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Results of the Draconids 2011 observation with the BRAMS network

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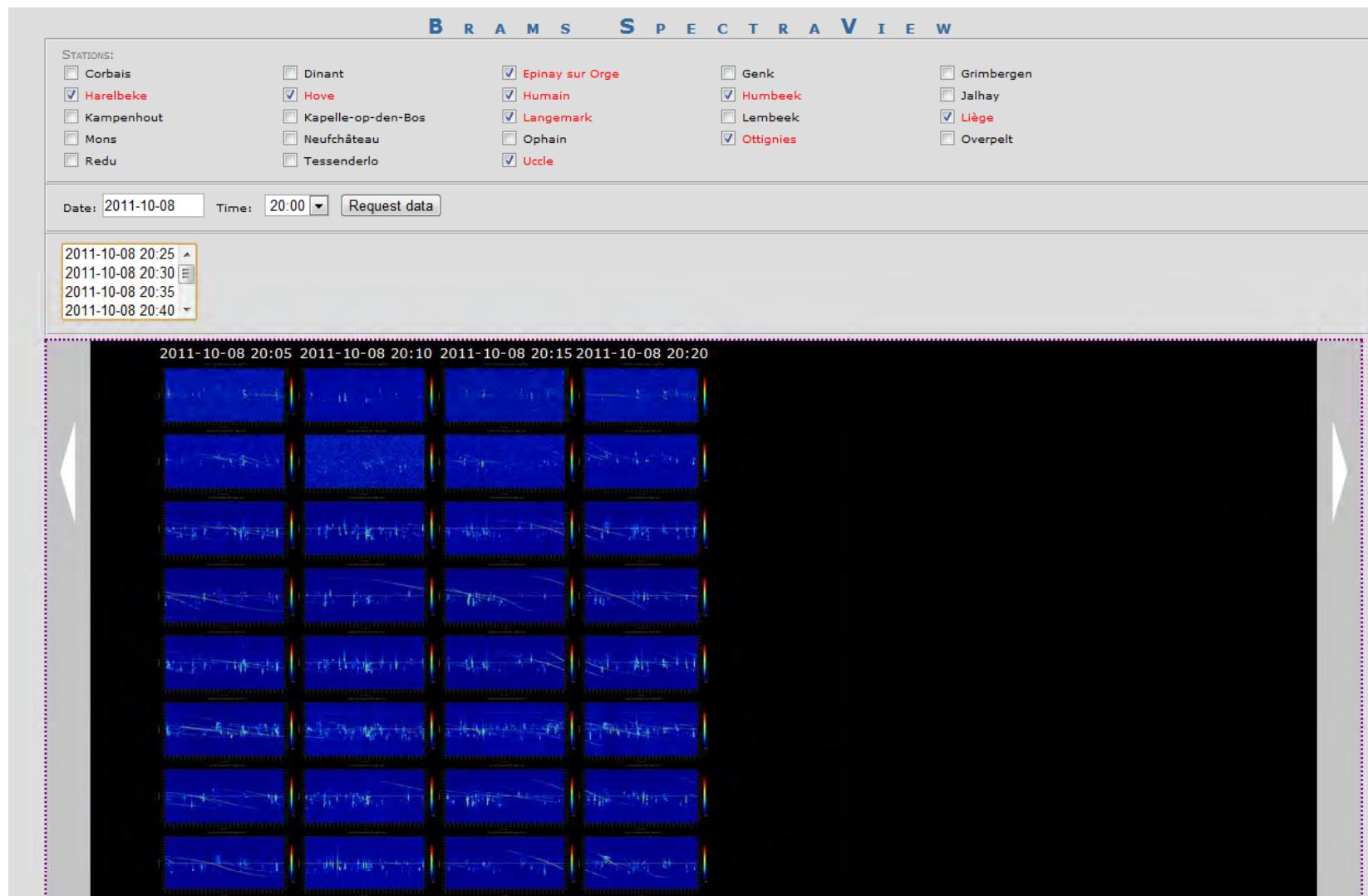
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Brams SpectraView

