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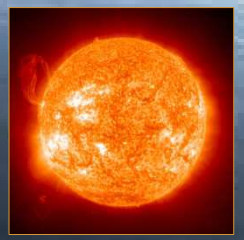
Royal Belgian Institute for Space Aeronomy (BIRA-IASB)

Institut royal d'Aéronomie Spatiale de Belgique (IASB)

Koninklijk Belgisch Instituut voor Ruimte-Aeronomie (BIRA)



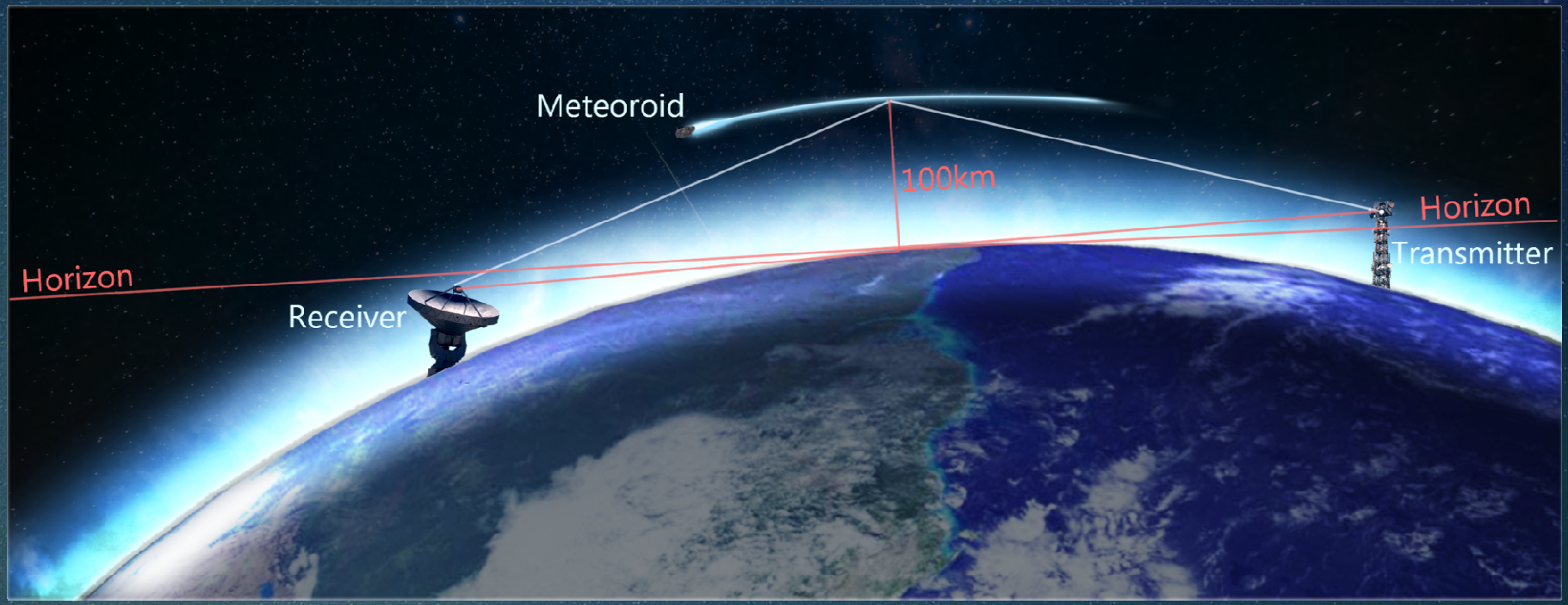
Involving citizen scientists in radio meteor research

Stijn Calders

https://www.radiometeorzoo.eu

Radio meteors

A meteor doesn't emit radio waves itself, but the ionized trail behind the meteoroid reflects the radio waves.



Radio versus visual observations

Radio versus visual observations

- We can observe during the night, but also during the day
  - Daylight showers

Radio versus visual observations

- We can observe during the night, but also during the day
- We are less prone to weather conditions
  - Except sporadic E and thunderstorms

Radio versus visual observations

- We can observe during the night, but also during the day
- We are less prone to weather conditions
- We observe much smaller meteoroids
  - ca. 2000 meteors per day per station

Radio versus visual observations

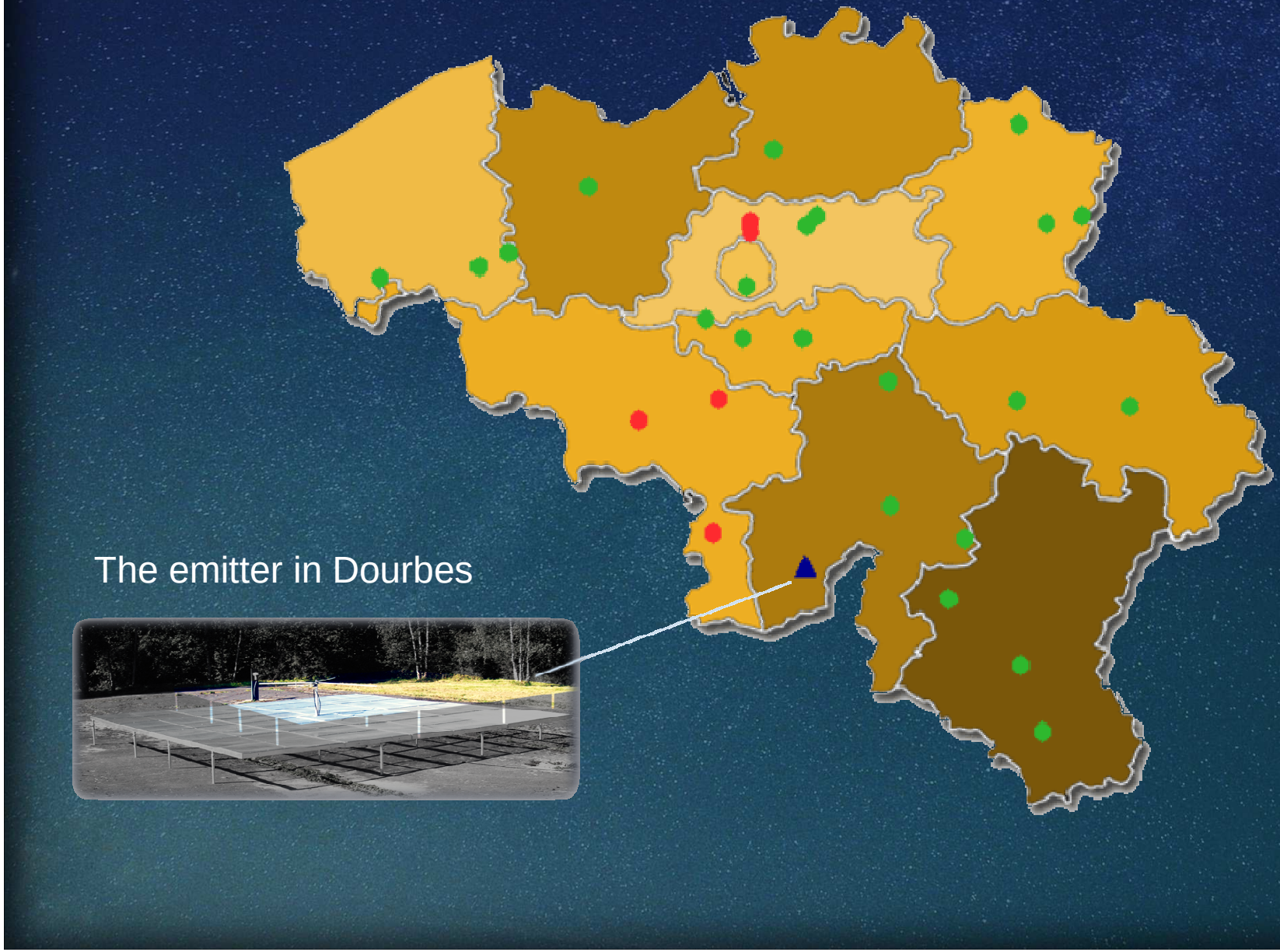
- We can observe during the night, but also during the day
- We are less prone to weather conditions
- We observe much smaller meteoroids
- If you are interested in the position/brightness/… of the meteor, camera networks are a much easier solution

Agenda

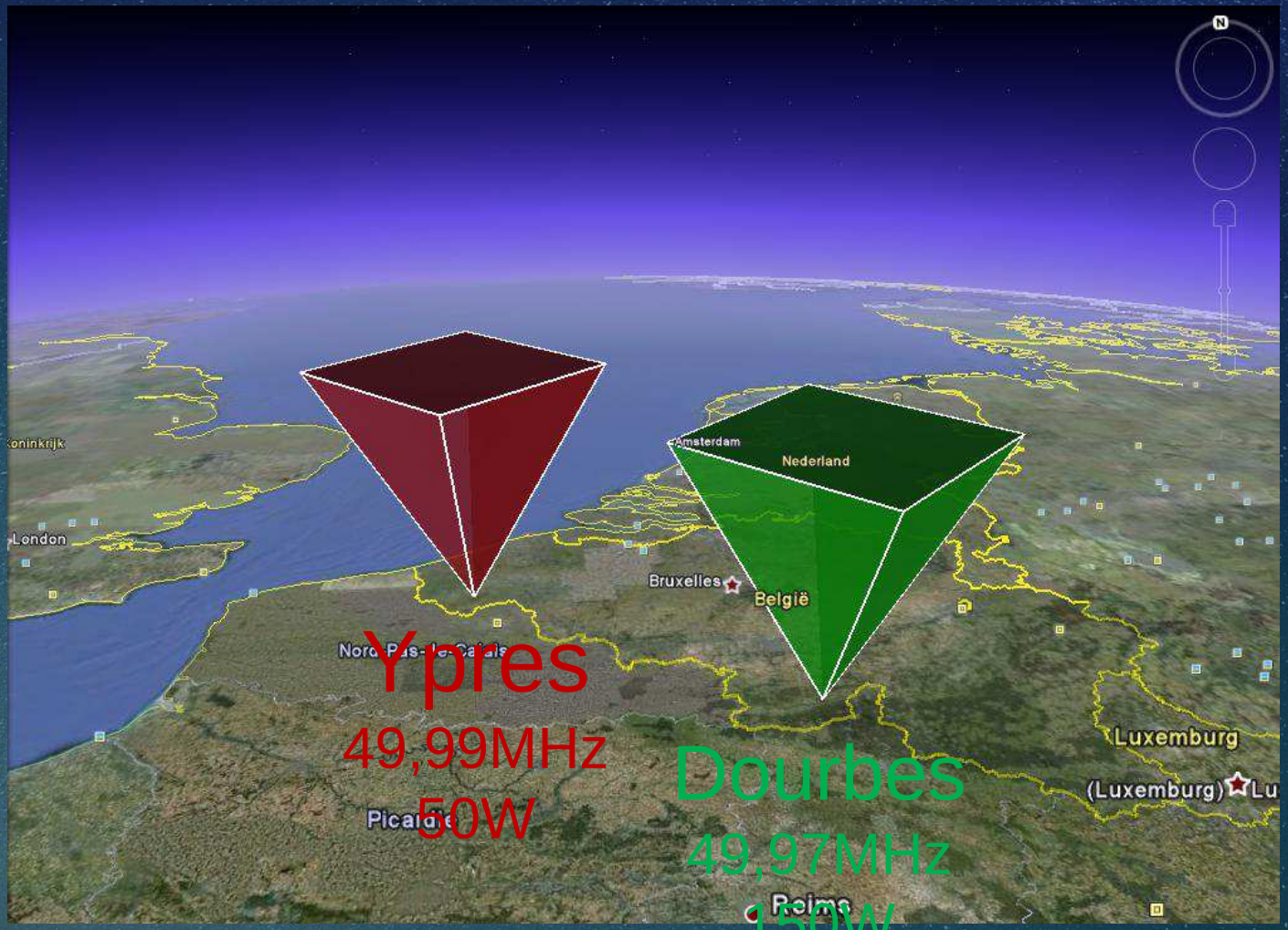
- The BRAMS network
- The physics behind radio meteors
- How could you help us?
- Results of the Radio Meteor Zoo

THE BRAMS NETWORK

The BRAMS network



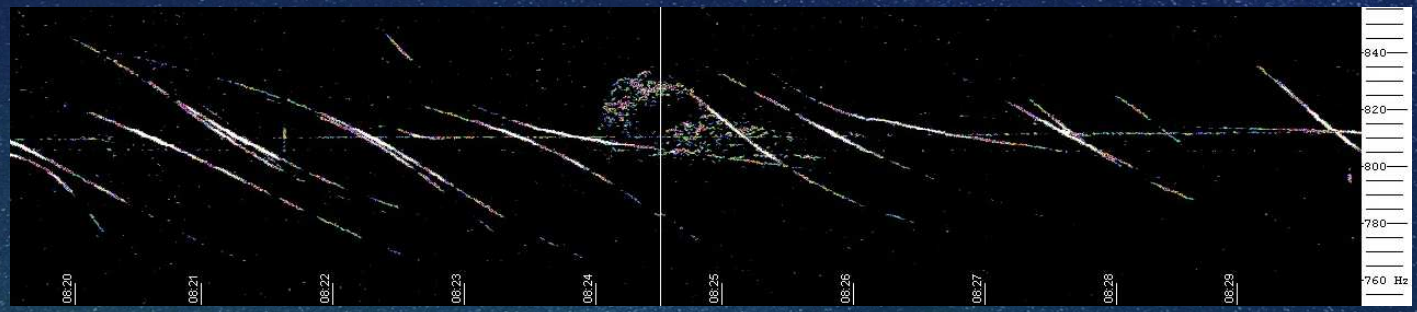
Radio beacons in Ypres (VVS) & Dourbes (BRAMS)



