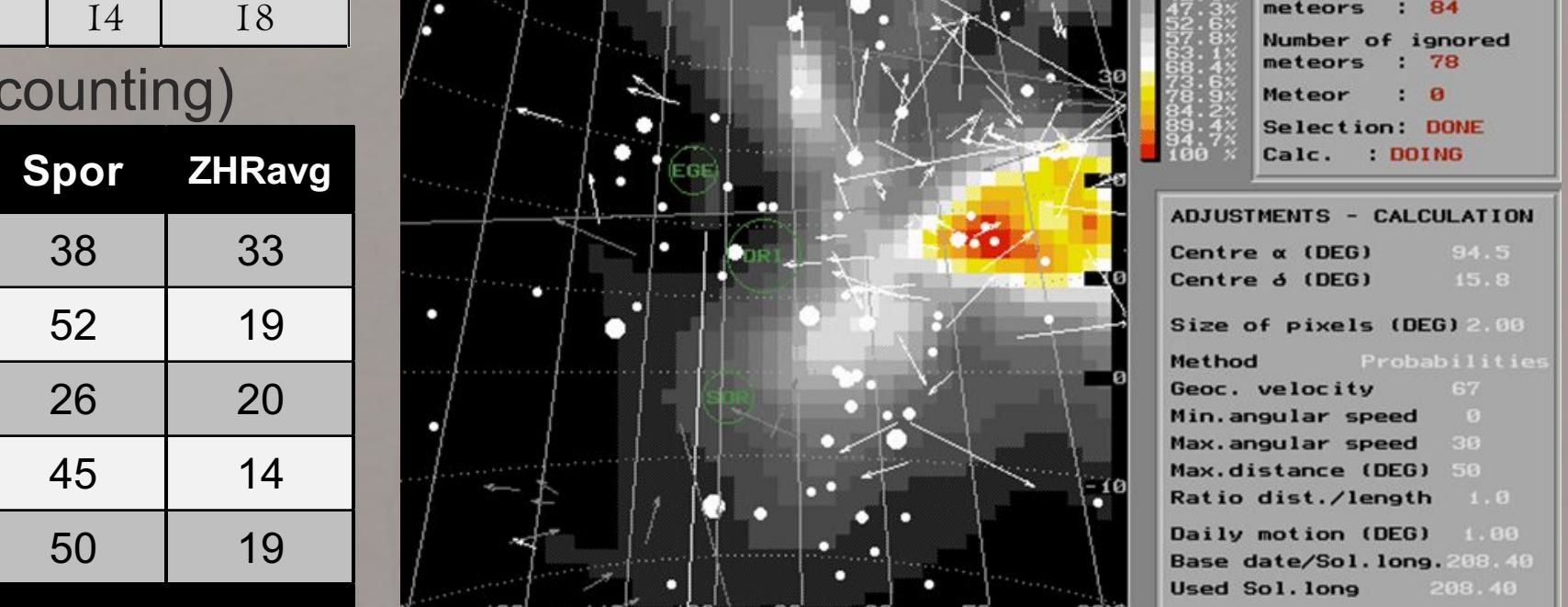
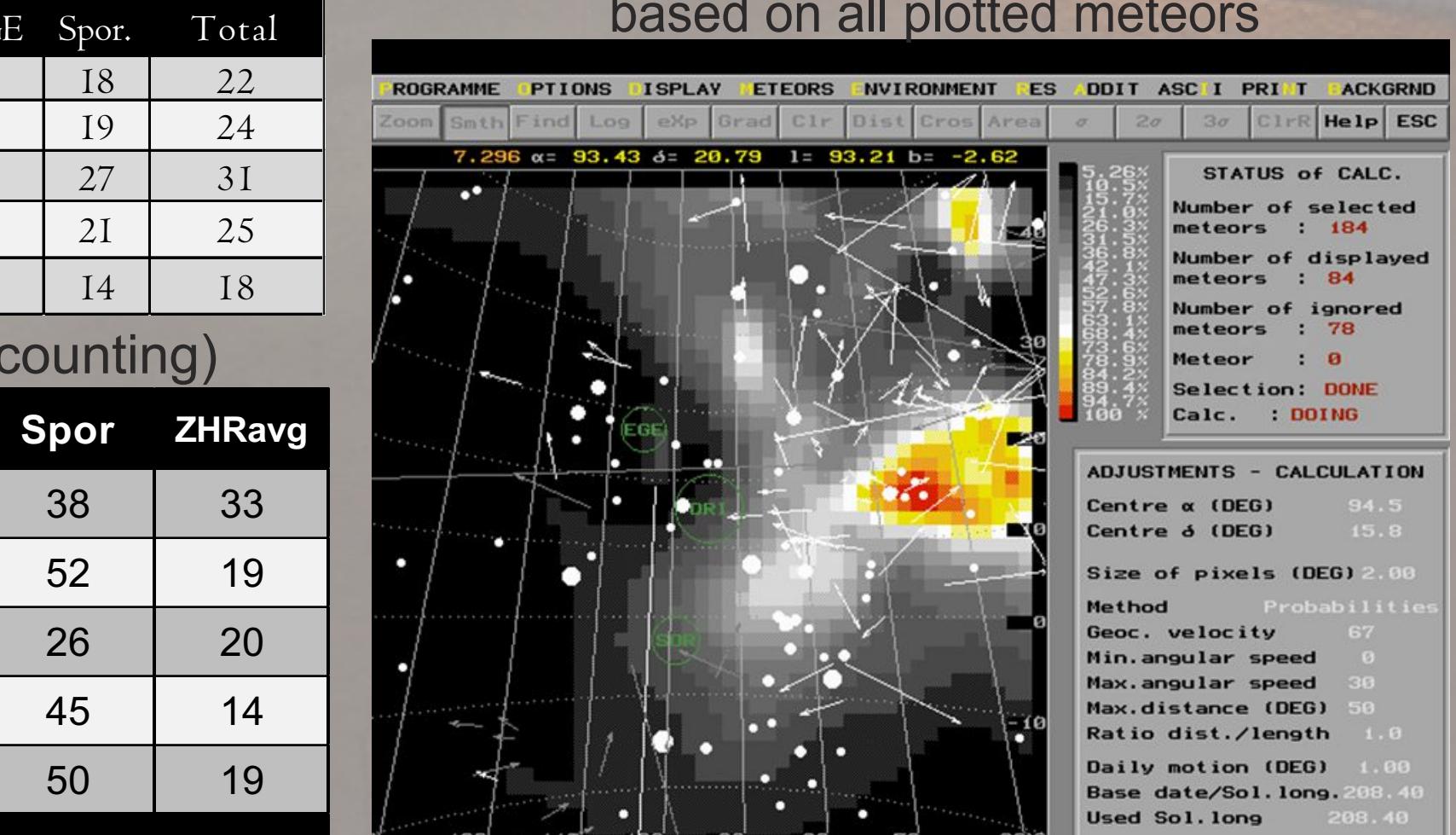