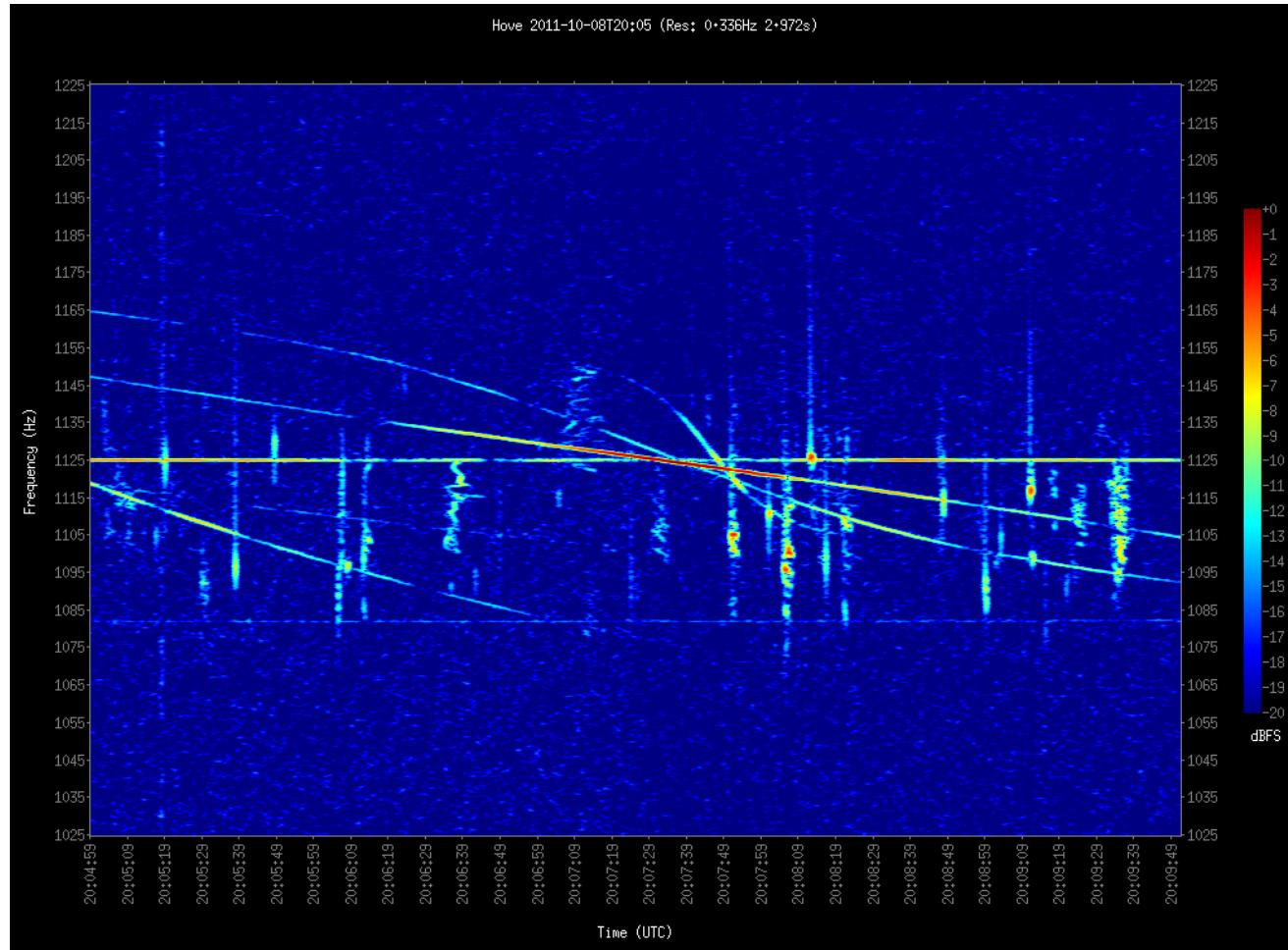


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Draconid spectrograms



Hove

8 Oct. 2011
20h05-20h10 UT

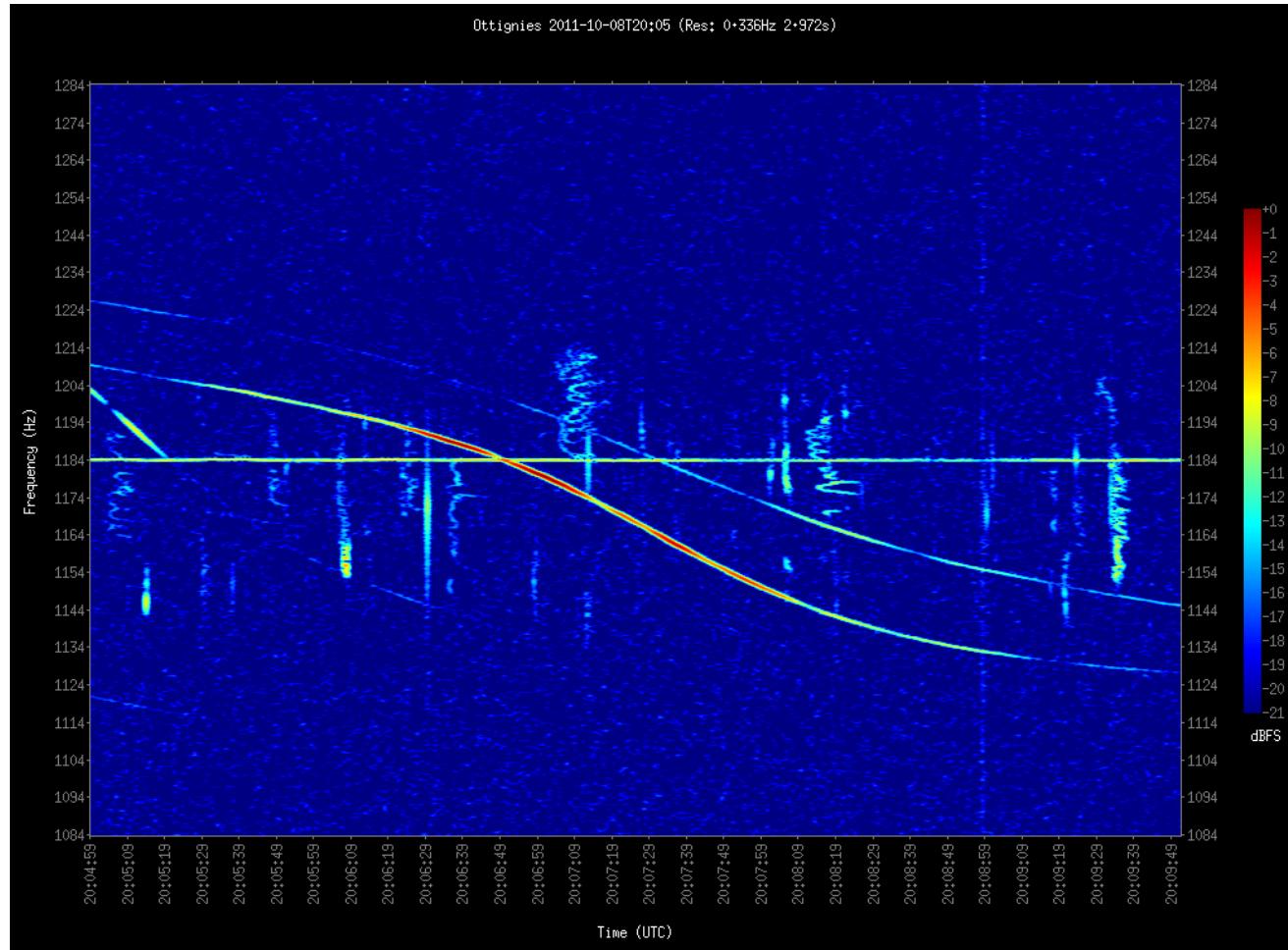


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Draconid spectrograms



Ottignies

8 Oct. 2011
20h05-20h10 UT

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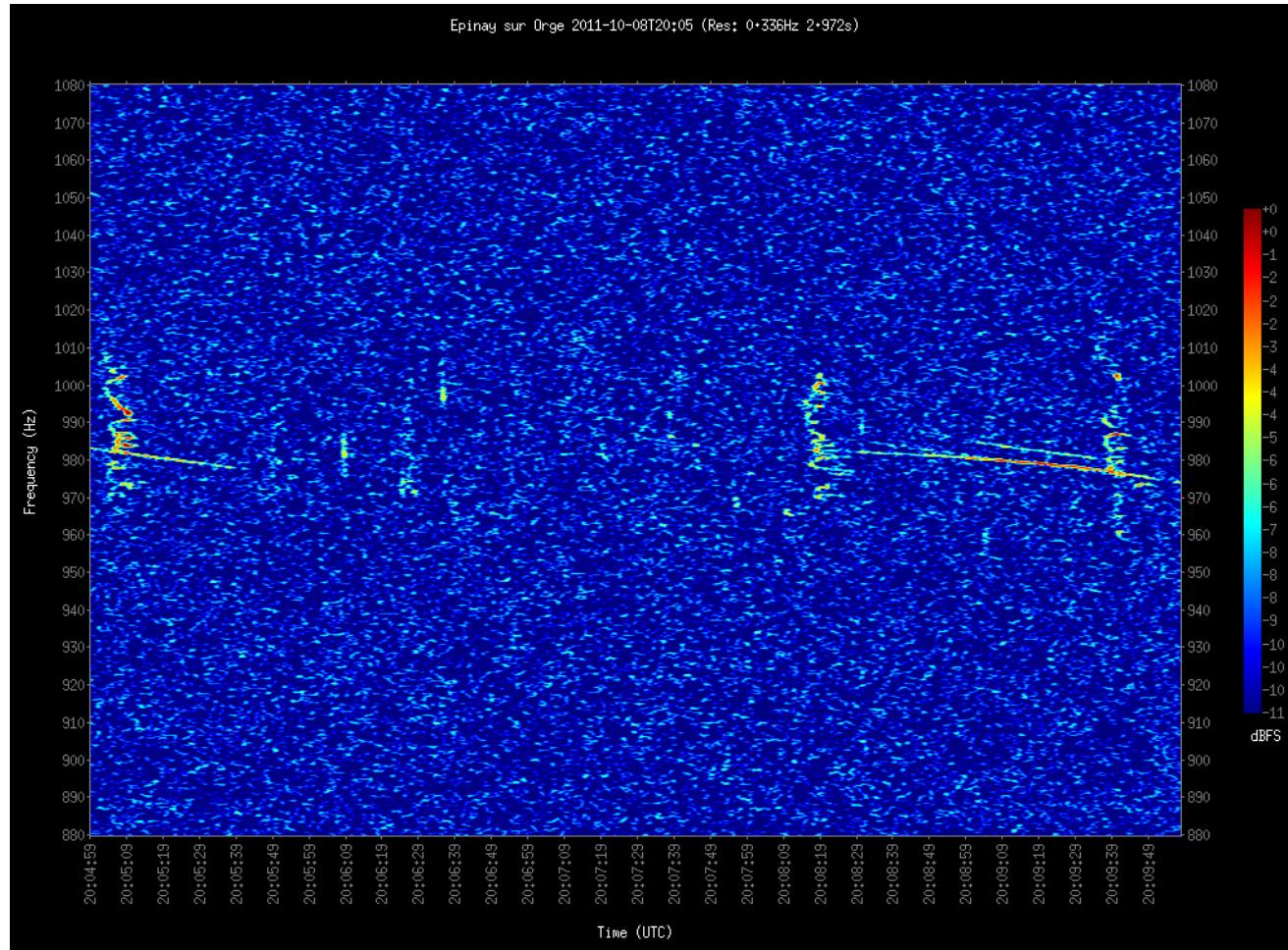


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Draconid spectrograms



Epinay-sur-Orge

8 Oct. 2011
20h05-20h10 UT

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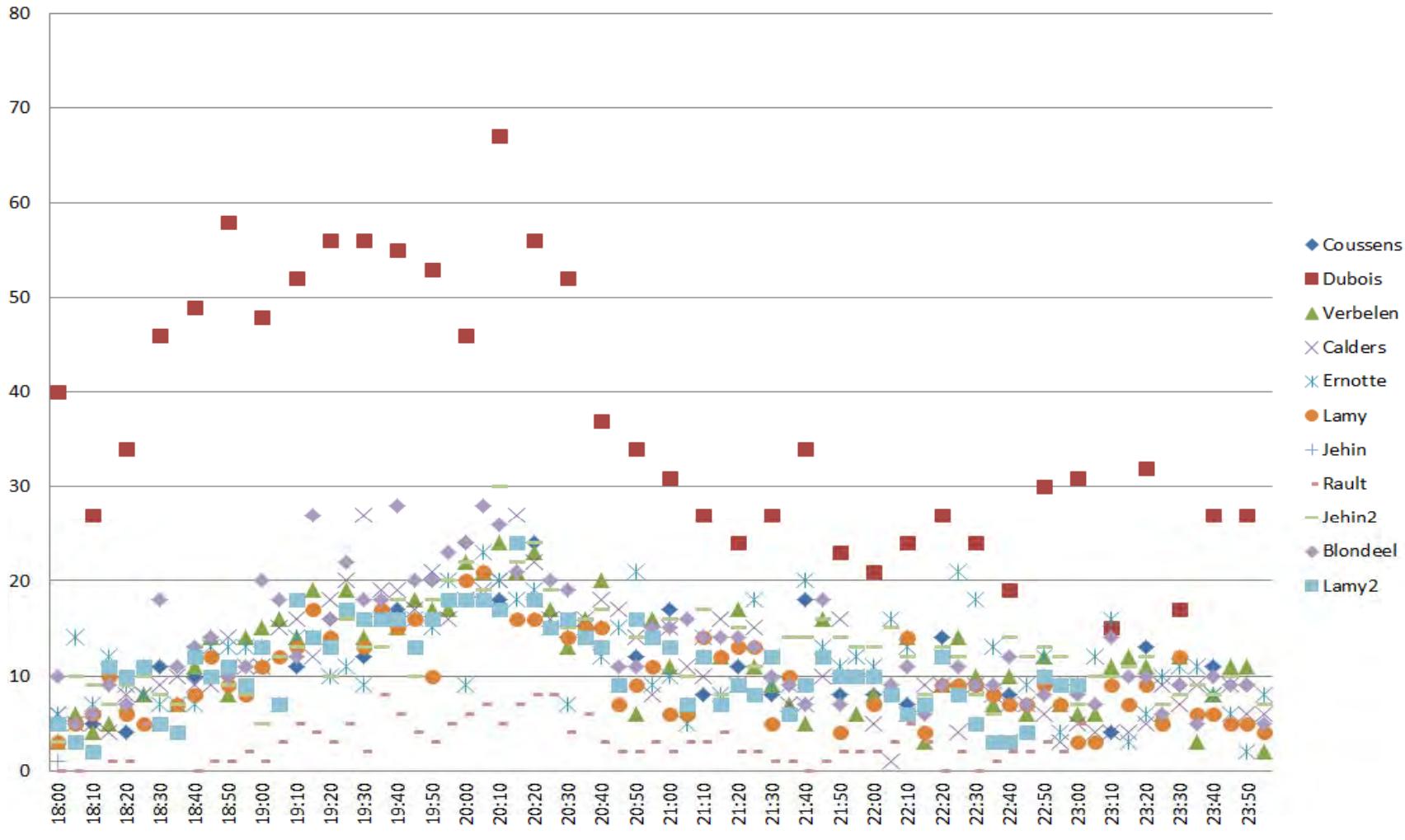




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Manual countings



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Observability function (OF)

- The OF is a function that represents the sensitivity of a particular forward scatter setup to detect underdense meteors of a given shower on a given moment.
 - I.e. if the OF at t1 is twice as big as at t2 and the meteor activity is constant, then the setup will observe twice as much shower meteors at t1 in respect to t2.
- The OF is just a rough estimate; real meteor activity can only be obtained by flux density calculations (see *Proc. RMS 2005*).



