

FRIPON



l'Observatoire
de Paris



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Pythéas

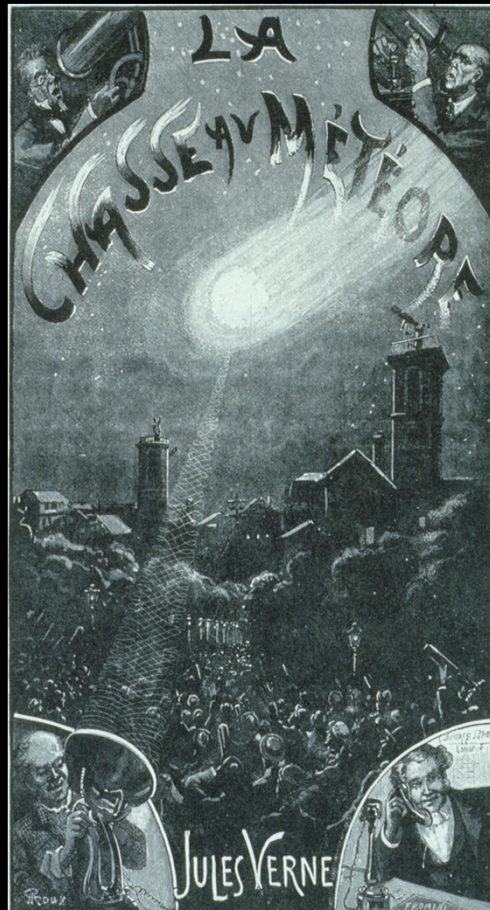


Status of the FRIPON network

The Fripon Team

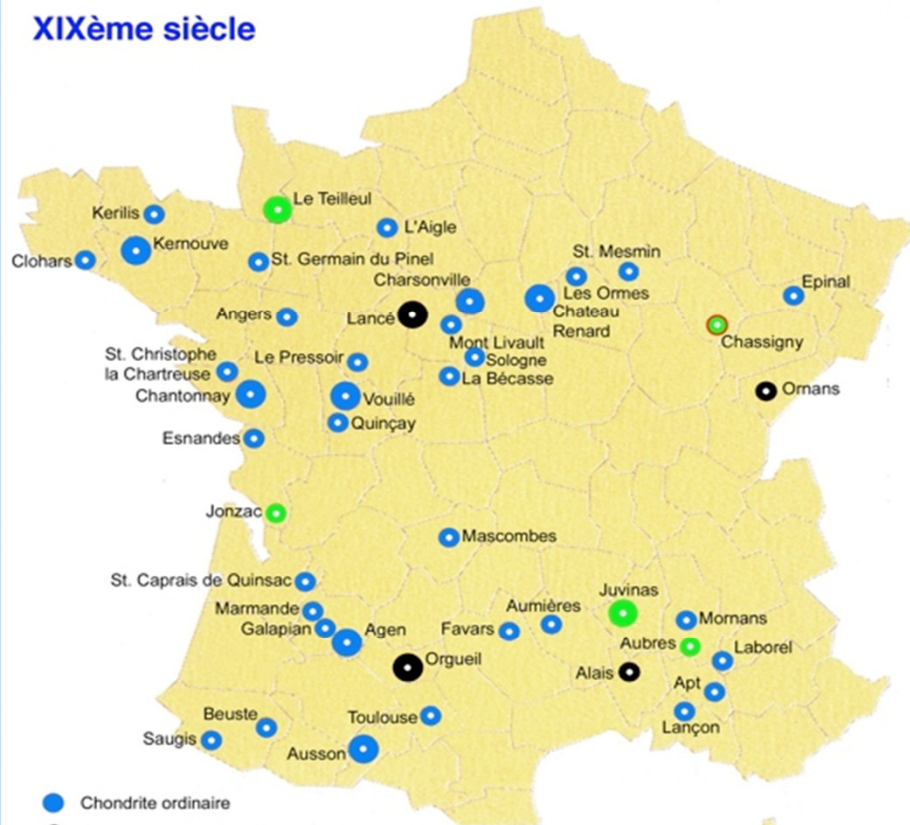
Annual BRAIN-BE meeting : METRO (MEteroid
TRajectories and Orbits)