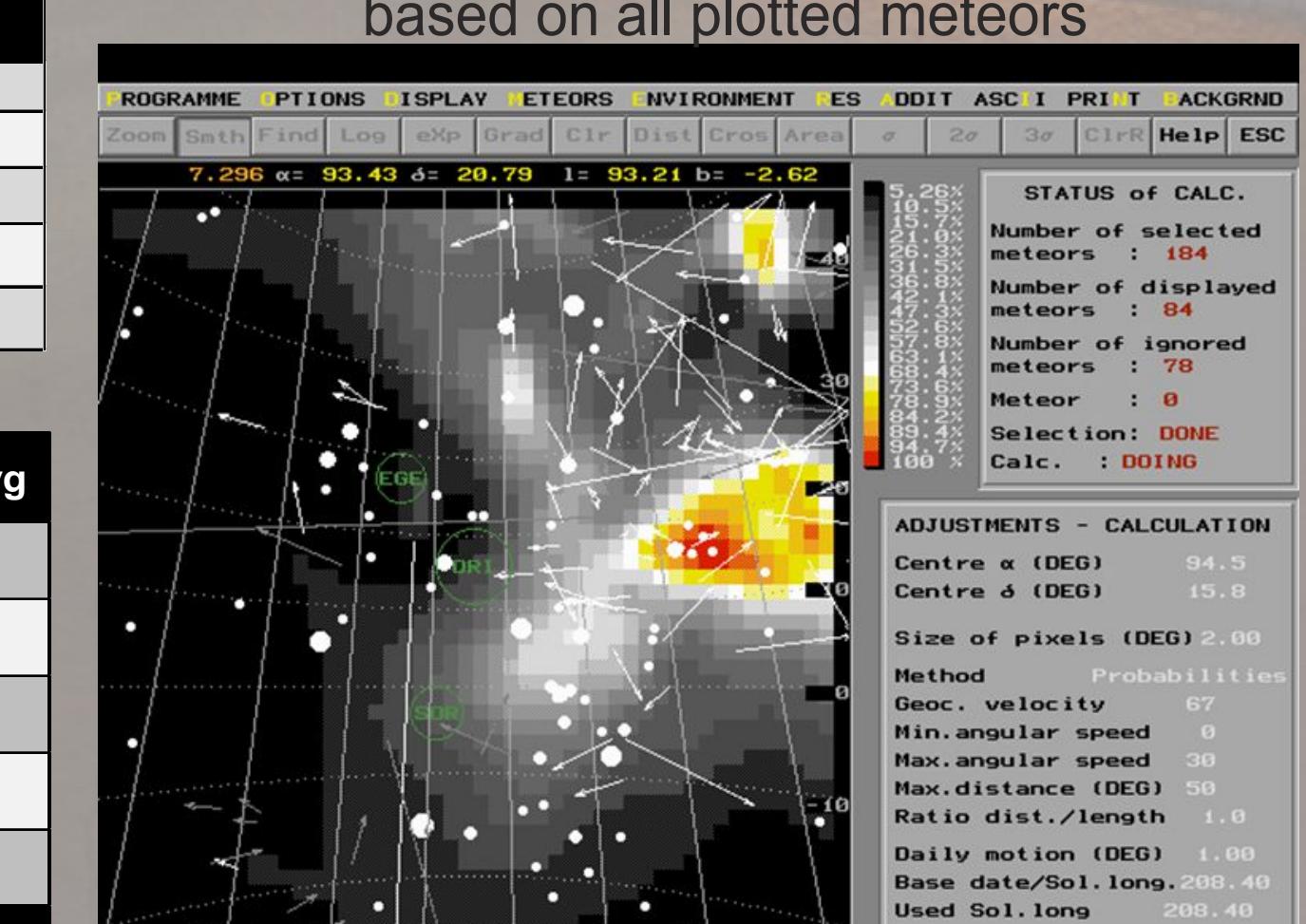
Photographer: Petar Kostadinov; Camera: Nikon D3200  
ISO: 3200 F-stop: f/4 Focal length: 18 mm  
Exposure time: 13 sec /18:20 UT/ (left); 6 sec /17:43 UT/ (right)



