EPSC Abstracts
Vol. 7 EPSC2012-725 2012
European Planetary Science Congress 2012

Radio observations of Draconids 2011 outburst

K. Fietkiewicz (1), **M. Wiśniewski** (1,2), P. Żołądek (1), Z. Cieślikowski (1)
(1) Polish Fireball Network, Comets and Meteors Workshop, ul. Bartycka 18, 00-716 Warsaw, Poland
(2) Central Office of Measures, ul. Elektoralna 2, 00-139 Warsaw, Poland
(parmo.pfn@gmail.com)

Abstract

Radio observations of Draconids 2011 outburst were made by 4 Polish radio meteor observers. We used variable windowing function to accurately reproduce the shape of the maximum. We detected three Draconids maxima at 20:03 UT, 20:18 UT and 20:50 UT. We analysed the mass index Draconids and overdense/underdense meteors ratio and found corelation with moments of individual peaks and mass index.

1. Introduction

The greatest event of recent year was outburst of Draconids at evening of October 8, 2011. It is known that besides the meteors observed in visible light (visual observations, photographic, video), meteors can be observed also by radio. In addition, the nearly full moon makes difficult to observe weak phenomena.

2. Observations

Four polish observers made radio observations during Draconids outburst: 1) Zdzisław Cieślikowski, Plock, the issue of FM, the frequency of 70.20MHz, log period antenna, azimuth: ~ 90 °. Receiver: Dior AS952; 2) Karol Fietkiewicz, PFN03 Złotokłos station, at a frequency of 70.20MHz, log period antenna, azimuth: ~ 90 °. Receiver: Diora AS952; 3) Piotr (SP2SWR) - a review of the full TV band emission of the DSB, at a frequency of 49.7 MHz. Receiver Yaesu FT-897. 4) Przemysław Żołądek, ZOLPR, Warsaw - listen TV on the frequency 77.25Mhz, the issue of the DSB, simple half lambda dipole, receiver Realistic PRO2006 + DX394. Observations of Piotr (SP2SWR) are under reduction. By courtesy of Andy Smiths (G7IZU) we obtained data for comparison.

2. Method

The standard analysis of activity involves counting events in a specified time intervals and fixed length. The rectangular time window of meteor counts can lead to loss of information about unexpected increases in short-term activity. We used the time windowing with variable length and Gaussian shape weight function for each phenomena to accurately reproduce the shape of the maximum Draconids. We assume that the window should contains at least 25 meteors. If the number of meteor was too small, the width of the interval was increased. Results for each station are shown on Figure 1.

3. Results

Przemek Żołądek's station recorded the first, the strongest maximum at about 20:03 UT, and a second maximum at about 20:18 UT. Nearly identical moments of maxima was recorded by PFN03 station, even though the receiving technique was different and there was different antenna configuration.

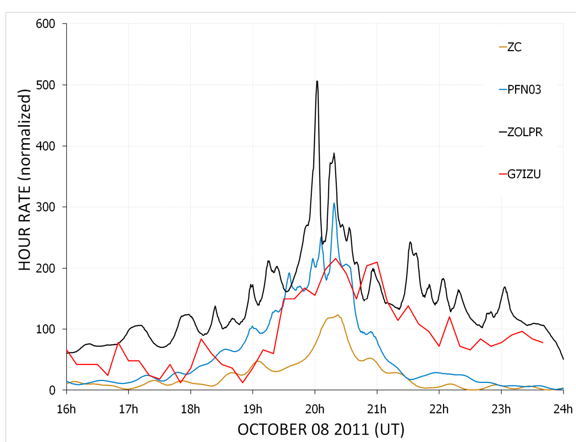

Figure 1: Comparison of Draconids activity obtained from radio observers. For the G7IZU data set used constant, one hour window width. .