Belgian Institute for Space Aeronomy (BISA), 27
October 2015



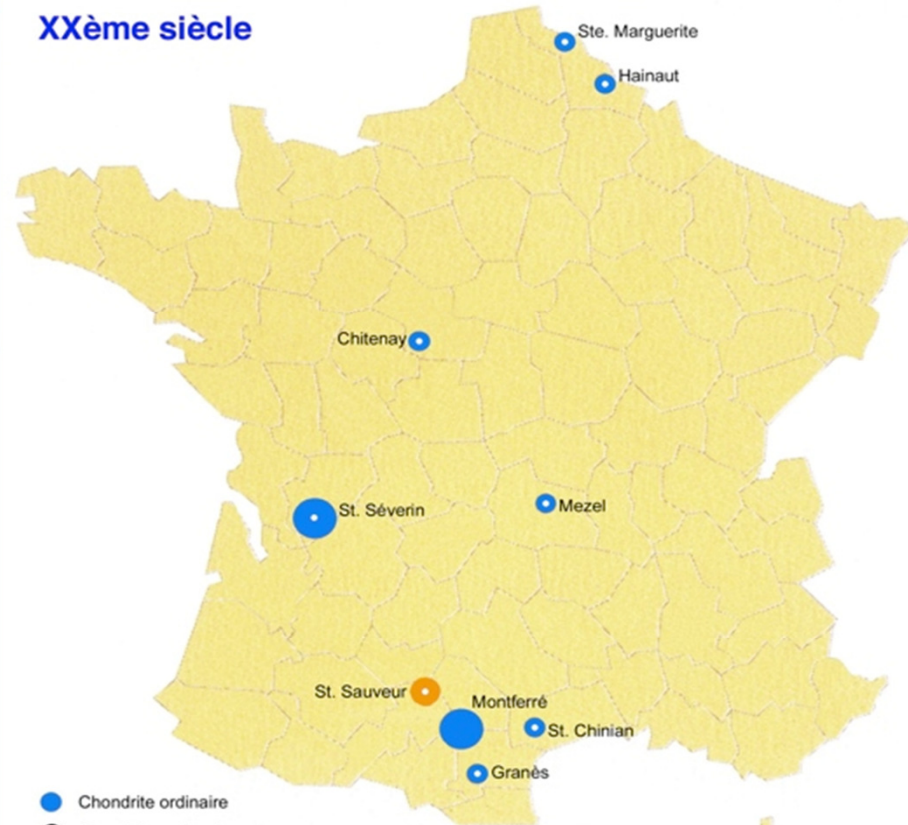
FRIPON, THE FRENCH FIREBALL NETWORK

XIXème siècle



- Chondrite ordinaire
- Chondrite carbonée
- Chondrite à enstatite
- Achondrite
- Météorite martienne
- Météorite de fer
- Météorite disparue
- Masse < 10 kg
- 10 kg < Masse < 100 kg
- Masse > 100 kg
- Chute
- Trouvaille