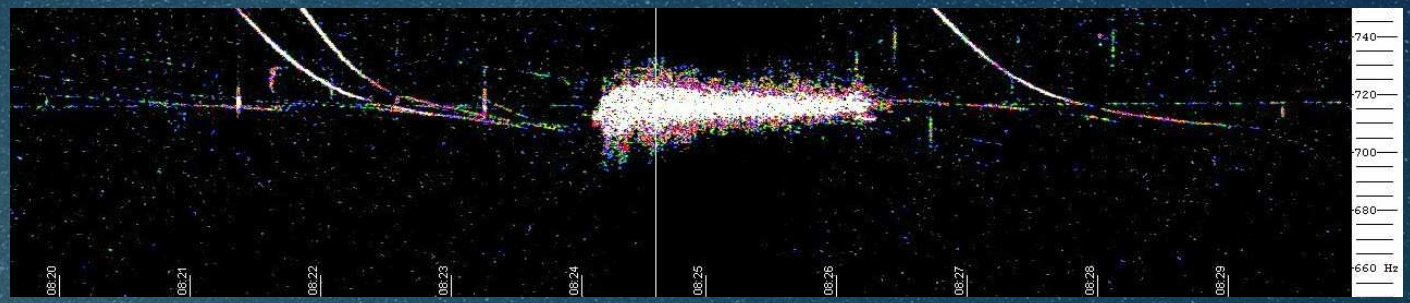
Radio beacon in Dourbes

2010: Radio beacon in Dourbes

- Dourbes (49,970 MHz, 150W):



- Ypres (49,990 MHz, 50W):



(Felix Verbelen, 17 oktober 2010 @ 8u20 UT)