OF revisited

- There are two steps in the calculation of the OF.
 1. Calculation of the place where shower meteors can reflect radio waves from transmitter to receiver. The result is a curve. This will be shown later.
 2. For any point on the curve the sensitivity of the system for underdense shower meteors occurring at this point is calculated. The OF is the sum of all these sensitivities.



History

- In 1996, Cis Verbeeck wrote a paper for the proceedings of the IMC in Appeldoorn.
 - *Calculating the sensitivity of a forward scatter setup for underdense shower meteors*
- For this paper, he wrote a code in C to calculate the OF. But after more than a decade, the compilers changed considerably, and we couldn't compile the code anymore.





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Recent work

3/1: Cis sent me the original code

13/1: First time recompiled

21/3: New code to calculate a 6th degree polynomial

16/4: First successful reproduction of the plots as showed in the paper

5/6: Calculation of the OF

31/7: Extended the code to use geographic and equator coordinates



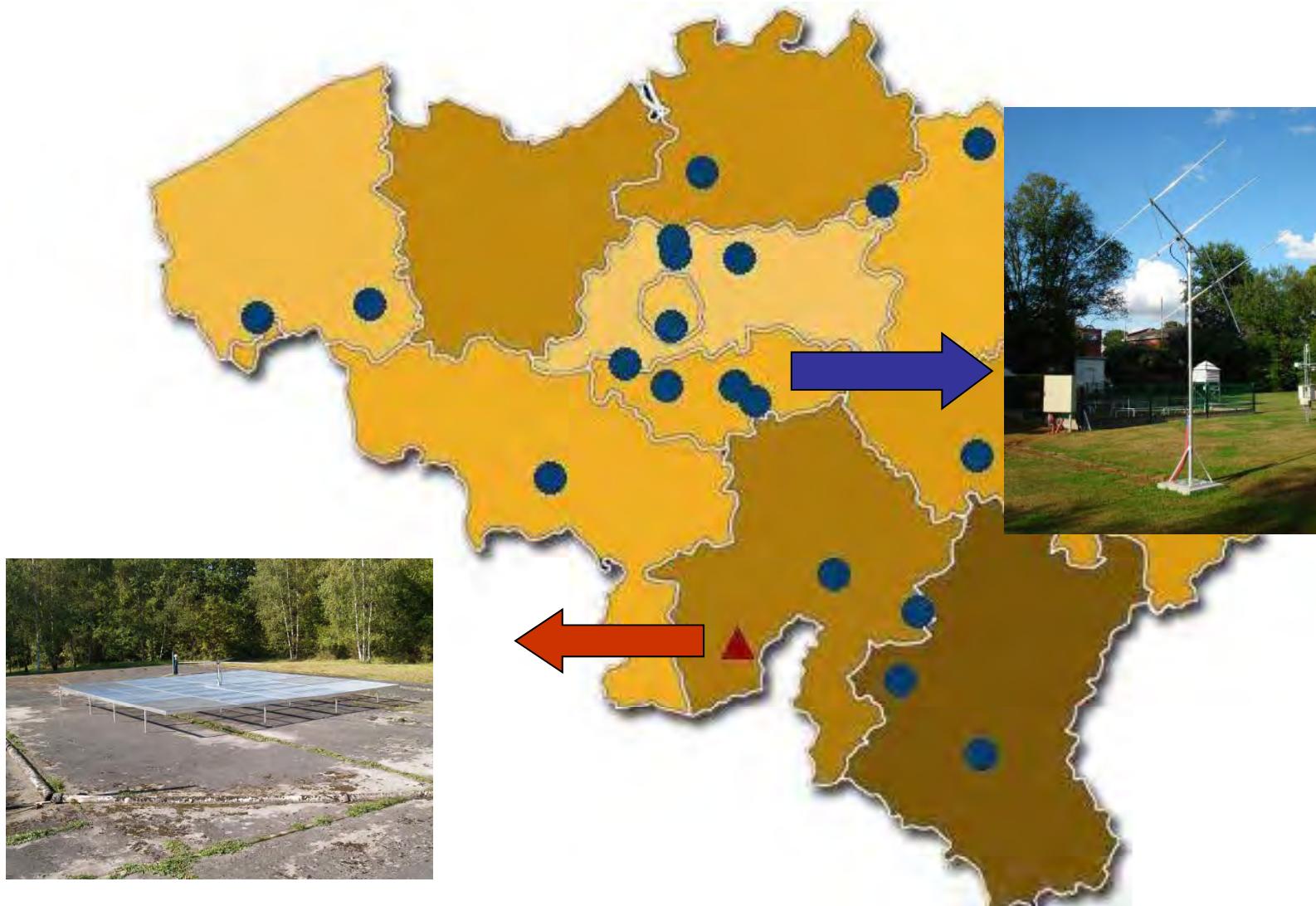


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The BRAMS network

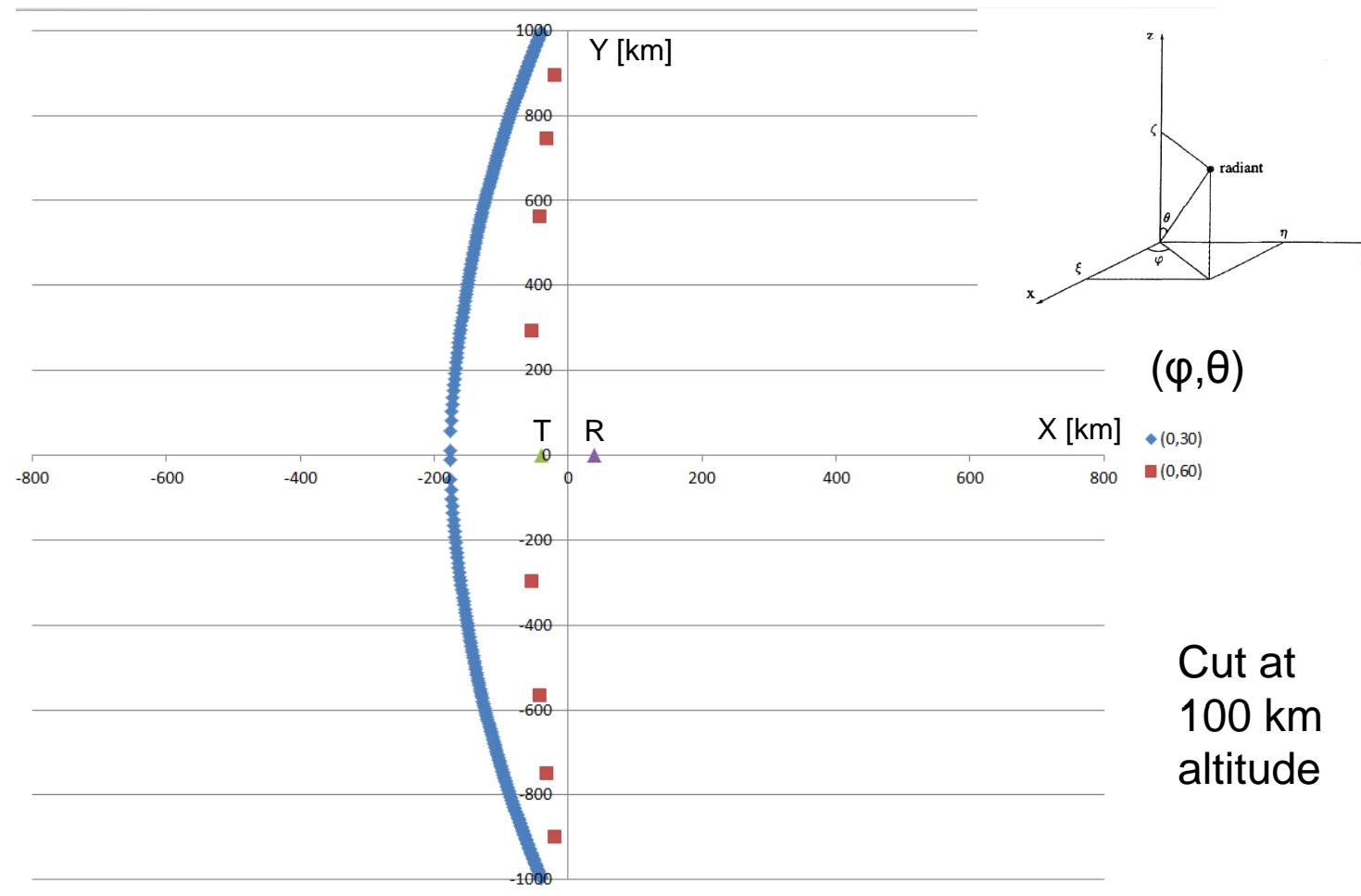


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Typical curves for Dourbes-Uccle



Cut at
100 km
altitude



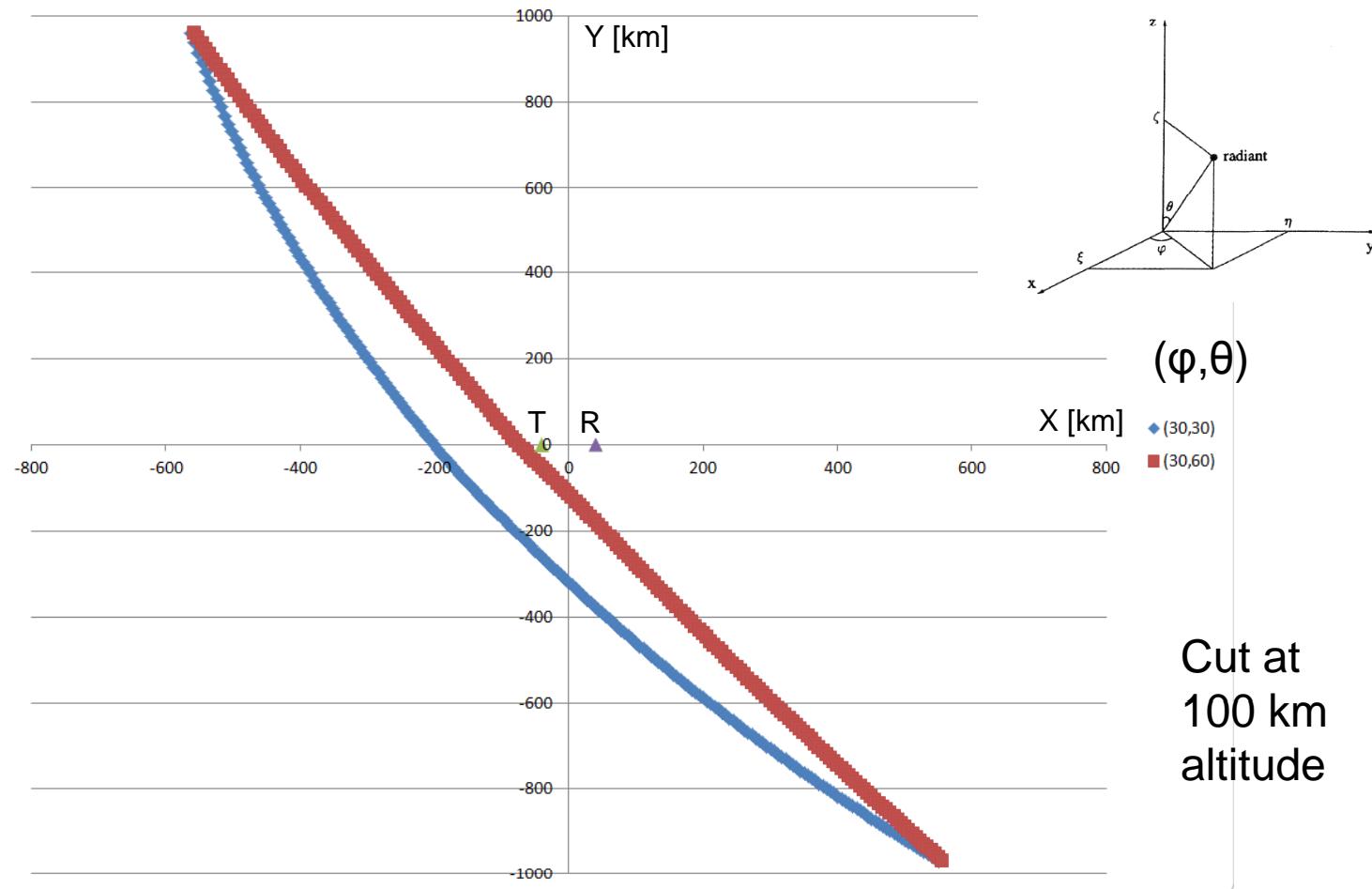
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Typical curves for Dourbes-Uccle