XXème siècle



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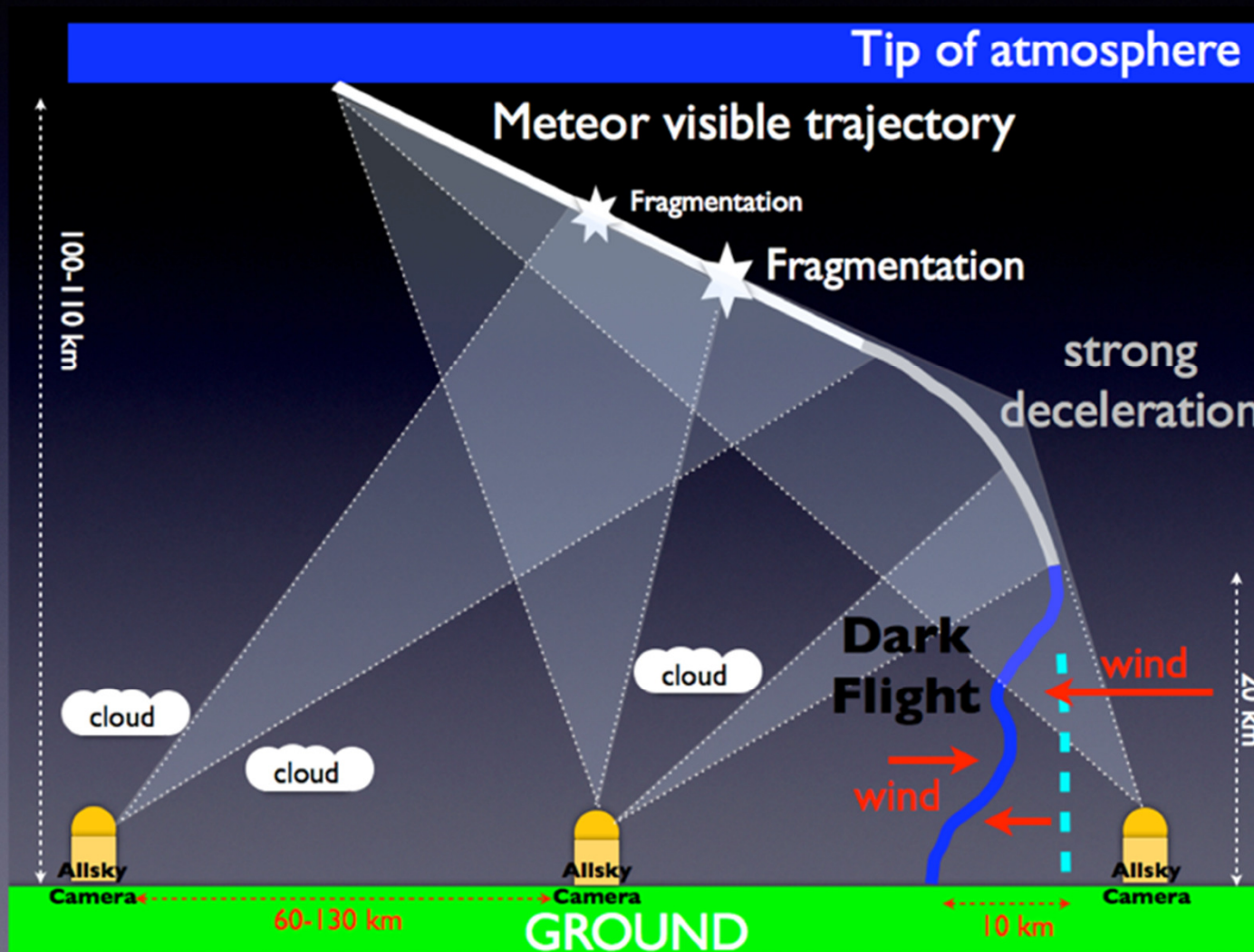