The BRAMS network

Harelbeke

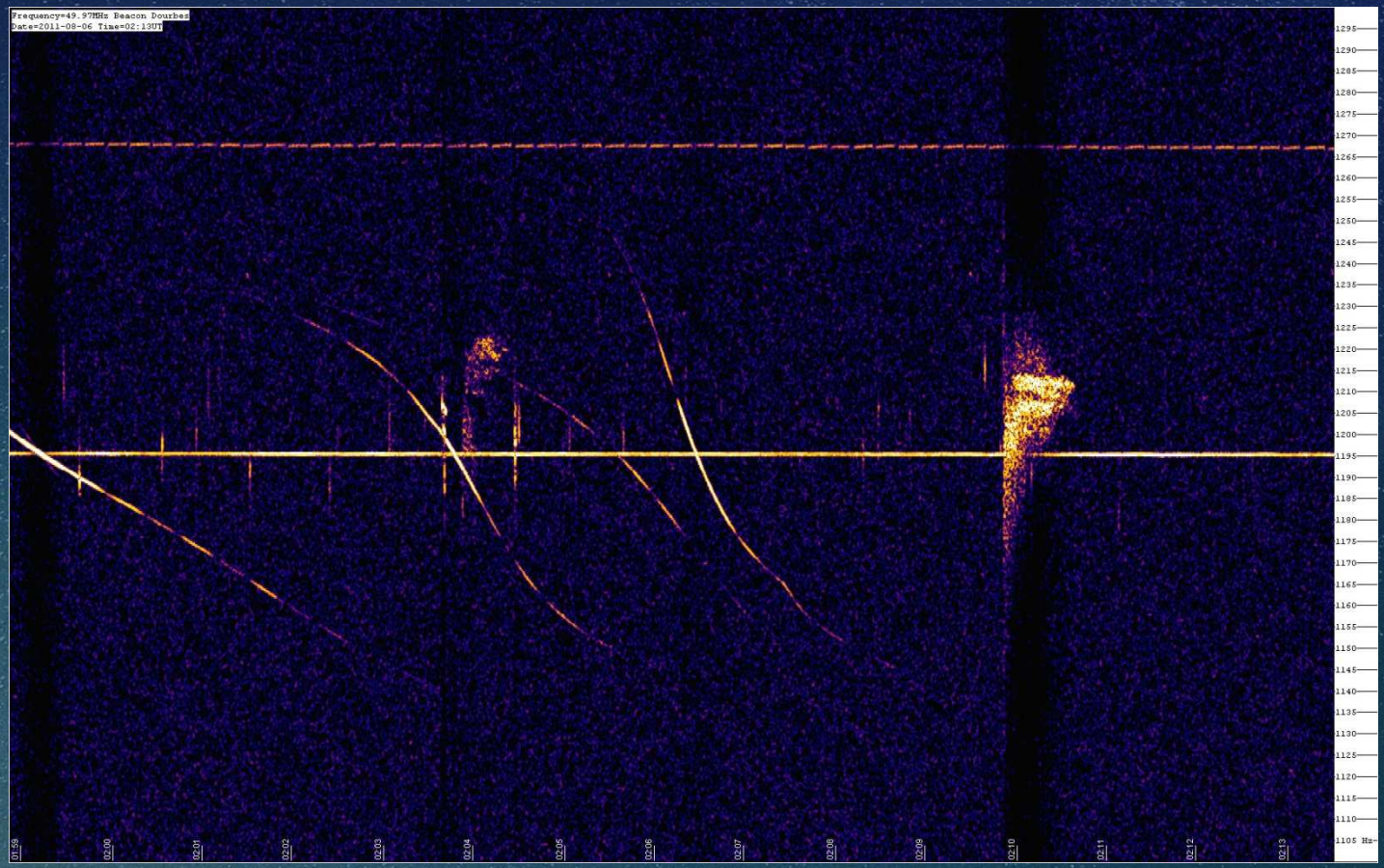
Maasmechelen

Uccle

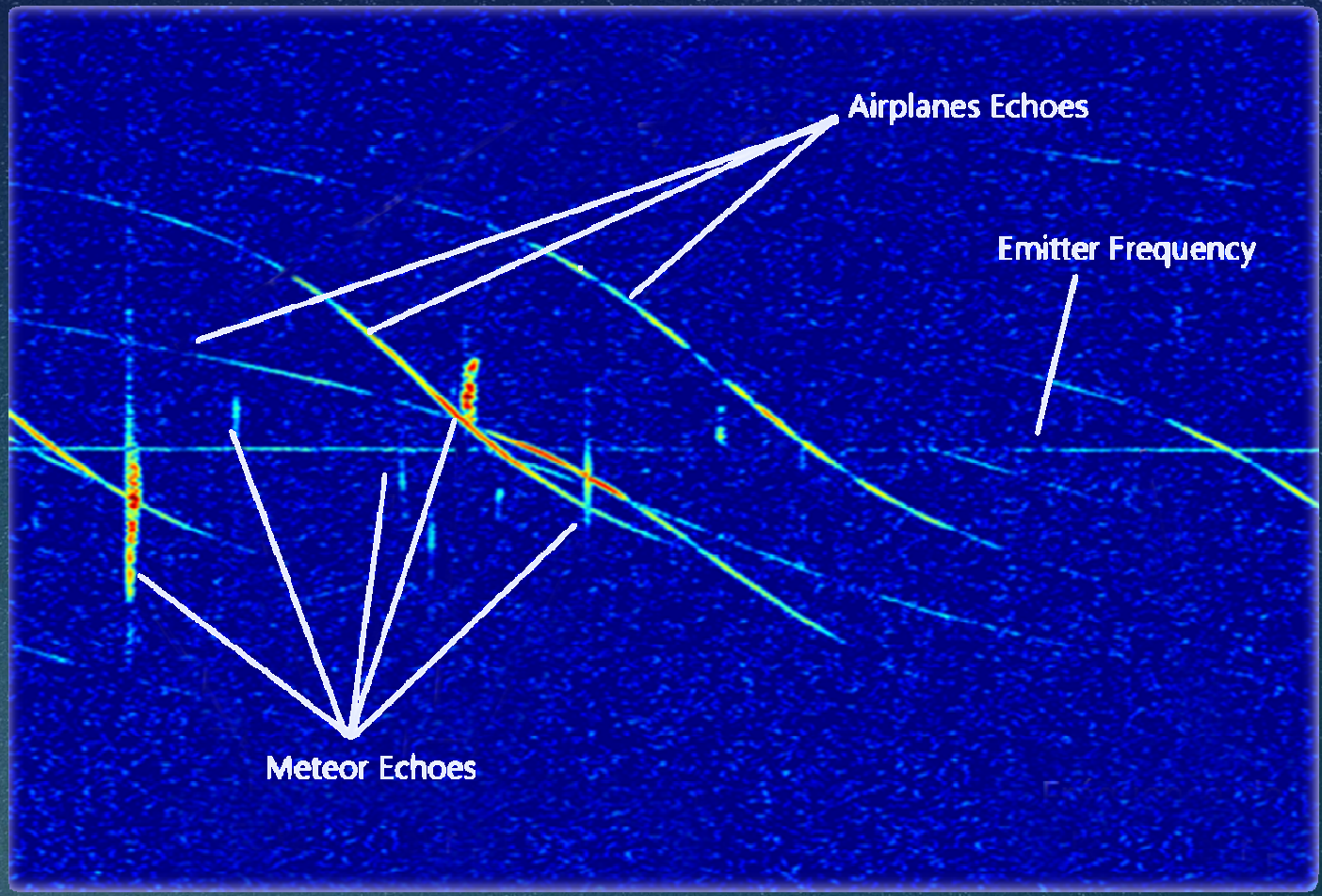
Neufchâteau

Receiving station

Spectrogram

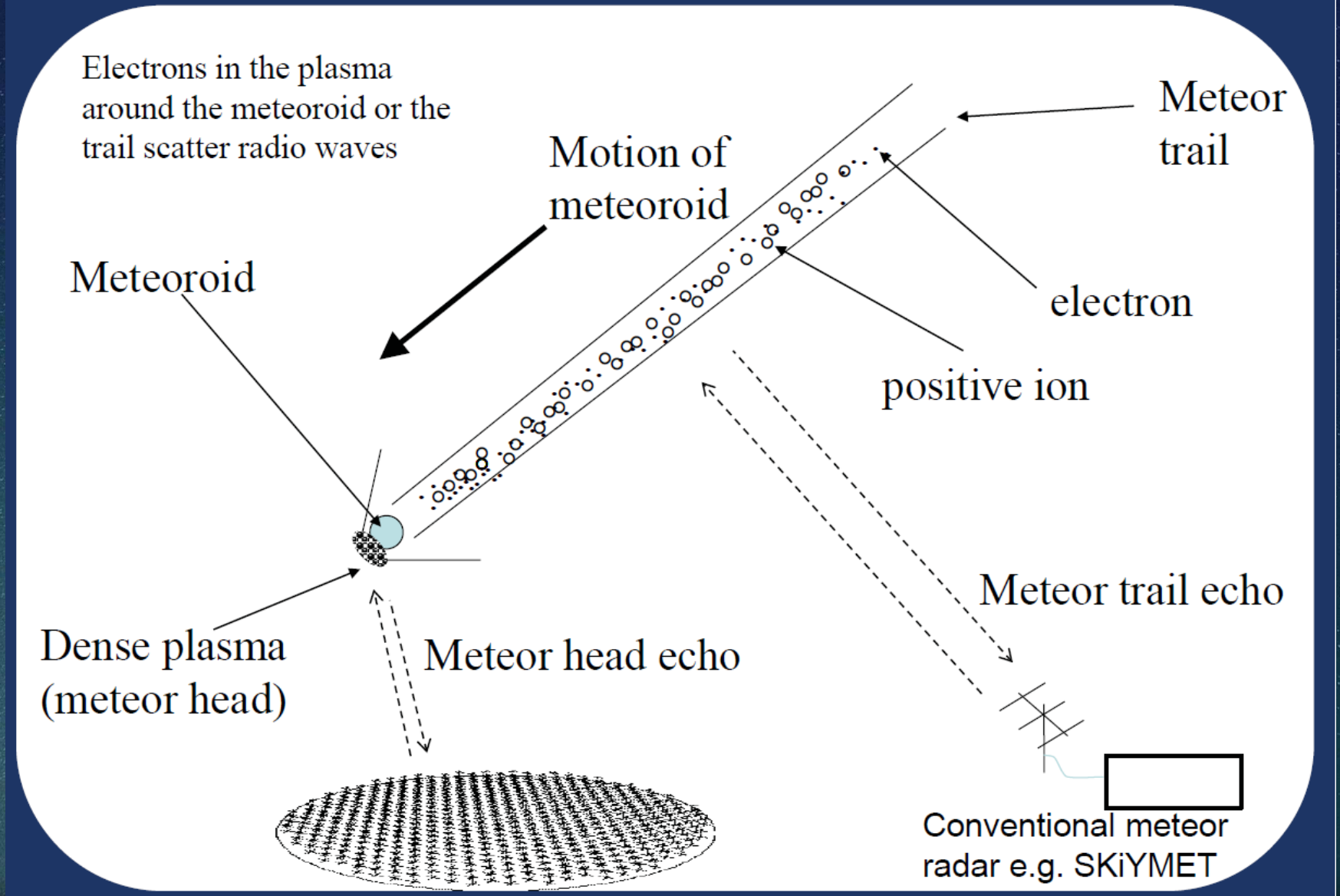


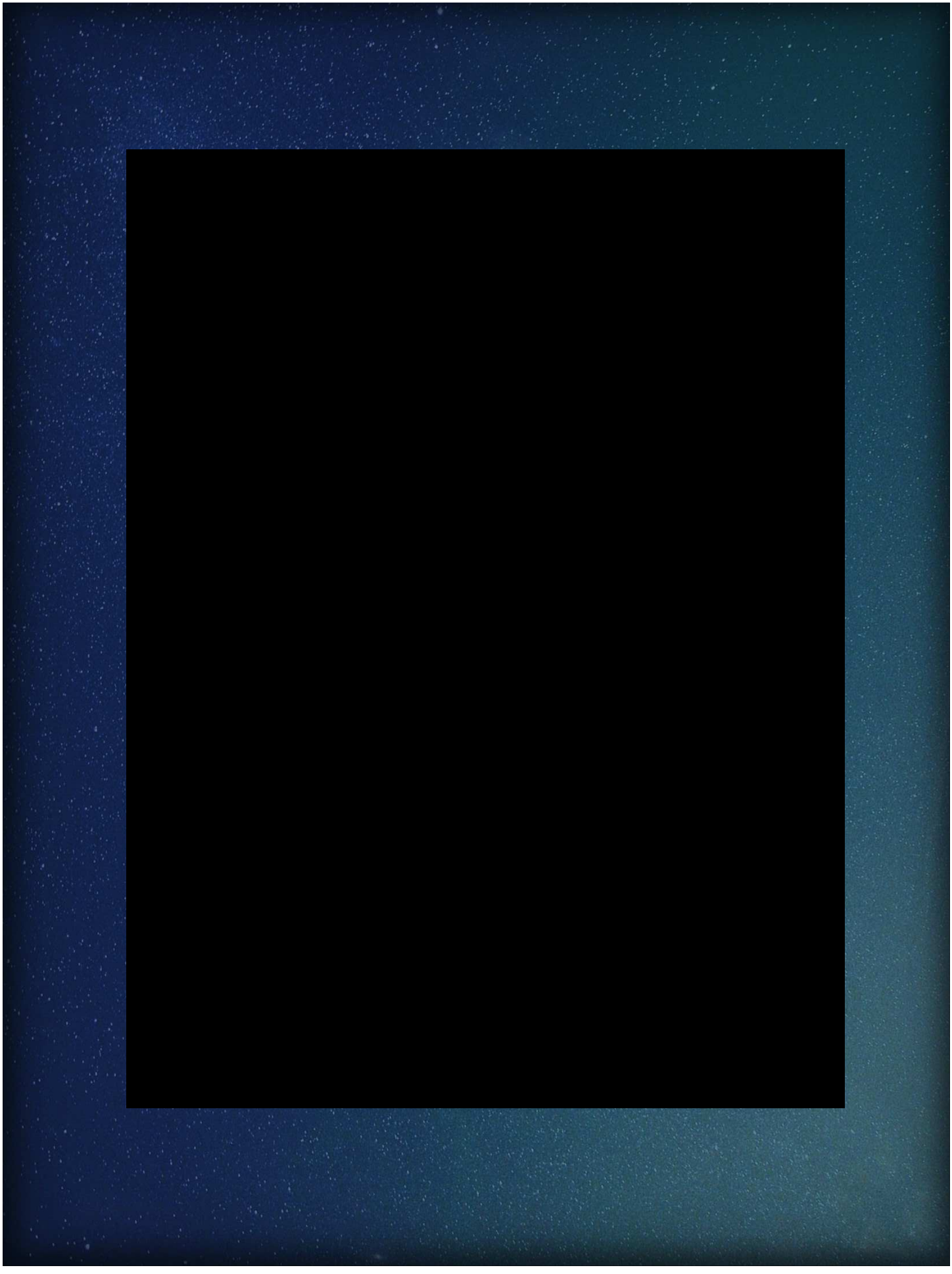
Spectrogram



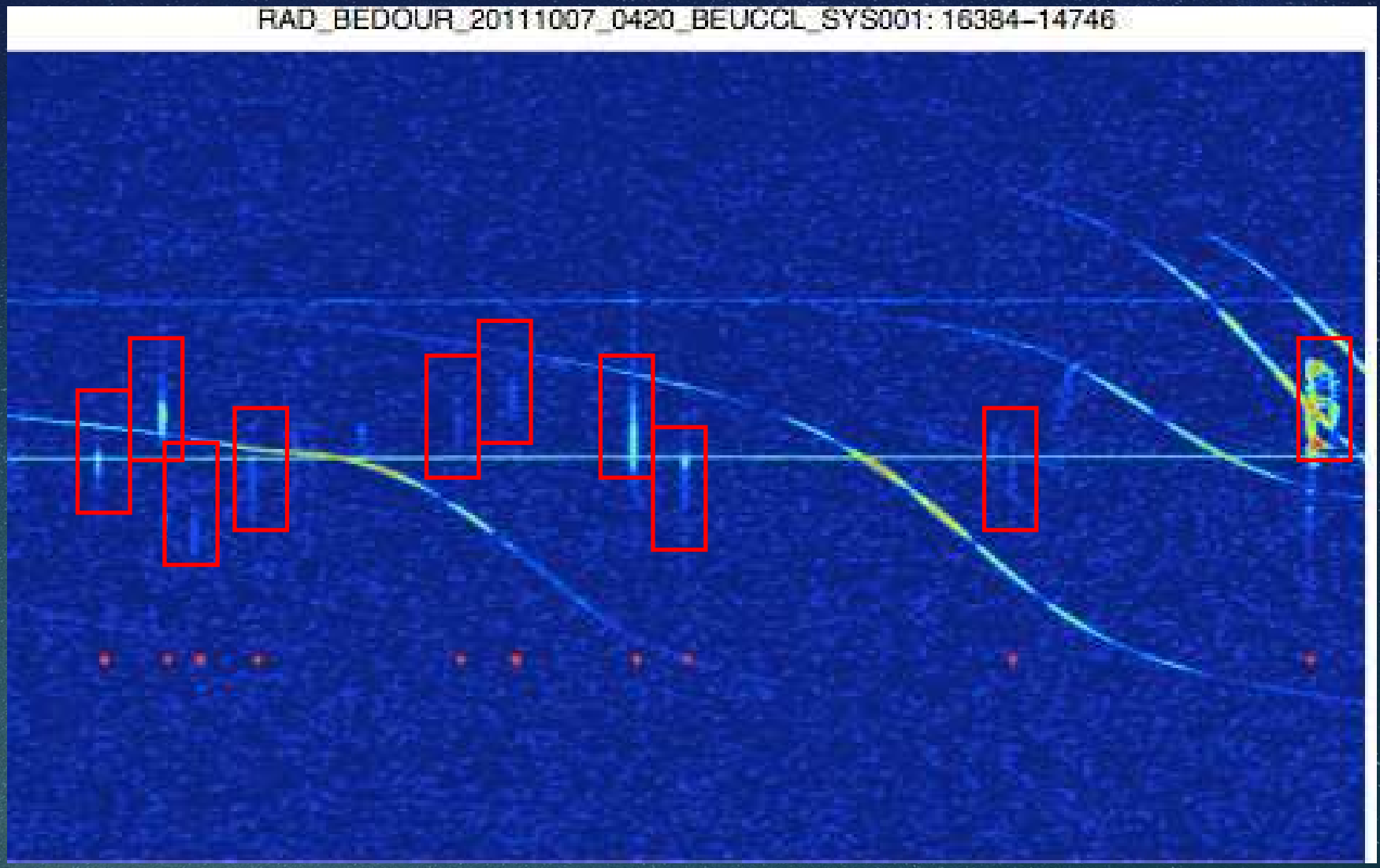
THE PHYSICS BEHIND RADIO METEORS

What do we observe?