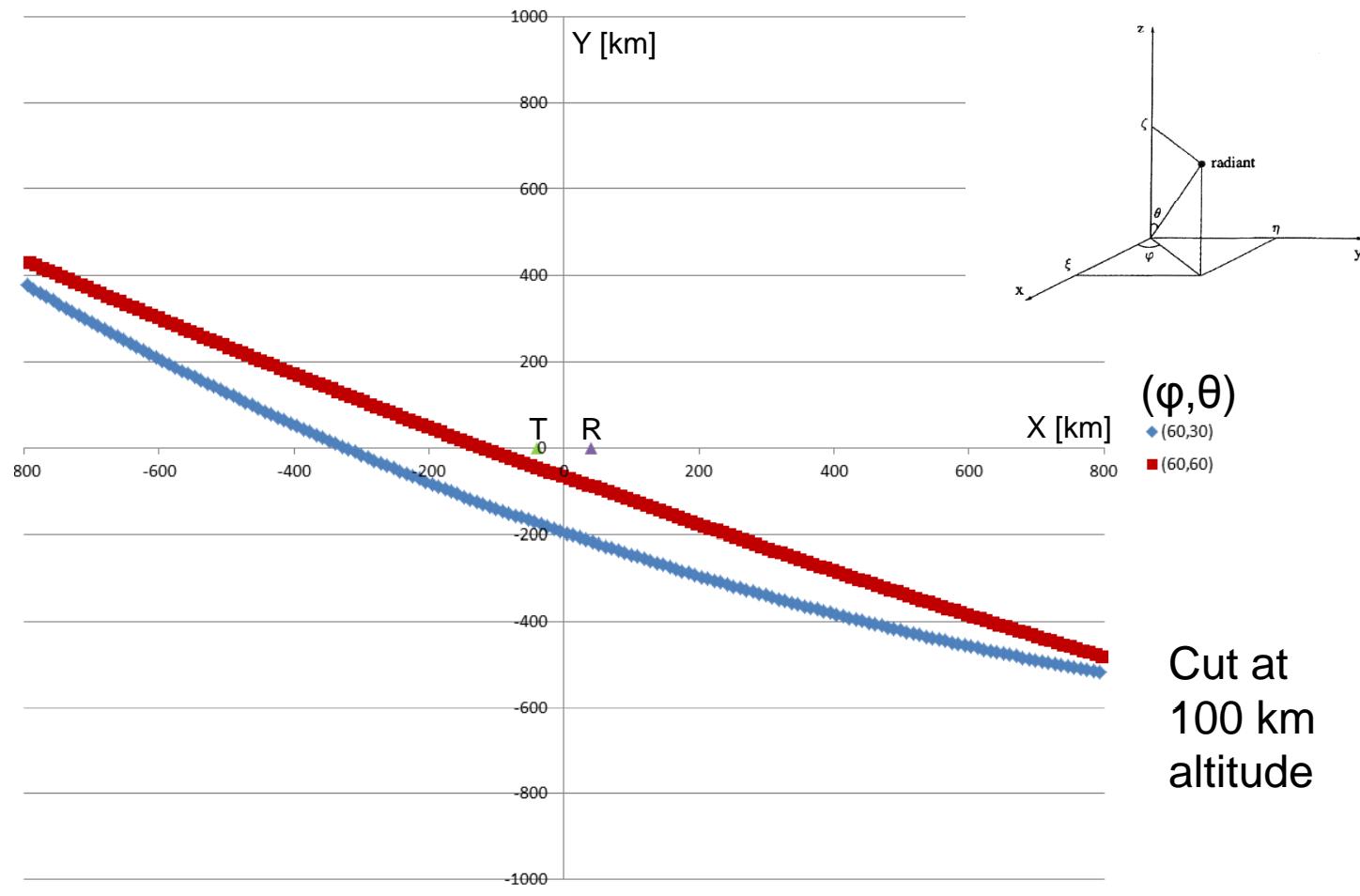
(φ, θ)

Cut at
100 km
altitude



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Typical curves for Dourbes-Uccle