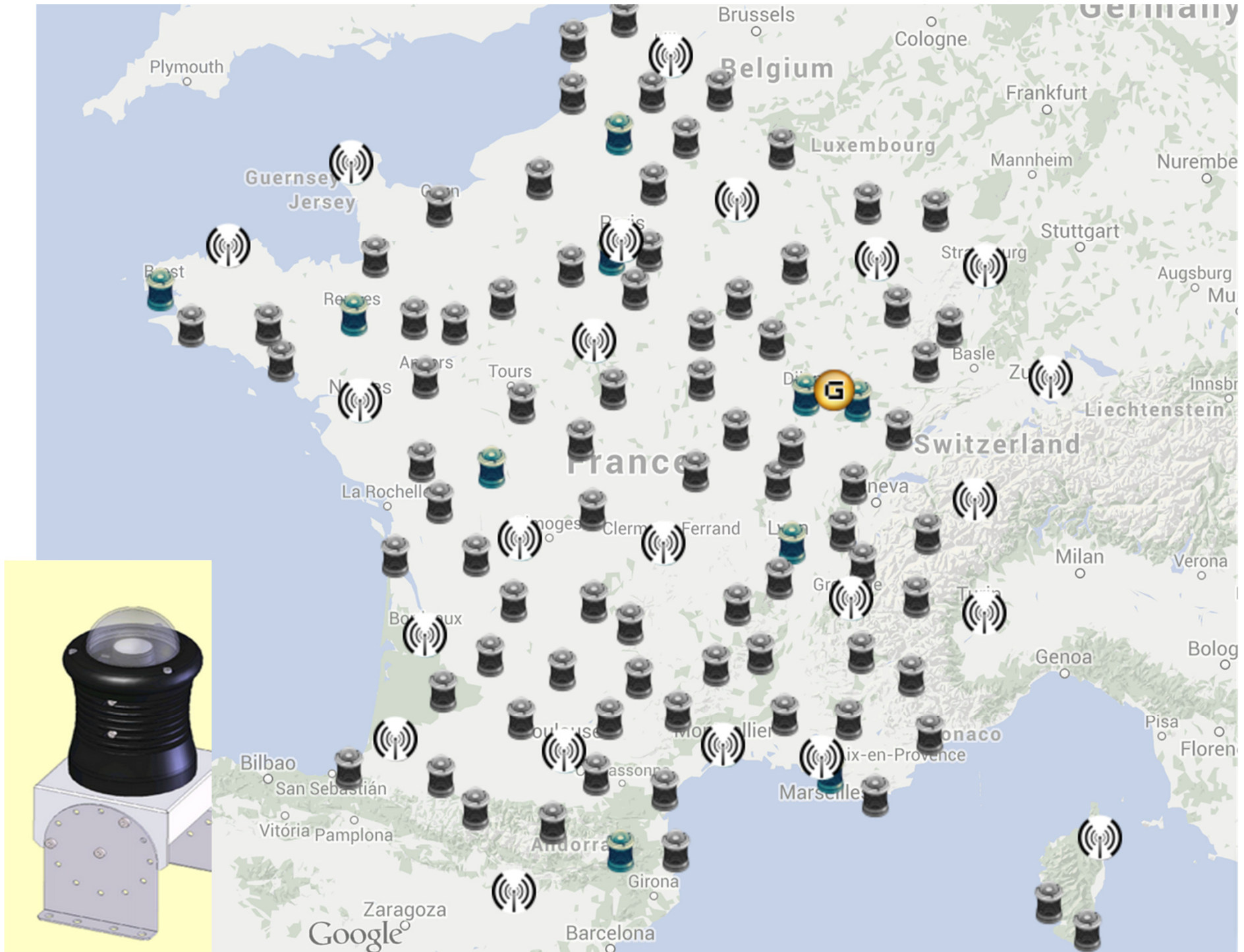
INAE

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FRIPON principle





FRIPON vs light pollution



- Digital cameras
- 1.2 megapixel chips
- 10-6 sec exposure time for day time
- 30 fps
- GigE Vision protocol
- PoE allowing 100 m single cable