The pictures were taken on: 13/14 December 2015 Both meteors were identified as Geminids.

### ORIONIDS

Radiant position of Orionids in 2011 based on all plotted meteors

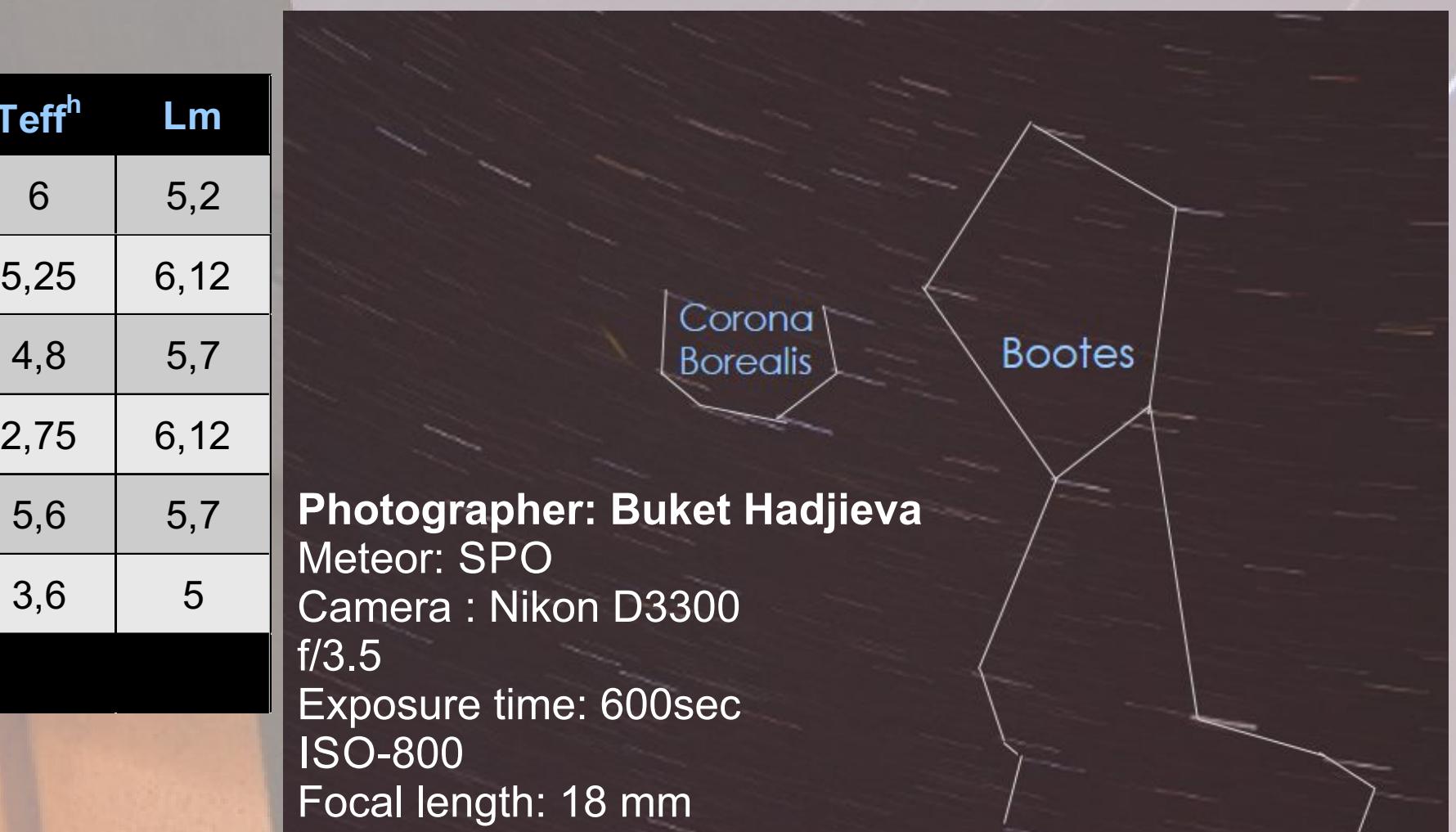


### JUNE BOOTIDS

25-27 June 2016

Observer	JBO	Spor	Teff <sup>h</sup>	Lm
Bilyana Valkova	1	7	6	5,2
Bozhenka Varbanova	2	29	5,25	6,12
Ginka Mihaylova	1	29	4,8	5,7
Ivanka Getsova	1	5	2,75	6,12
Iskra Vasileva	1	10	5,6	5,7
Kristiyana Georgieva	0	5	3,6	5

ZHR<sub>avg</sub> = 2±2



Photographer: Buket Hadjieva

Meteo: SPO  
Camera : Nikon D3300  
f/3.5  
Exposure time: 600sec  
ISO-800  
Focal length: 18 mm  
L.Time: 25.Jun.2016/19:36-19:46 UT

This poster was prepared by: Ivaylo Belchev, Kalina Georgieva, Katerina Ruseva  
Teacher: Ivanka Getsova-Momcheva