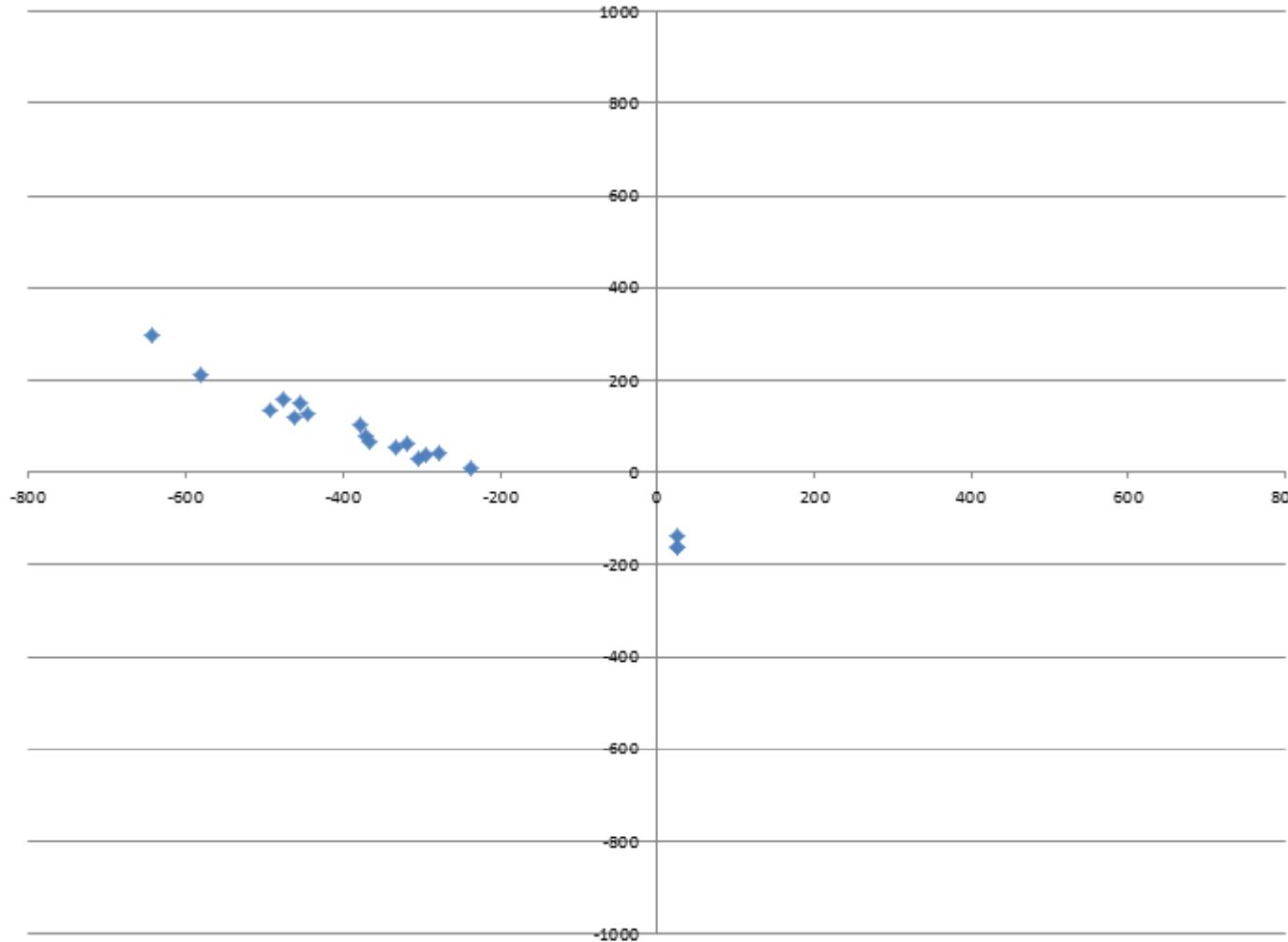


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Draconids for Hove @ 20h



Distance: 93km
Phi: 61.09°
Theta: 35.59°

(Meteor height:
90km)



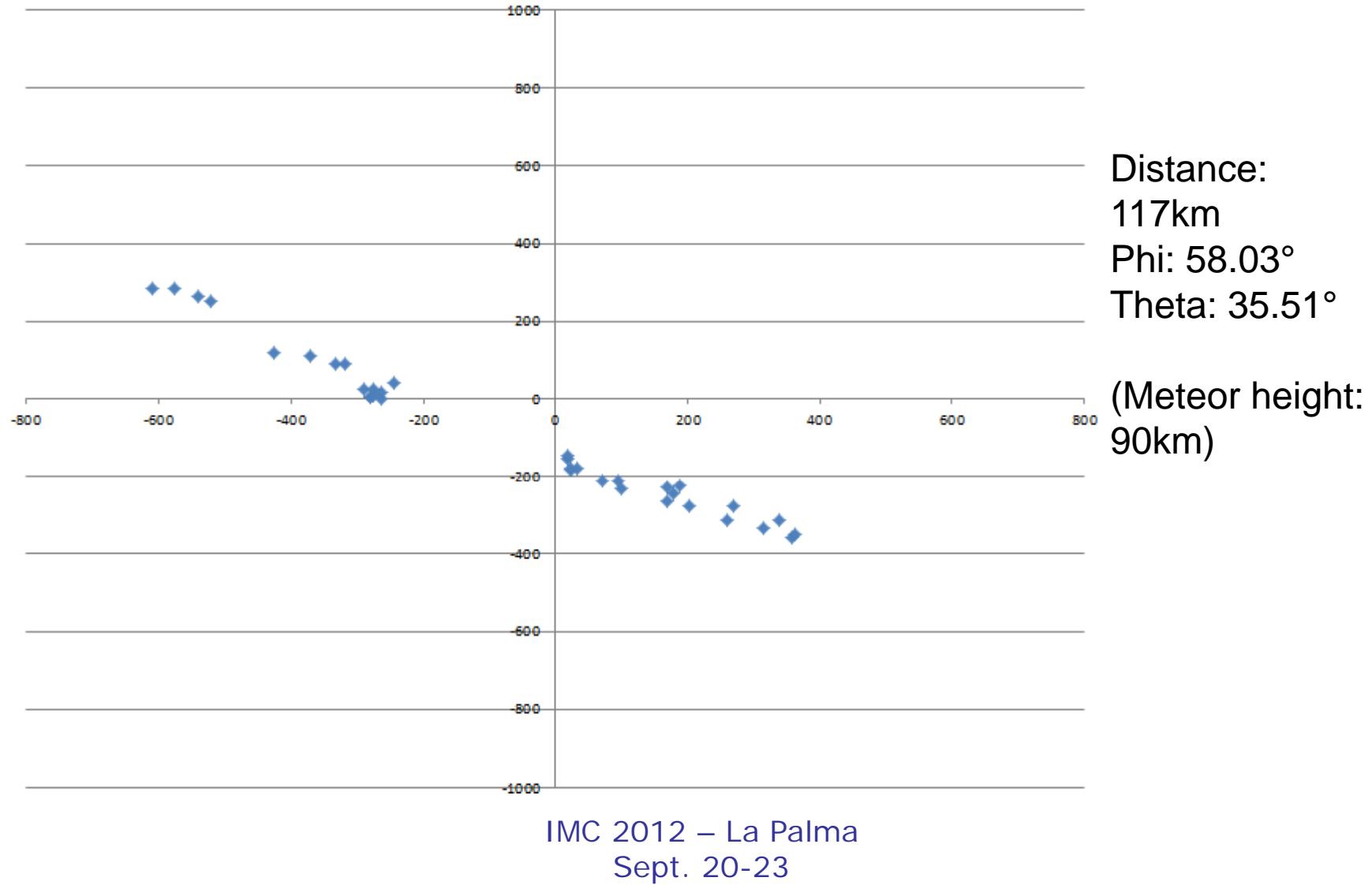
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Draconids for Ottignies @ 20h