Acquisition and detection : FreeTure

1) Filtering: map of changes

2) Selection of regions: single frame events

3) List of multiple events

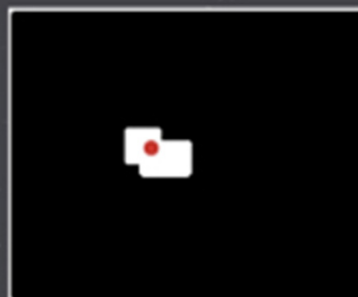
4) Analysis of ME



Event map
Frame n-2



Event map
Frame n-1



Event map
Frame n

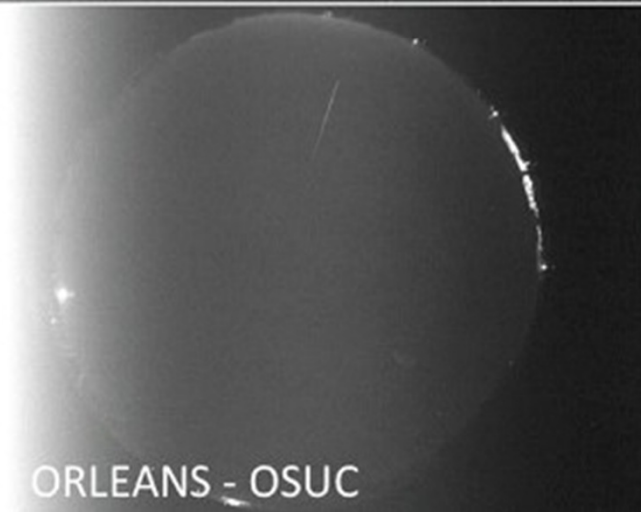
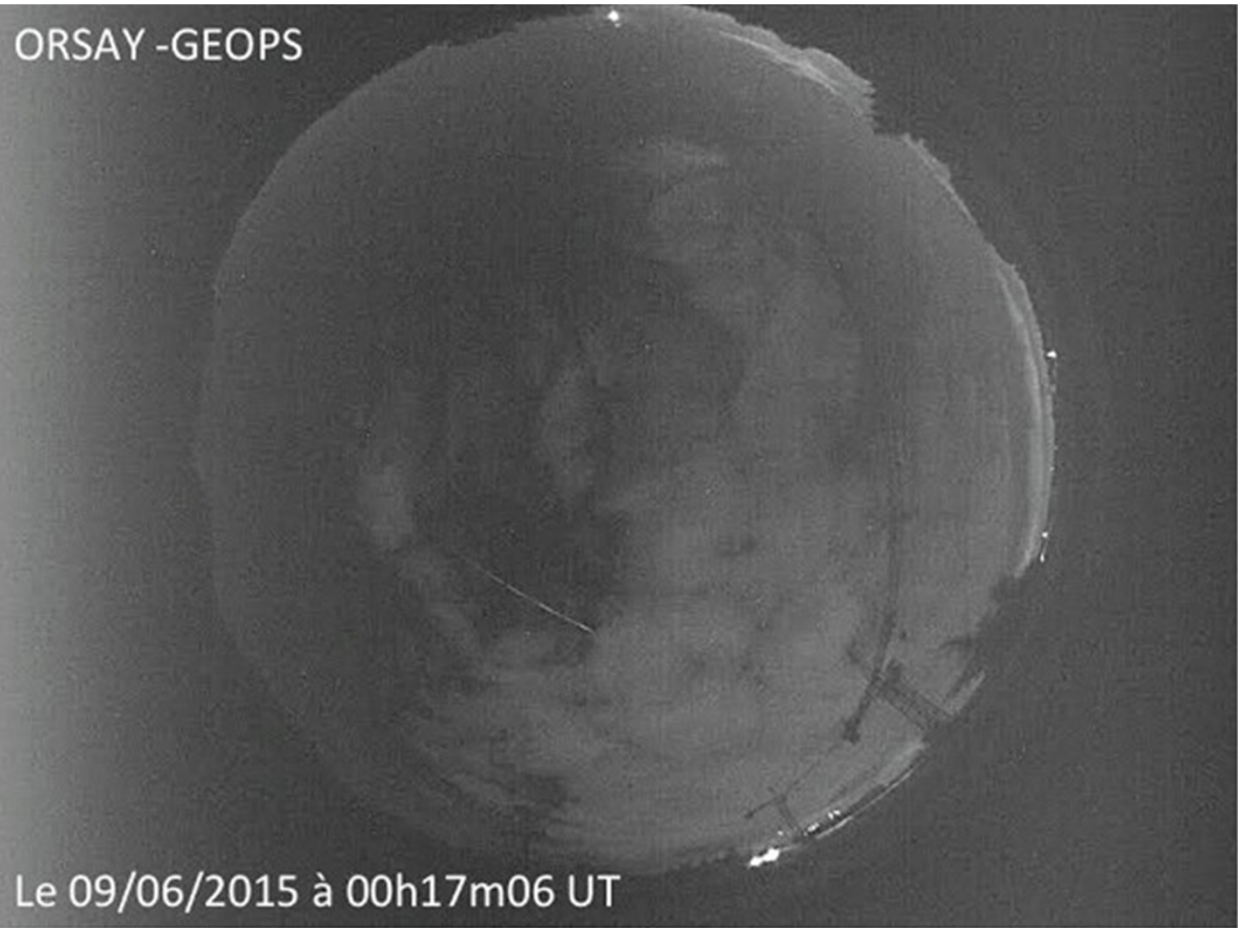