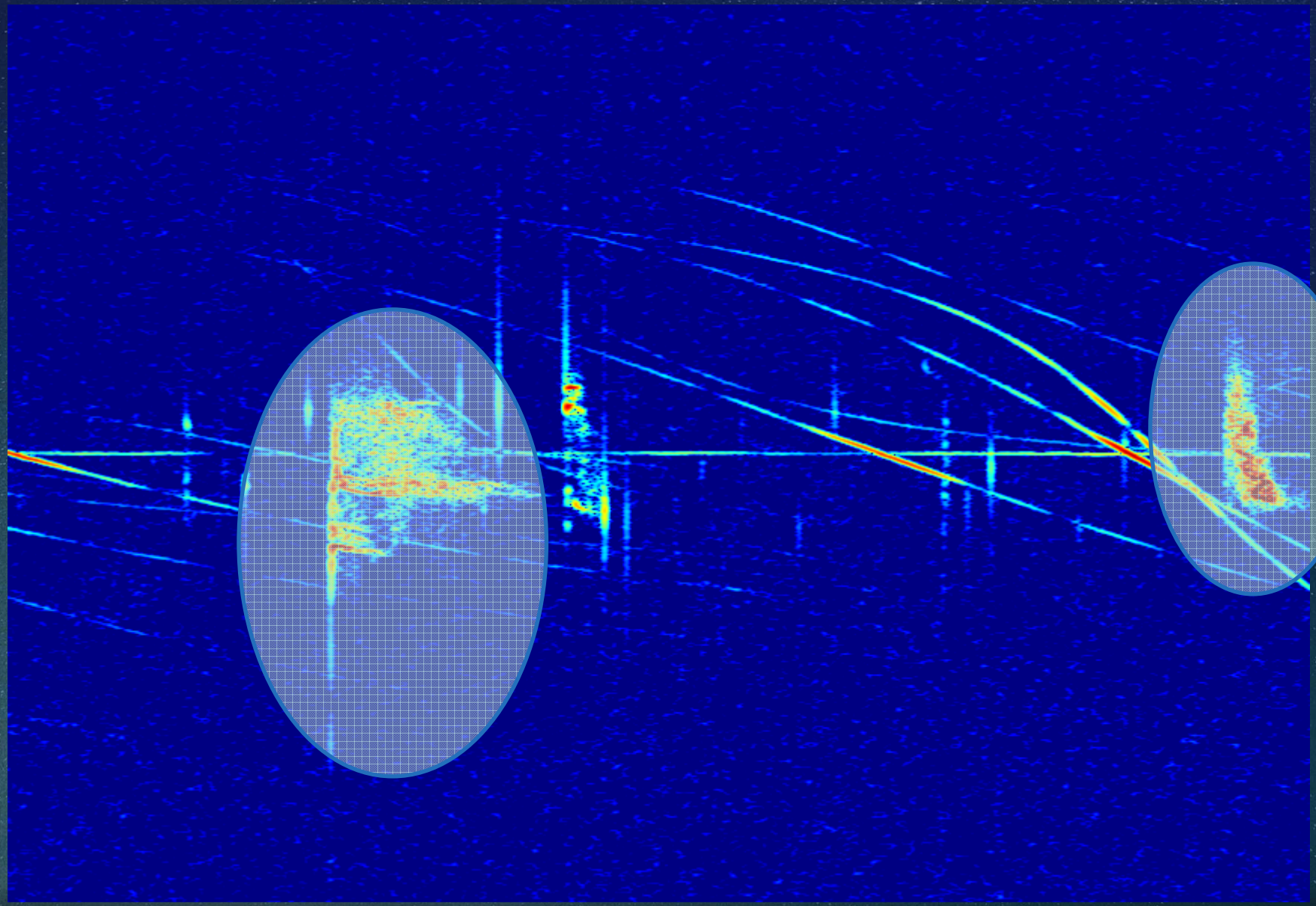




Automatic detection



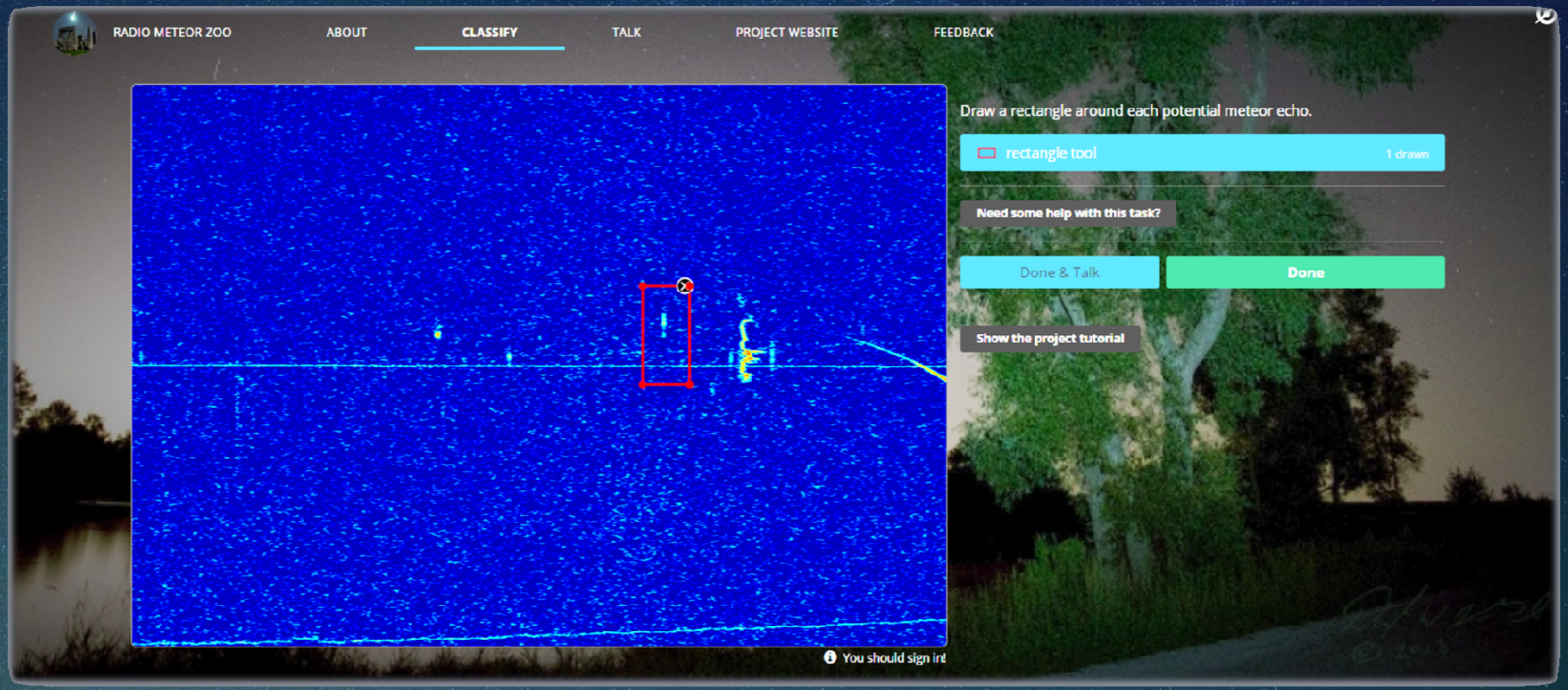
But sometimes it fails…




WE
NEED
YOU

The Radio Meteor Zoo

www.radiometeorzoo.eu



OneTab | Inbox (1) - stijn.calders@ | RoundCube Webmail by | coordinates to star - Goo | Locations - Brams - Aero

brams.aeronomie.be/locations/index

BRAMS Listen to the meteors

Royal Belgian Institute for Space Aeronomy

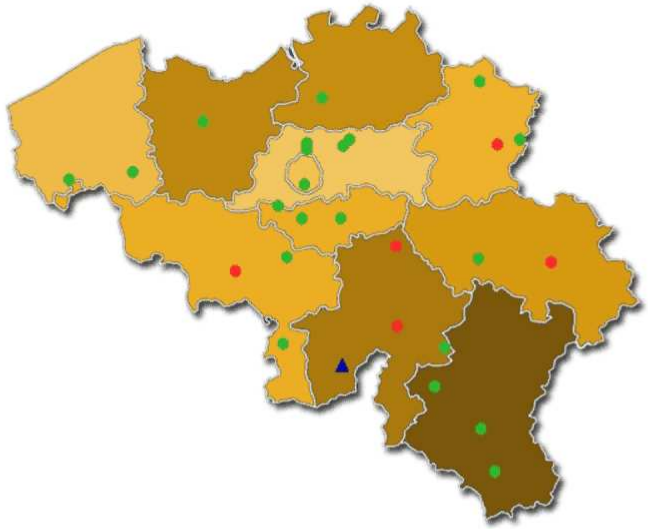
CamStudio

File Region Options Tools Effects View Help

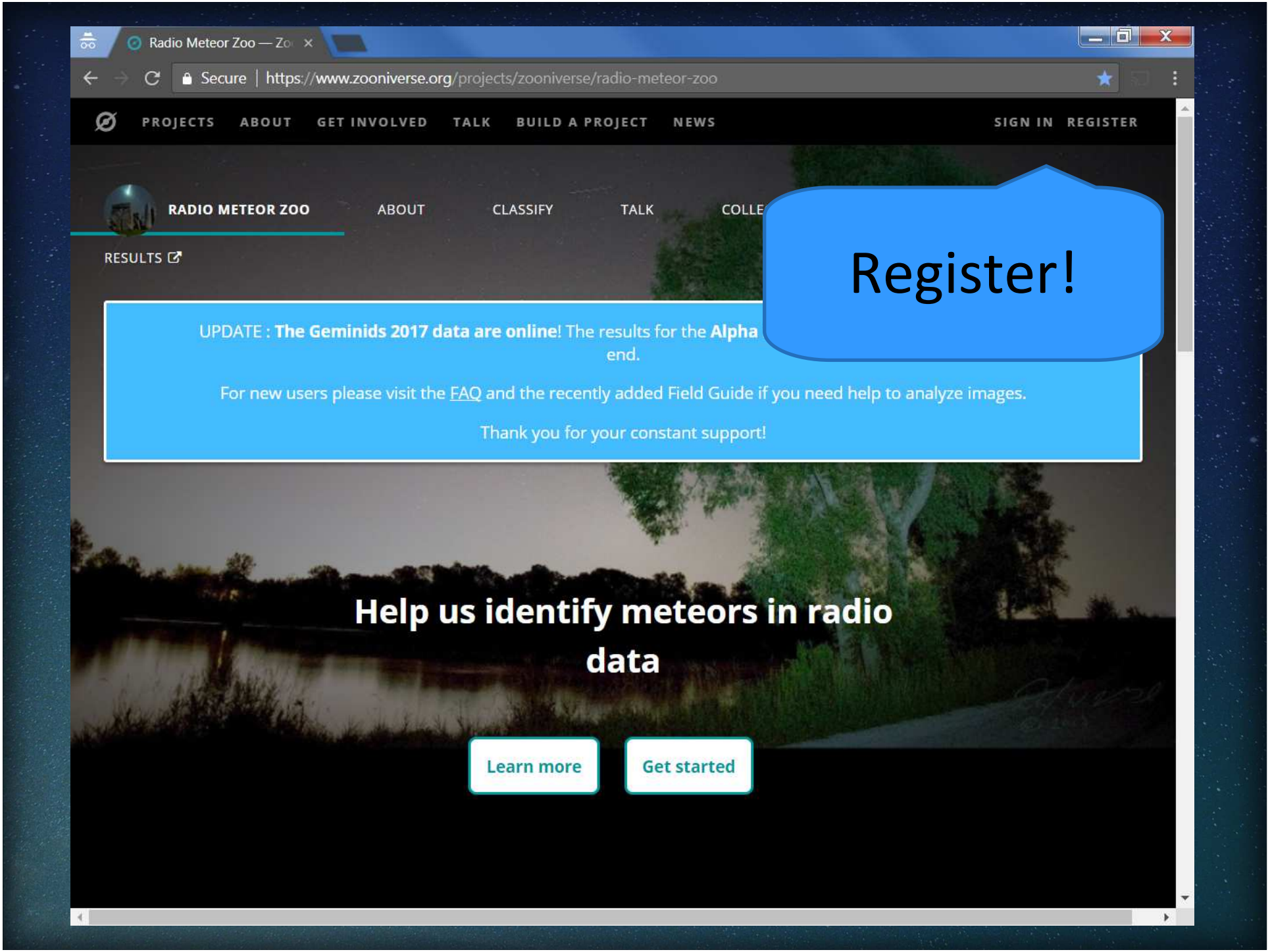
NEWS DOWNLOAD BRAMS NETWORK THEORY PARTNERS LOG IN

BRAMS N

This is the geographical distribution of the stations of the BRAMS network. The green spots represent the recently updated receiving stations, the red spots represent the outdated stations while the triangle represents the beacon at Dourbes. You can hover over the spots to know the names of the stations.