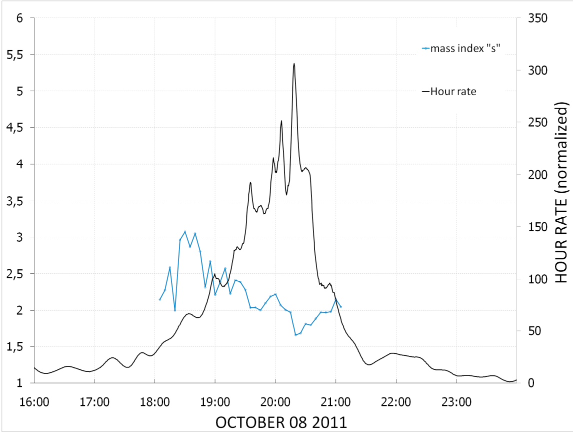

Figure 2: The analysis of the Draconids mass index from PFN03 station.

The second maximum at the same time also registered G7IZU station, and station of Zdzisław Cieślikowski. The G7IZU station recorded a third increase in activity at about 20:50UT. It was also recorded in the station ZOLPR, and less clear visible in other stations. The first maximum for PFN03 station was at 19:40UT, and also was visible in G7IZU station. All of these short bursts are not visible in the standard analysis (see Figure 3, and the black line "Total").

The analysis of the mass index Draconids is presented on Figure 2. Activity was analyzed only for stations PFN03. The mass index value at the time of maximum Draconids was determined from cumulative graph of meteor duration distribution[1]. We used only overdense meteors with echo duration exceeding 0.4 sec, and did the nonlinear fit for this set of data, to obtain the slope for shorter echoes (to be sure that we choose region, where echo duration is controlled only by diffusion) [2].

The obtained mass index "s" (Figure 2, blue line) was variable and this seems to be correlated with moments of individual peaks. The analysis shows that the first maximum in PFN03 (~19:40UT) was more abundant in the larger echos, while the second (20:05UT) the smaller ones. The third, very short outburst was detected (~20:20UT) with the largerst echoes, and the mass index is the lowest. To be sure, that obtained mass index "s" is correct, we did another analysis –we divide the data set to two groups – meteors with echoes longer than 1 sec (this should be overdense meteors) and shorter than 1 sec (underdense). The results (Figure 3) is comparable to our obtained mass index.

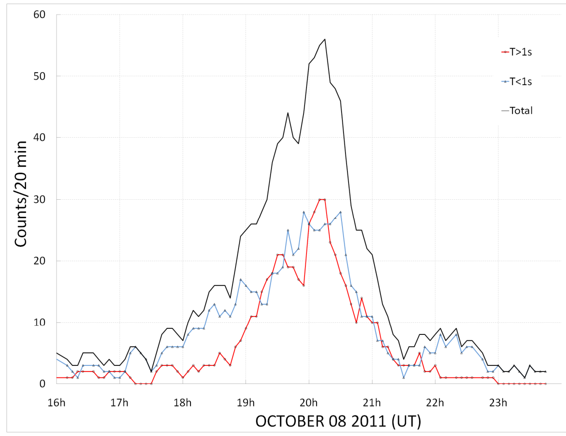

Figure 3: The analysis of the Draconids overdense/underdense ratio from PFN03 station.

Both results are not significantly different from each other, and are comparable – during the first, and third maximum we can see that counts of larger meteors was higher, unlike the second maximum, where faint meteors dominate. Additional, the calculation of mass index in the case of activity of less than 30 meteors uncertainty estimate is large.

6. Summary and Conclusions

Using radio receivers we detected two, very strong and short peaks at 20:05 and 20:20 UT, and another two, at 19:40 and 20:50 UT. We shown, that the short, variable window length analysis can give more detailed information about structure of this, very interesting, meteor outburst.

Acknowledgements

We would like to thanks Piotr **SP2SWR,** and Andy Smiths (**G7IZU**) for observation and provide access to data.

References

[1] O. Belkovich, , Procedings of radar observations: Calculation of meteor flux density and mass index, Proceedings IMO radio meteor school, pp.48-54, 2006

[2] Šimek, M.; Pecina, P., The Giacobinid meteor stream observed by radar in 1998, Astron. Astrophys., 343, L94–L96, 1999