1 Multiple | Event
Frame n

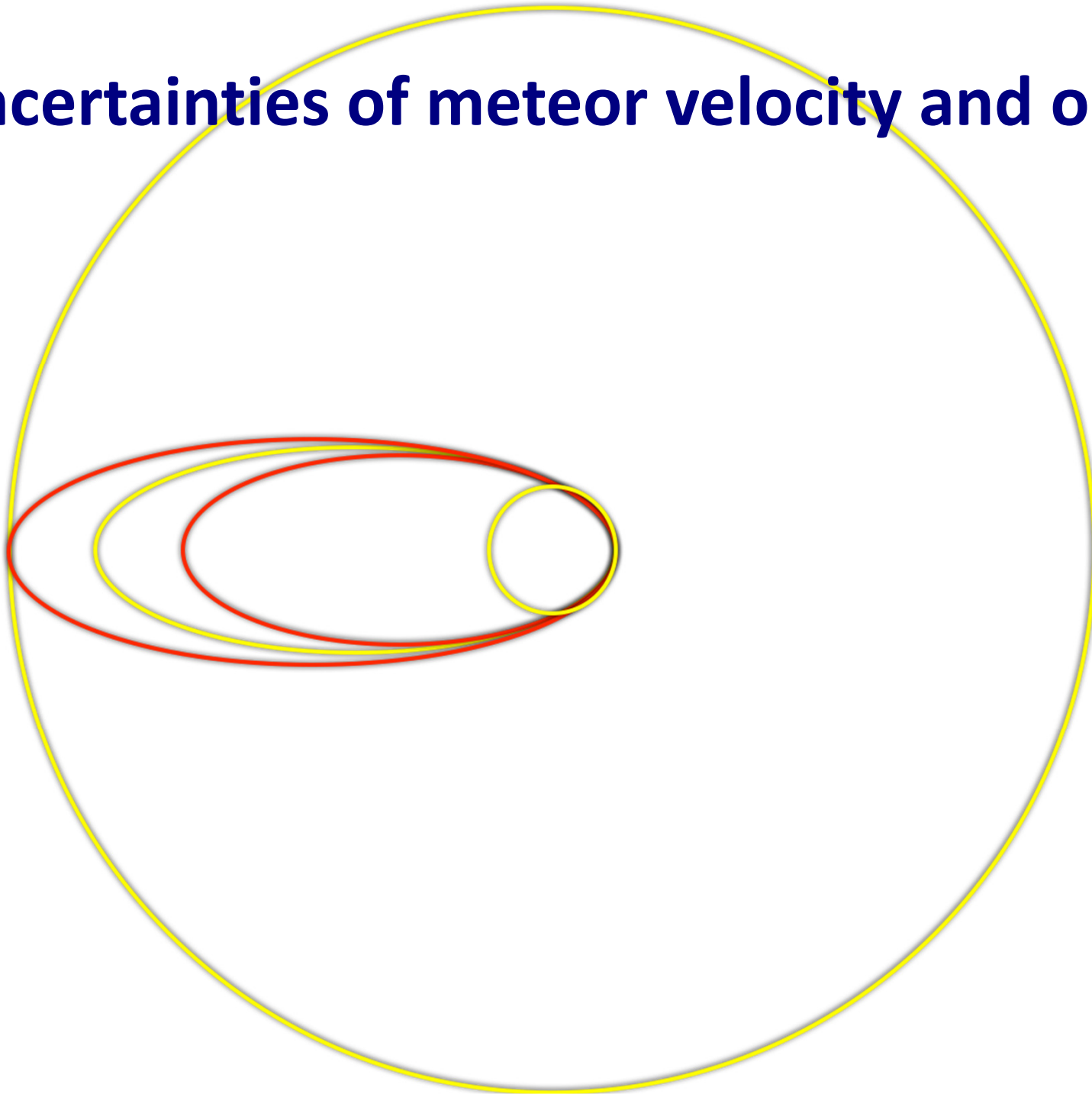
<https://github.com/fripon/freeture>

First triple detection of the test FRIPON camera network, June 2015

Network installation : 75 camera will be working for the end of the year



Uncertainties of meteor velocity and orbit





VES Radar

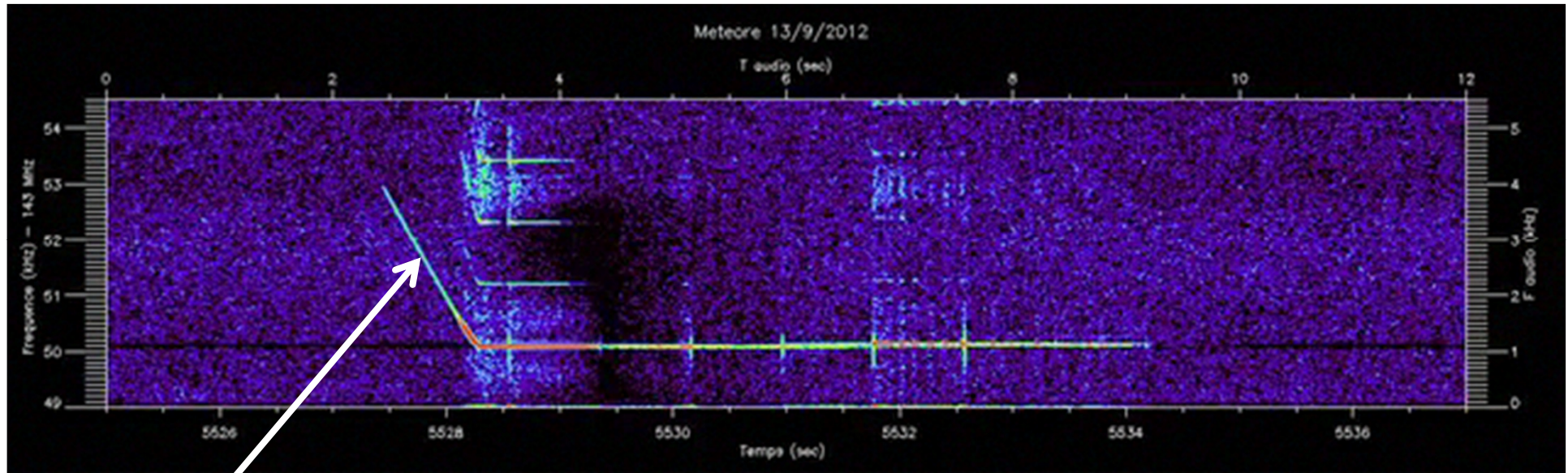