NL 22:06 21/09/2017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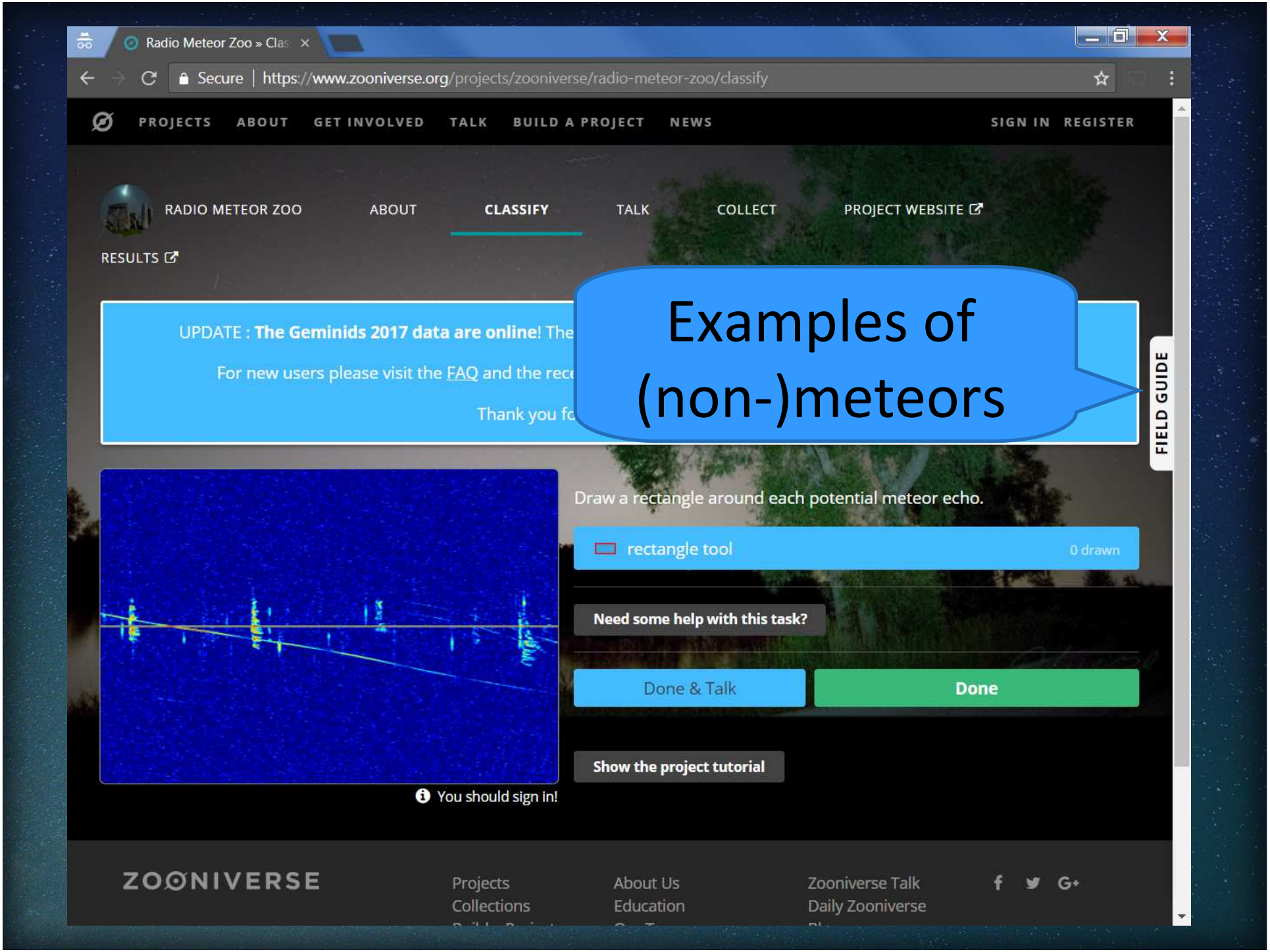
PROJECTS ABOUT GET INVOLVED TALK BUILD A PROJECT NEWS SIGN IN REGISTER
RADIO METEOR ZOO ABOUT CLASSIFY TALK COLLE
RESULTS
Register!
UPDATE : The Geminids 2017 data are online! The results for the Alpha
end.
For new users please visit the FAQ and the recently added Field Guide if you need help to analyze images.
Thank you for your constant support!
Help us identify meteors in radio data
Learn more
Get started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RESULTS
UPDATE : The Geminids 2017 data are online! The
For new users please visit the FAQ and the rece
Thank you fo
Examples of (non-)meteors
FIELD GUIDE
Draw a rectangle around each potential meteor echo.
rectangle tool 0 drawn
Need some help with this task?
Done & Talk
Done
Show the project tutorial
You should sign in!
ZOONIVERSE
Projects
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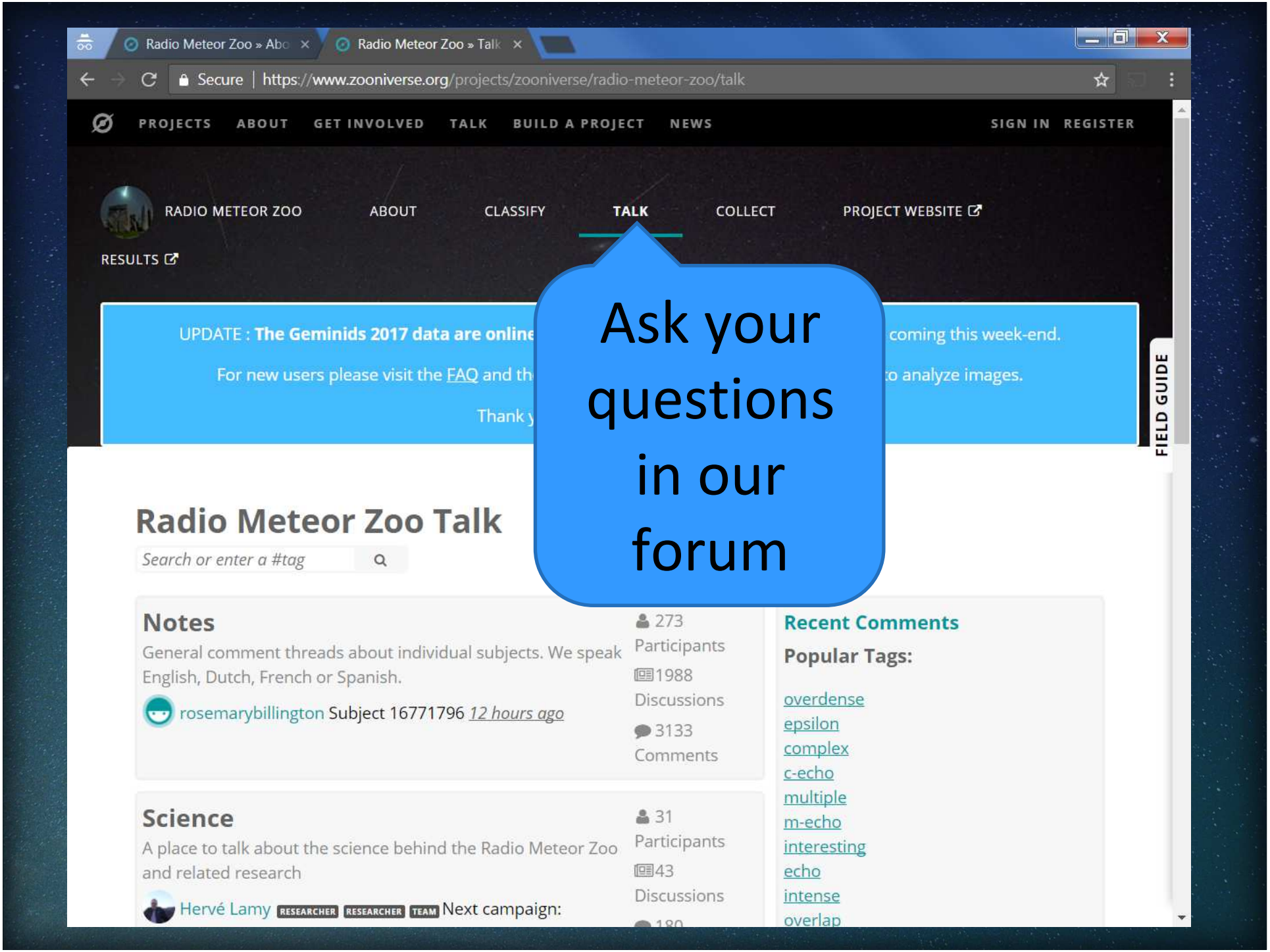
Radio Meteor Zoo » Abo
Radio Meteor Zoo » Talk
Secure | https://www.zooniverse.org/projects/zooniverse/radio-meteor-zoo/talk
PROJECTS ABOUT GET INVOLVED TALK BUILD A PROJECT NEWS SIGN IN REGISTER
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RESULTS
UPDATE : The Geminids 2017 data are online
coming this week-end.
For new users please visit the FAQ and th
o analyze images.
Thank y
FIELD GUIDE
Ask your questions in our forum
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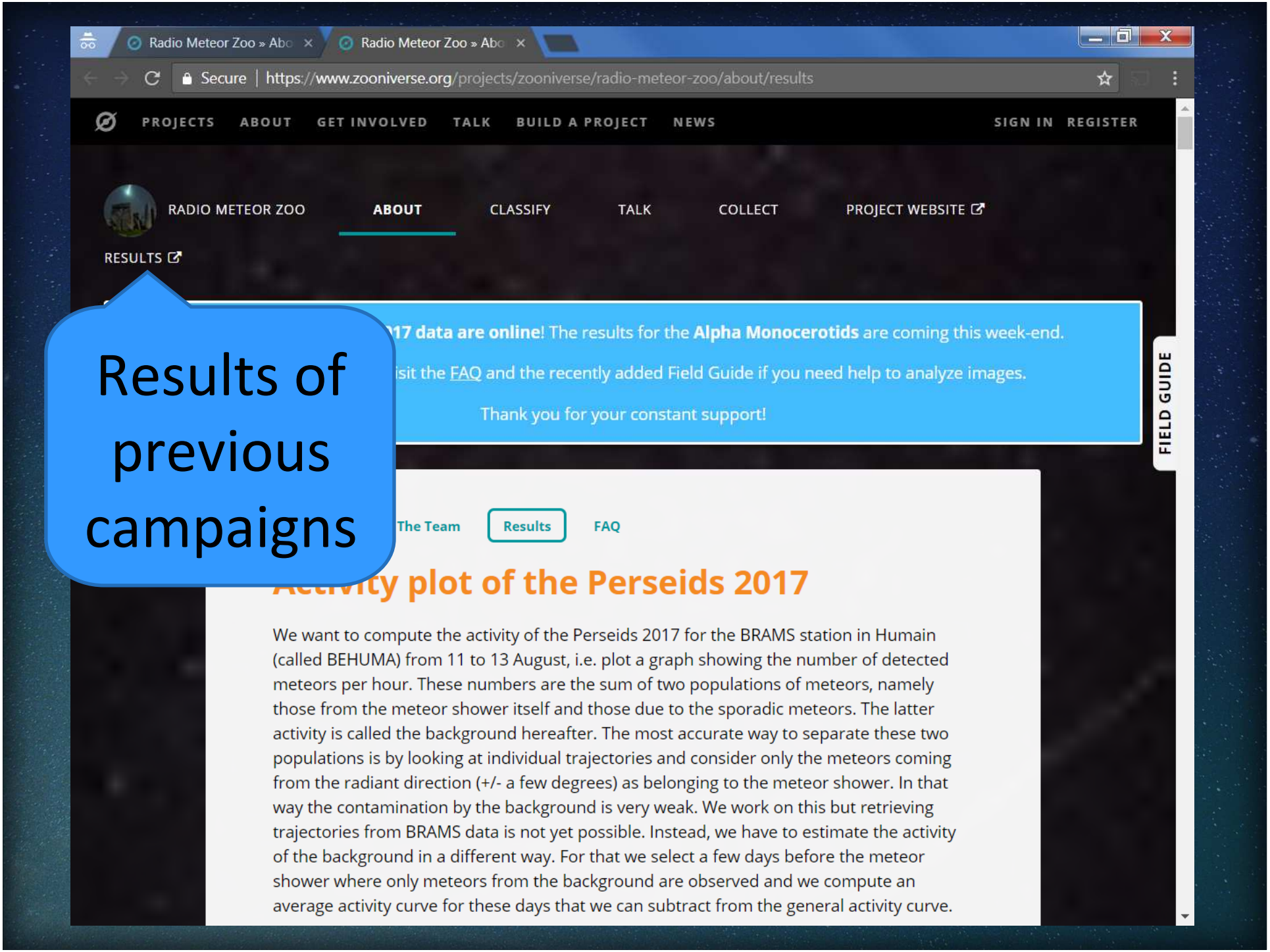
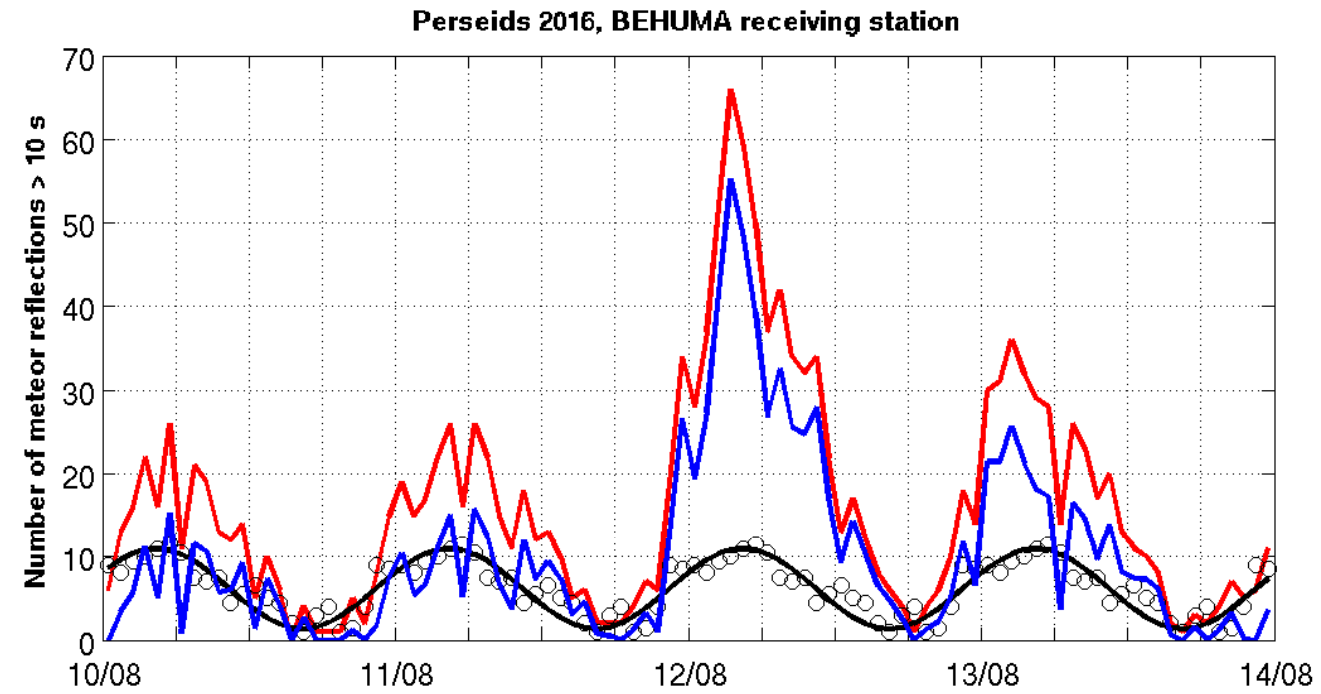
Search or enter a #tag
Notes
General comment threads about individual subjects. We speak English, Dutch, French or Spanish.
rosemarybillington Subject 16771796 12 hours ago
273 Participants
1988 Discussions
3133 Comments
Science
A place to talk about the science behind the Radio Meteor Zoo and related research
Hervé Lamy RESEARCHER RESEARCHER TEAM Next campaign:
31 Participants
43 Discussions
Recent Comments
Popular Tags:
overdense
epsilon
complex
c-echo
multiple
m-echo
interesting
echo
intense
overlap