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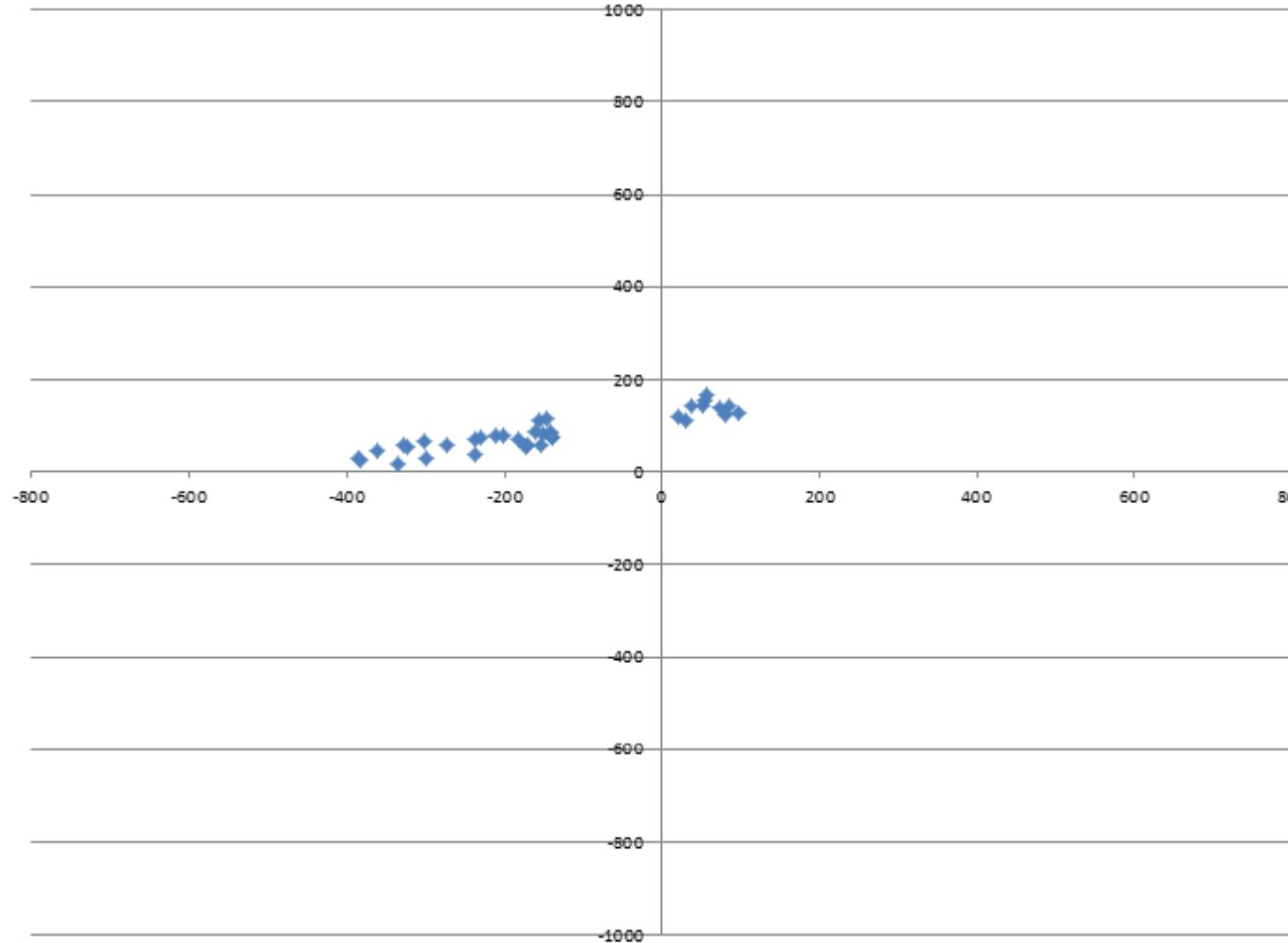


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Draconids for Epinay-sur-Orge @ 20h



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Distance:
226km
Phi: 285.06°
Theta: 35.52°
(Meteor height:
90km)

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Conclusion & future work



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- The OF is a rough estimate of the real number of meteors. Real meteor activity can only be obtained by flux density calculations.
- But it can give us also an idea where a simultaneous observed underdense shower meteor should have occurred.
- The source code and compiled software will be downloadable from our website after the IMC.
- Cis will extend the code to transform all the observations to the same coordinate system.





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BRAMS: the website

The screenshot shows the 'What is BRAMS?' page of the BRAMS website. The header features the BISA logo and the text 'BRAMS Listen to the meteors Belgian Institute for Space Aeronomy'. The main content area has a blue header 'What is BRAMS?'. Below it, a paragraph describes BRAMS as a set of radio receiving stations using forward scattering techniques to study the meteoroid population. It mentions the project is coordinated by the Belgian Institute for Space Aeronomy (BISA), in the frame of the Solar-terrestrial Centre of Excellence (STCE). Most stations will be run by Belgian radioamateurs or groups of amateur astronomers. Two dedicated beacons located in Ieper (Western Belgium) and Dourbes (Southern Belgium) act as transmitters. A list of main goals follows:

- To collect and standardise the meteor observations of all the stations.
- To write codes for **automatic detection** of underdense/overdense meteor echoes.
- To compute **meteoroid flux densities** for meteor showers and **mass indexes** for meteor showers and sporadic meteors.
- To determine **individual meteor trajectories** from observations of the same meteor by multiple stations (both shower meteors and sporadic ones)
- To determine **orbital parameters** of multi-station meteoroids
- To analyse meteor profiles in order to retrieve physical parameters such as **ionization, speed and mass** of the meteoroids
- To study **head echoes** and the so-called "**epsilon**" **echoes**
- To promote radio-observation of meteors.

Below this, a note states that currently most BRAMS receiving stations belong to the radioamateur network of the VVS (with about 15 receiving stations mainly spread over the Flemish region). They listen to the beacon located in Ieper, which emits a cw circularly polarized signal at a frequency of 49.99 MHz with a constant power of 50W. In September 2010, a second beacon will be added in the Geophysical Center of Dourbes, which is part of the Royal Meteorological Institute of Belgium (RMI). It will emit a cw circularly polarized signal at a frequency of 49.97 MHz with a constant power of 150W. A photograph of a building with a satellite dish is shown. A note at the bottom indicates plans to provide hardware material to existing stations and extend the network to the South of Belgium, mentioning groups like GAS in Spa, SAL in Nadrin, and Astronomie Centre Ardenne in Neufchateau.

<http://brams.aeronomy.be>

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