Radio aerial at Pic du Midi



1 of spectra detected at the Pic du Midi

Ham radio operators have been listening to meteors for years



Detection of radio waves reflected by the meteor head

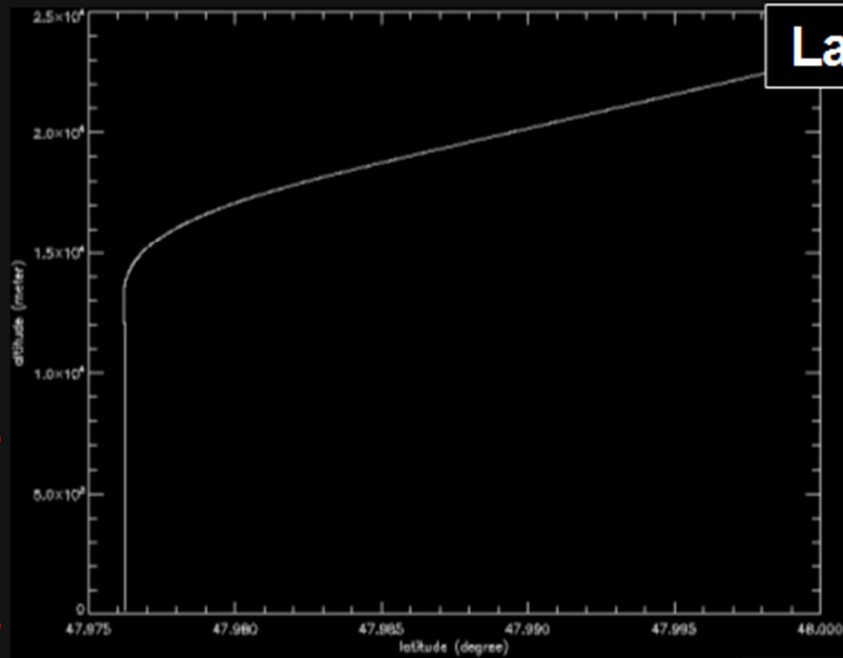
The Doppler effect (hopefully) allows us to very precisely determine the speed of the meteor, hence the semi-major axis of the ellipse