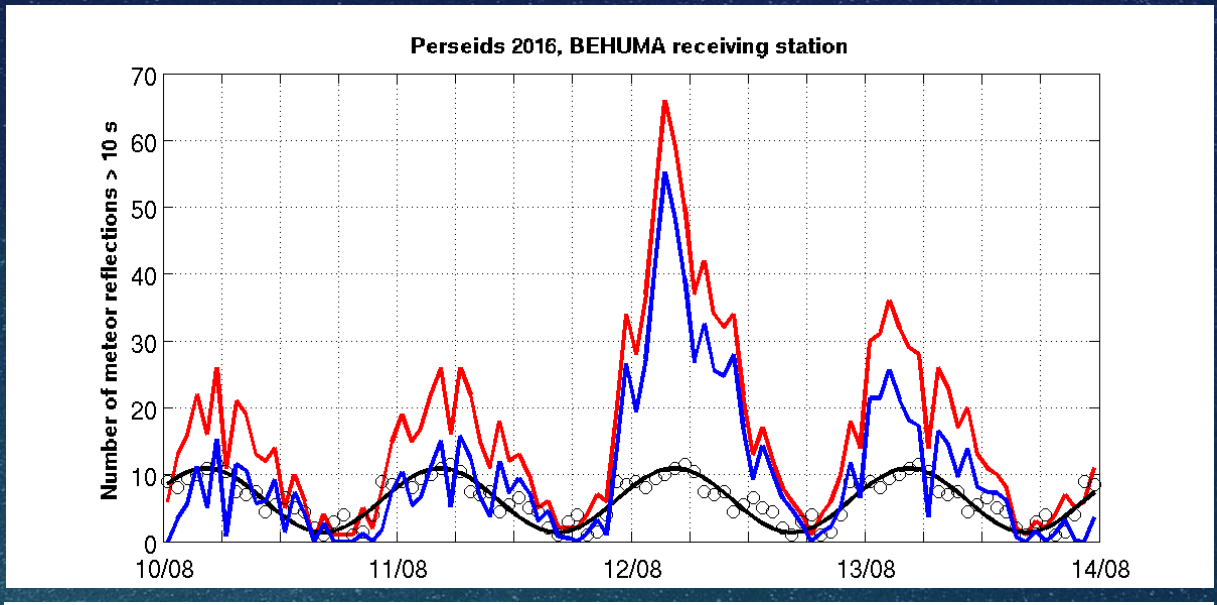
Results of previous campaigns

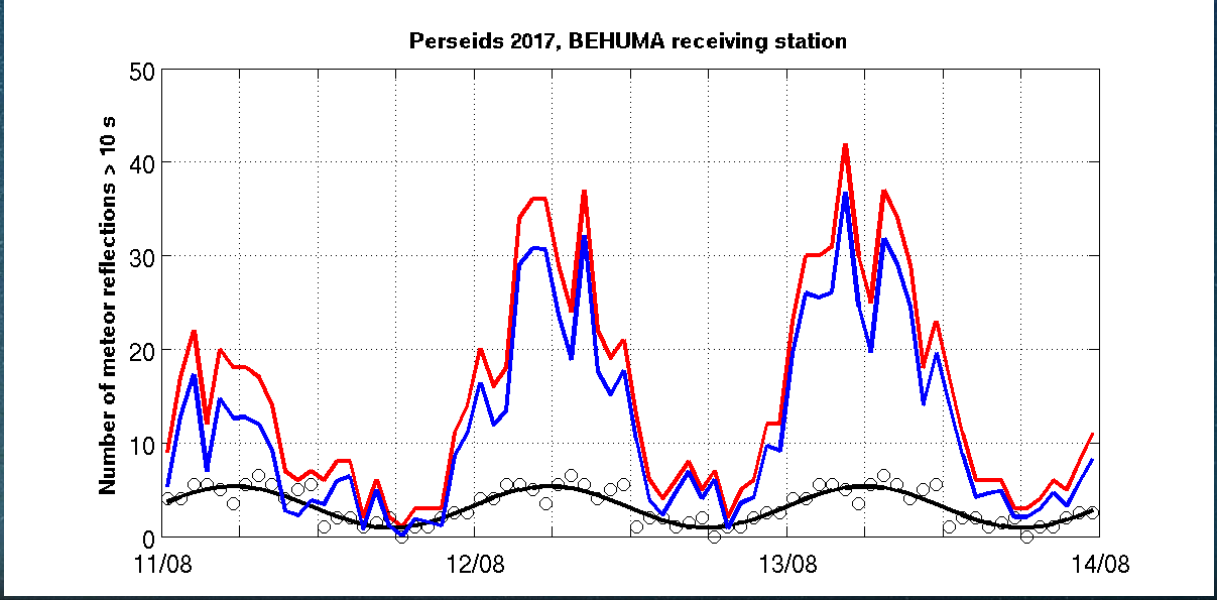
RESULTS

Start of the RMZ project

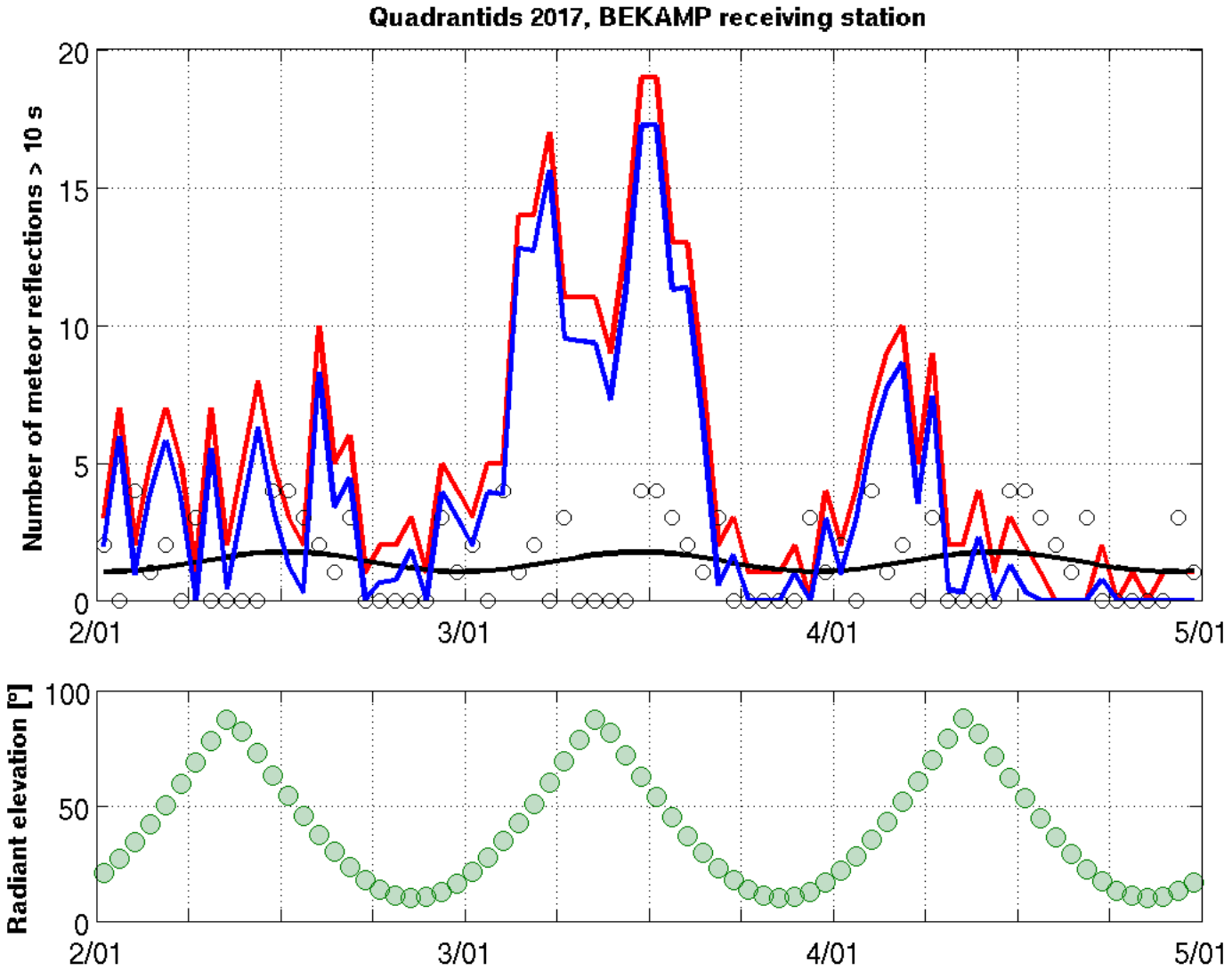


Perseids in 2017 were less active

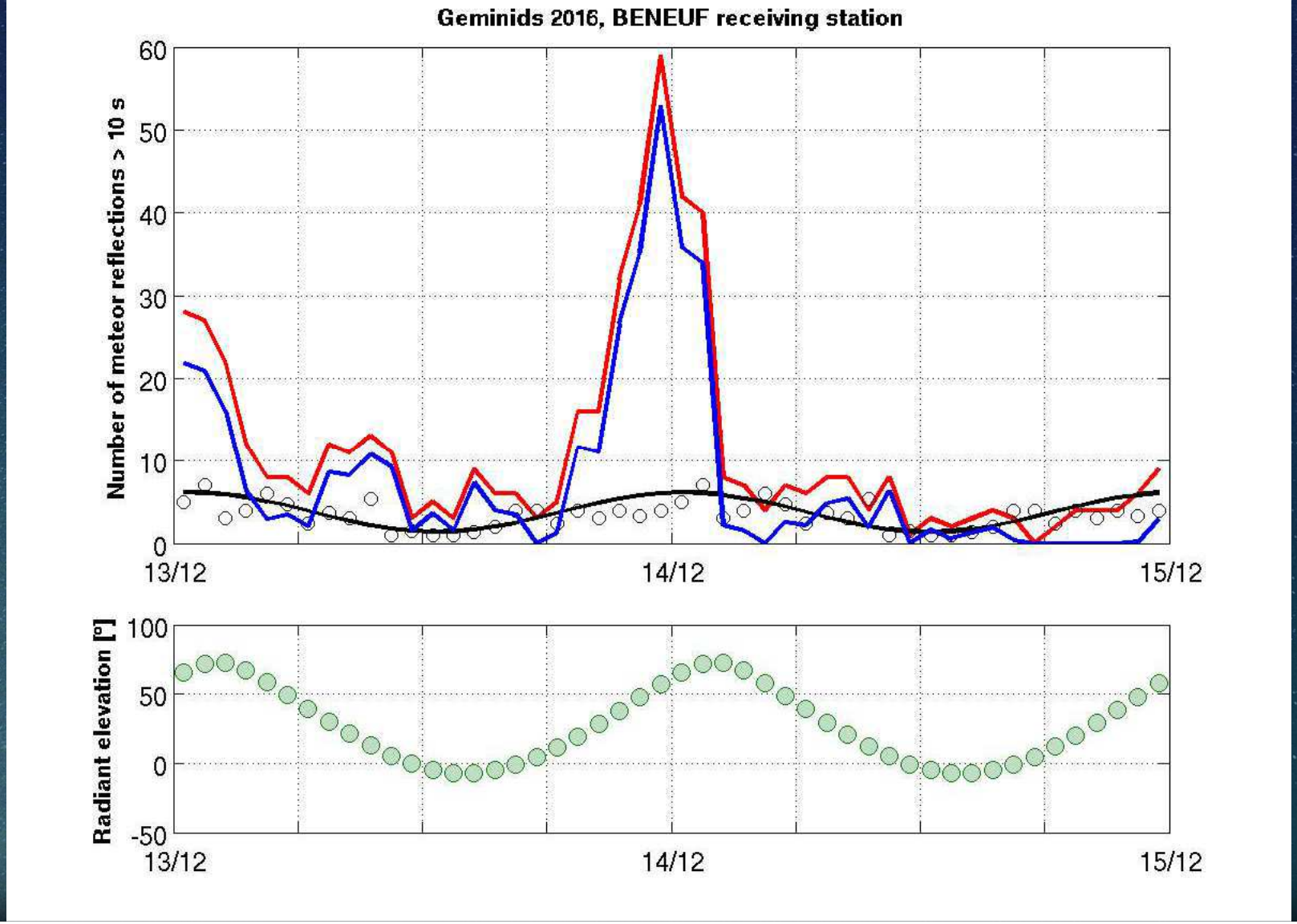




Quadrantids 2017



Geminids 2016



Questions?

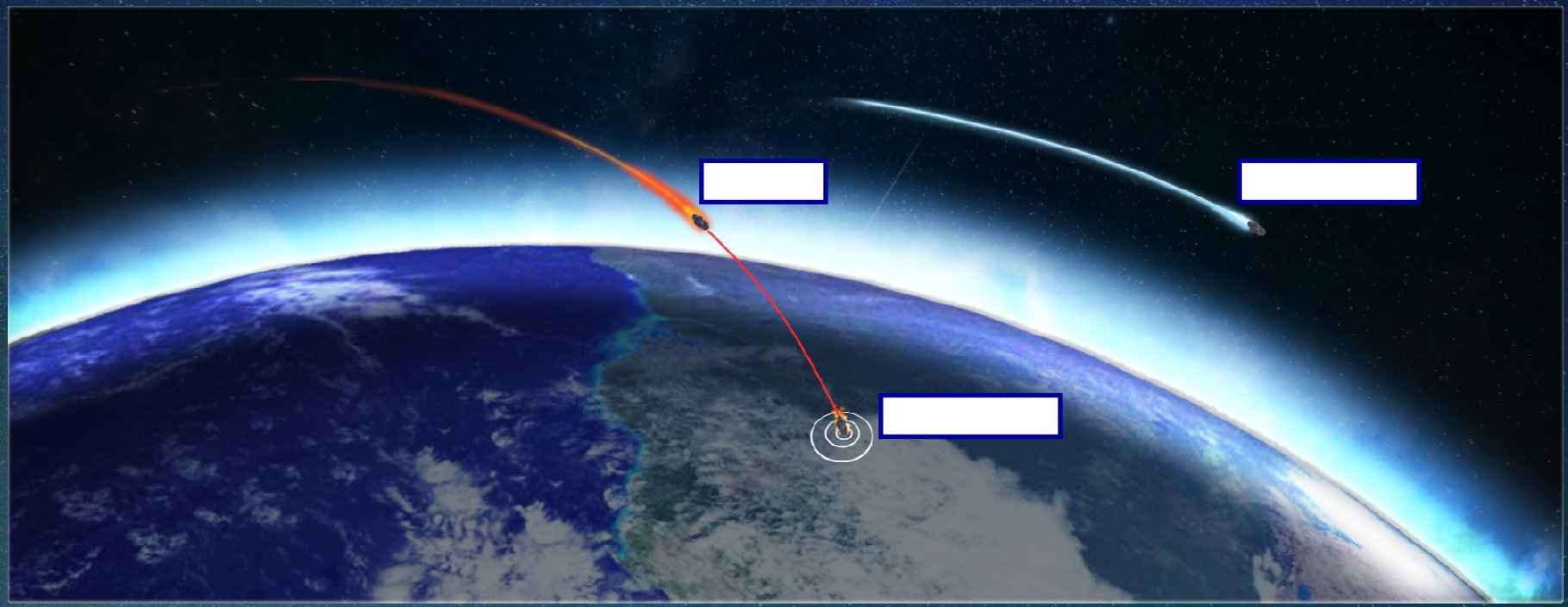
Thank you for your attention!

https://www.radiometeorzoo.be

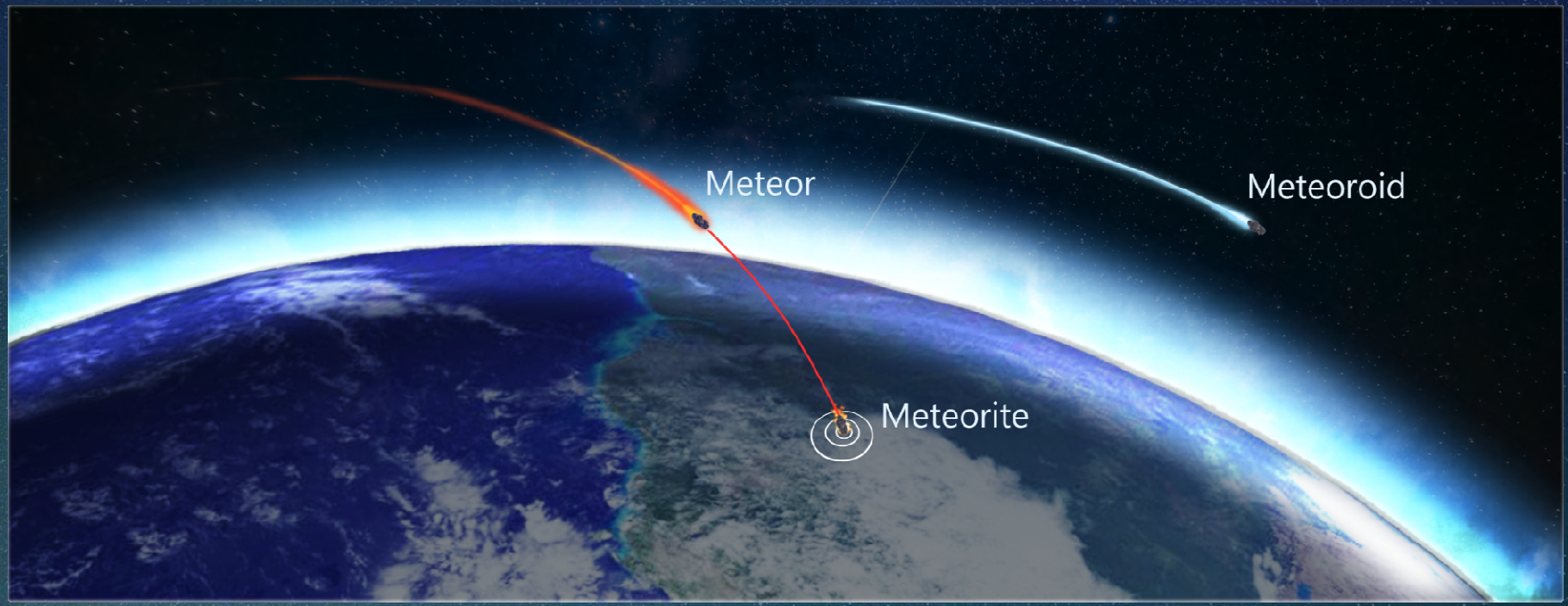
More information stijn.calders@aeronomie.be herve.lamy@aeronomie.be

BACKUP SLIDES

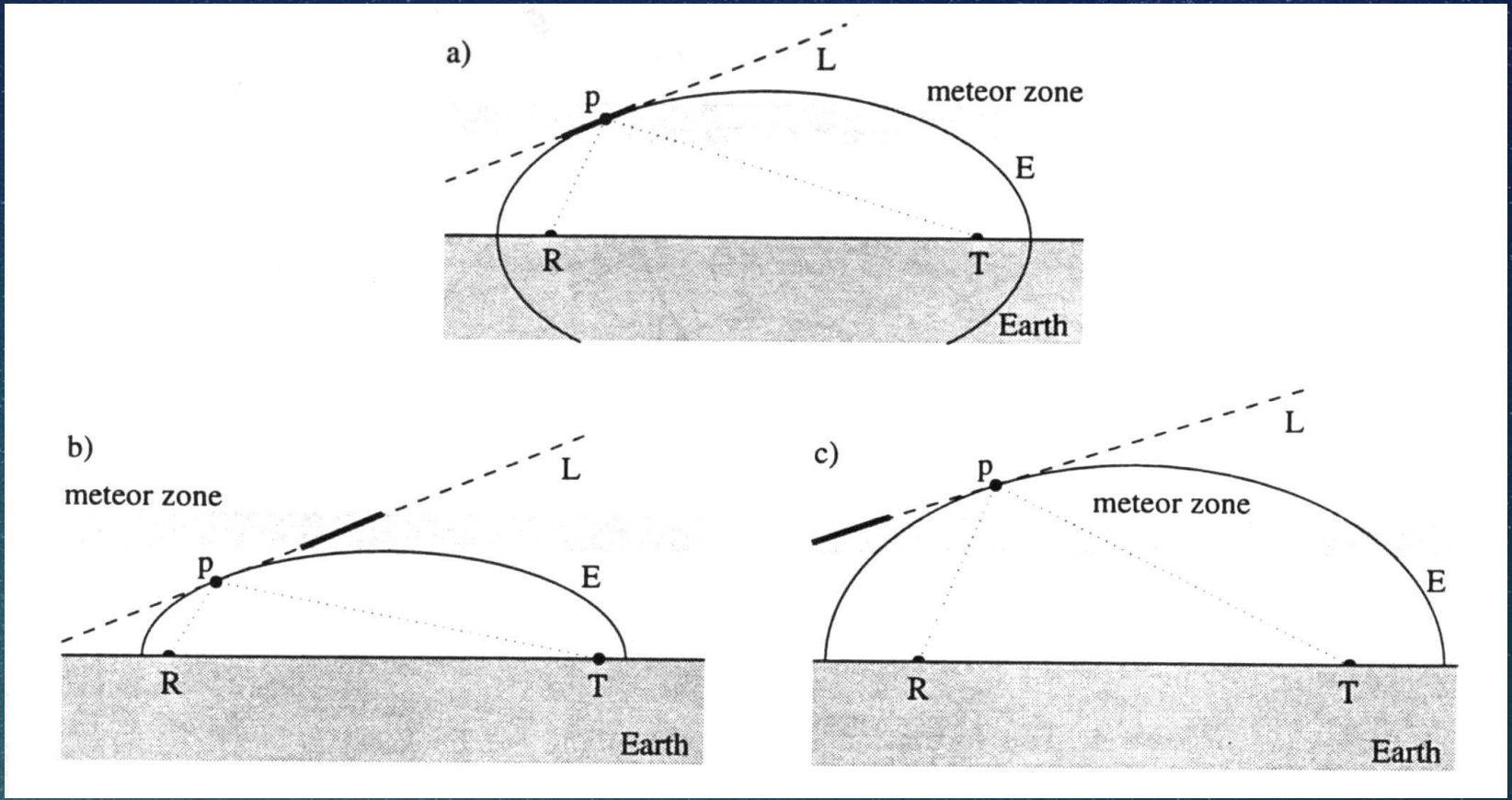
Terminology



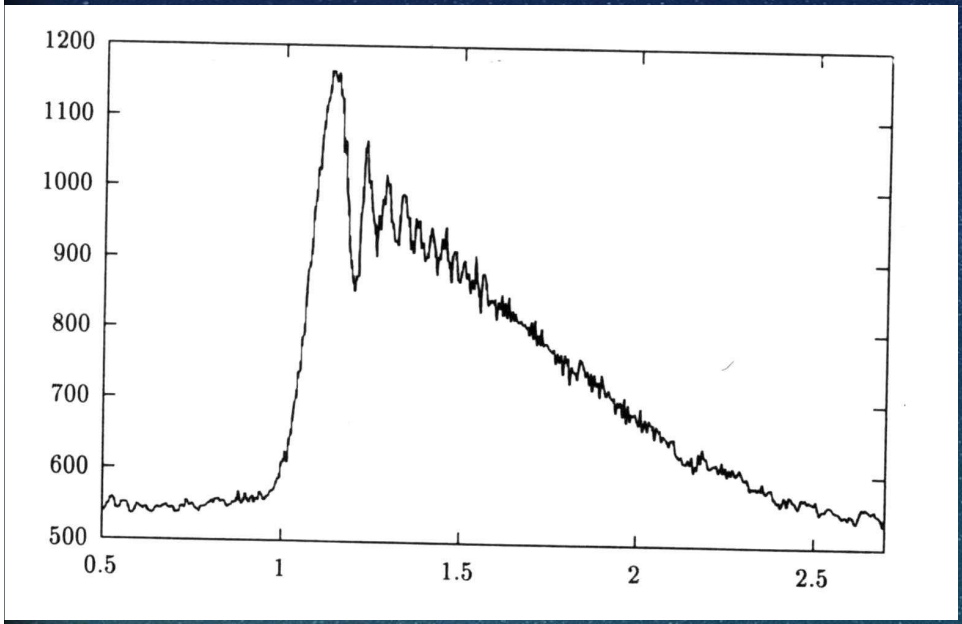
Terminology

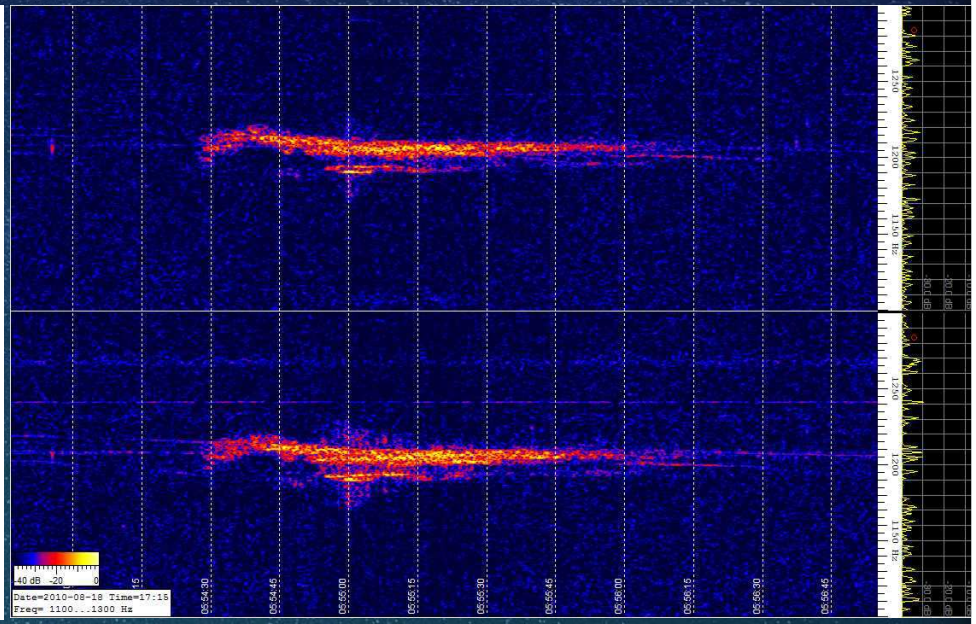


Geometrical conditions



How do we observe?

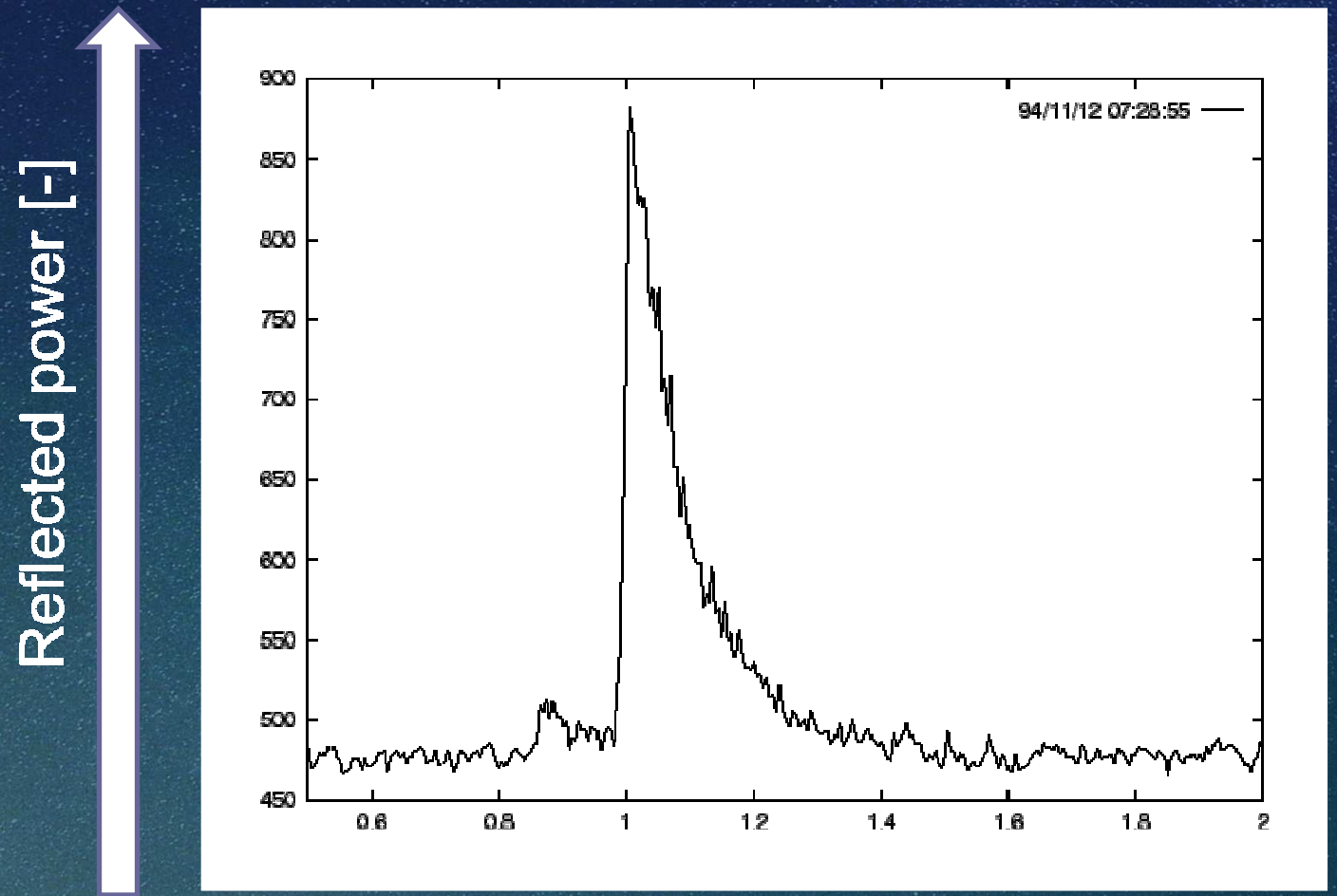




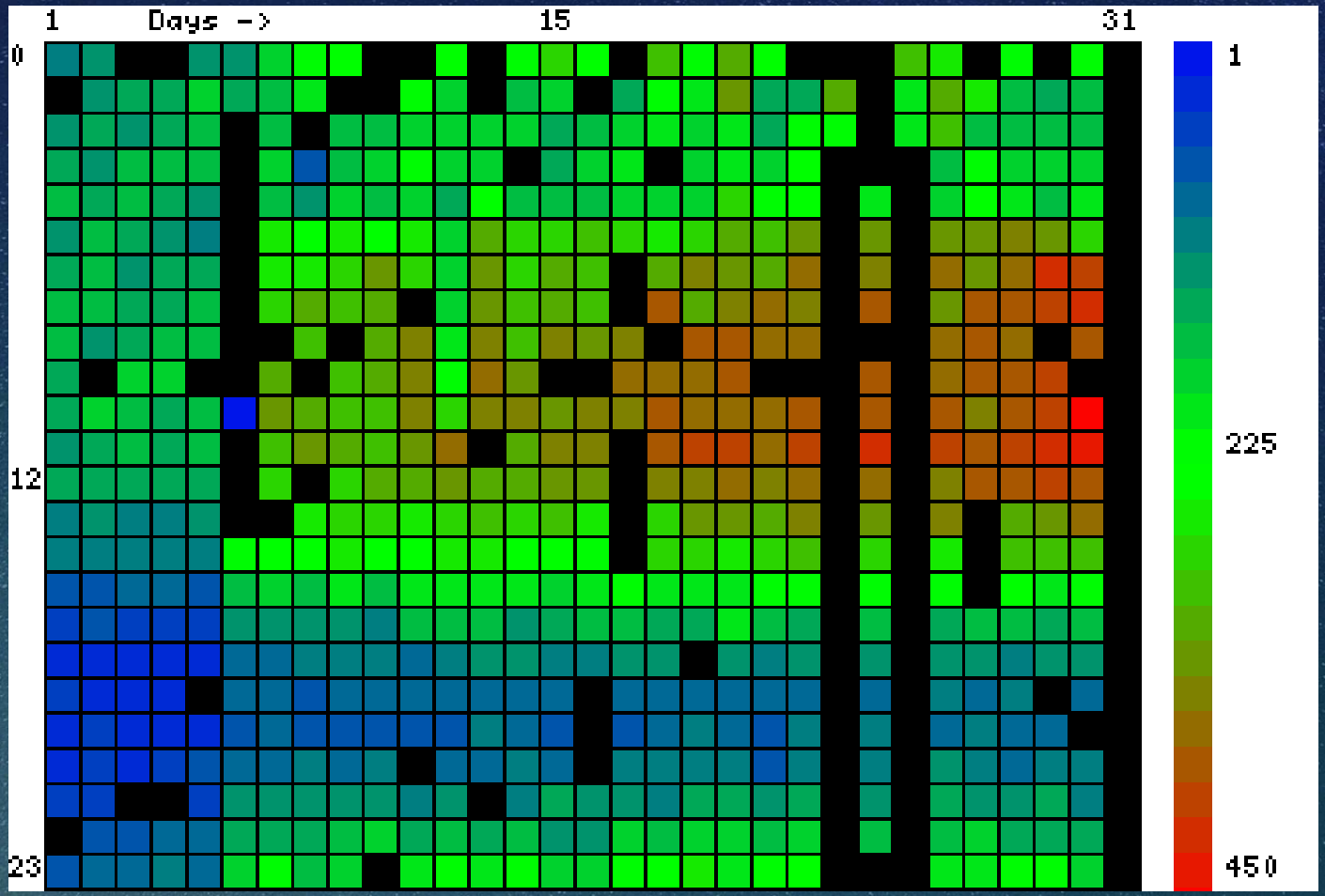
Power profile: reflected power as a function of time

Spectrogram: spectrum as a function of time

Reflected power



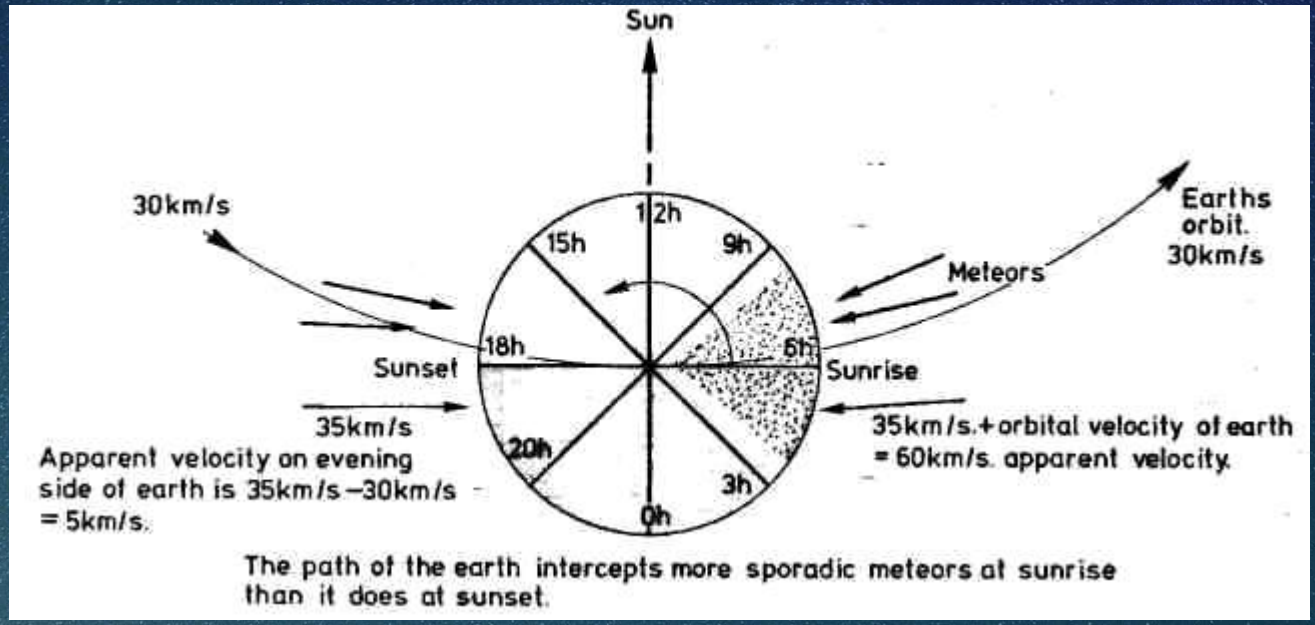
Monthly overwiew



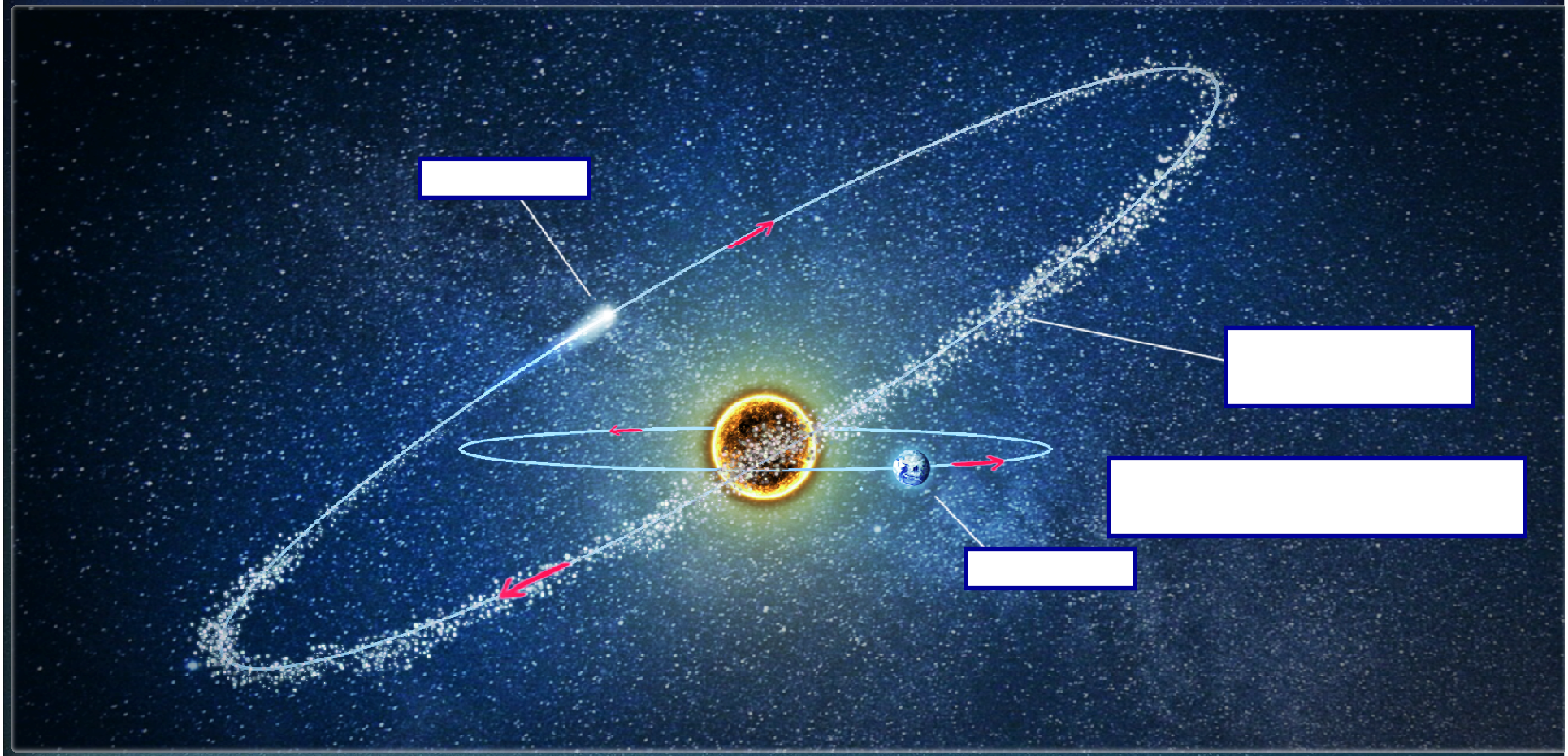
The diurnal variation of sporadic meteors
& a daylight shower

Patrick Vanouplines, May 2008

Diurnal variation



Comets & meteors



Comets & meteors