Radio detection of a meteor by Jean-Pierre Lebreton and Philippe Zarka

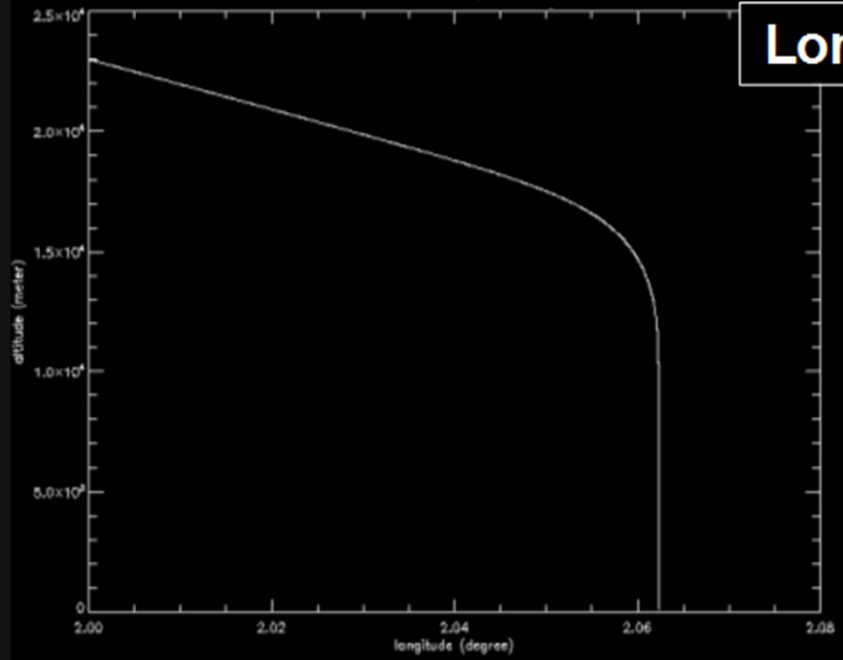
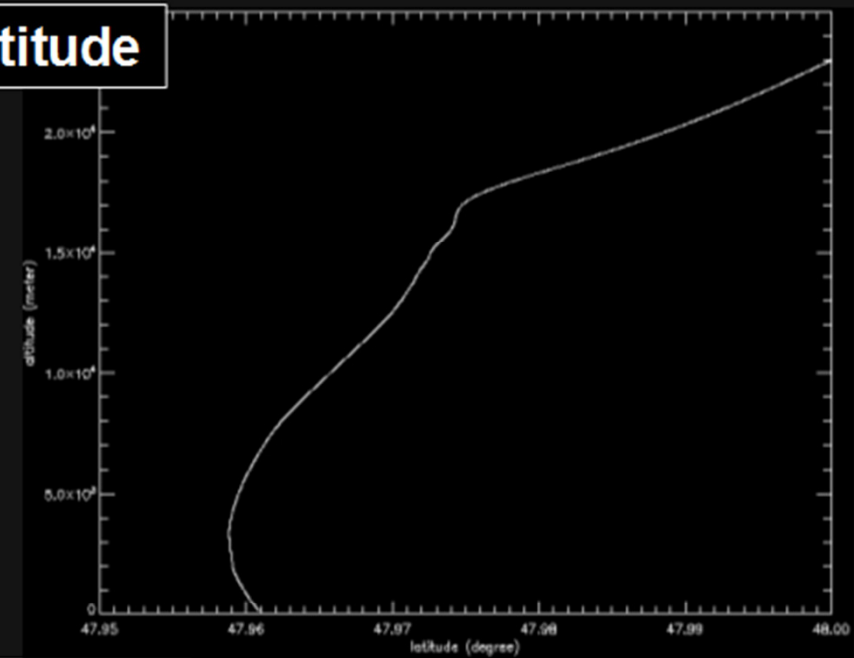
Without wind

With wind

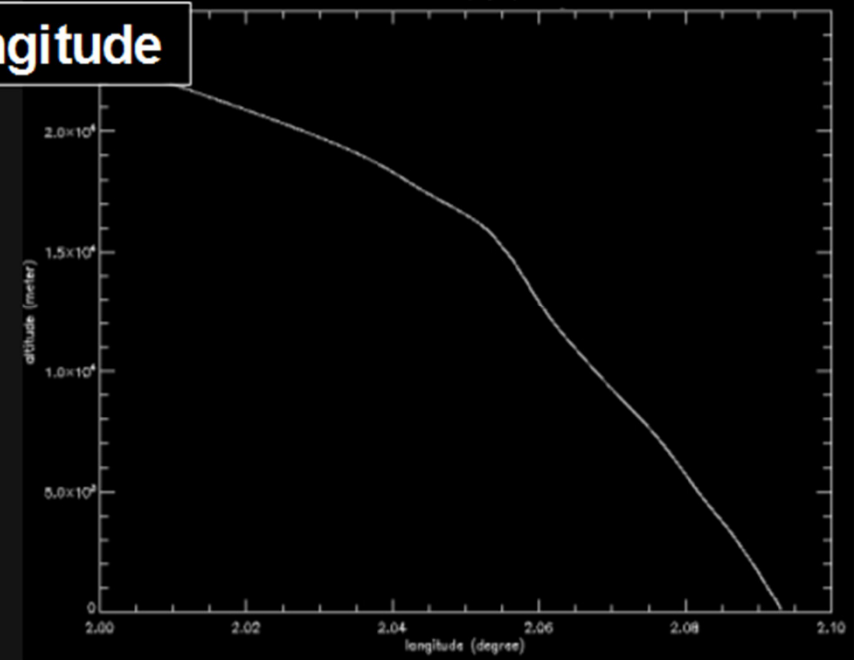
Altitude (mètres)



Latitude



Longitude



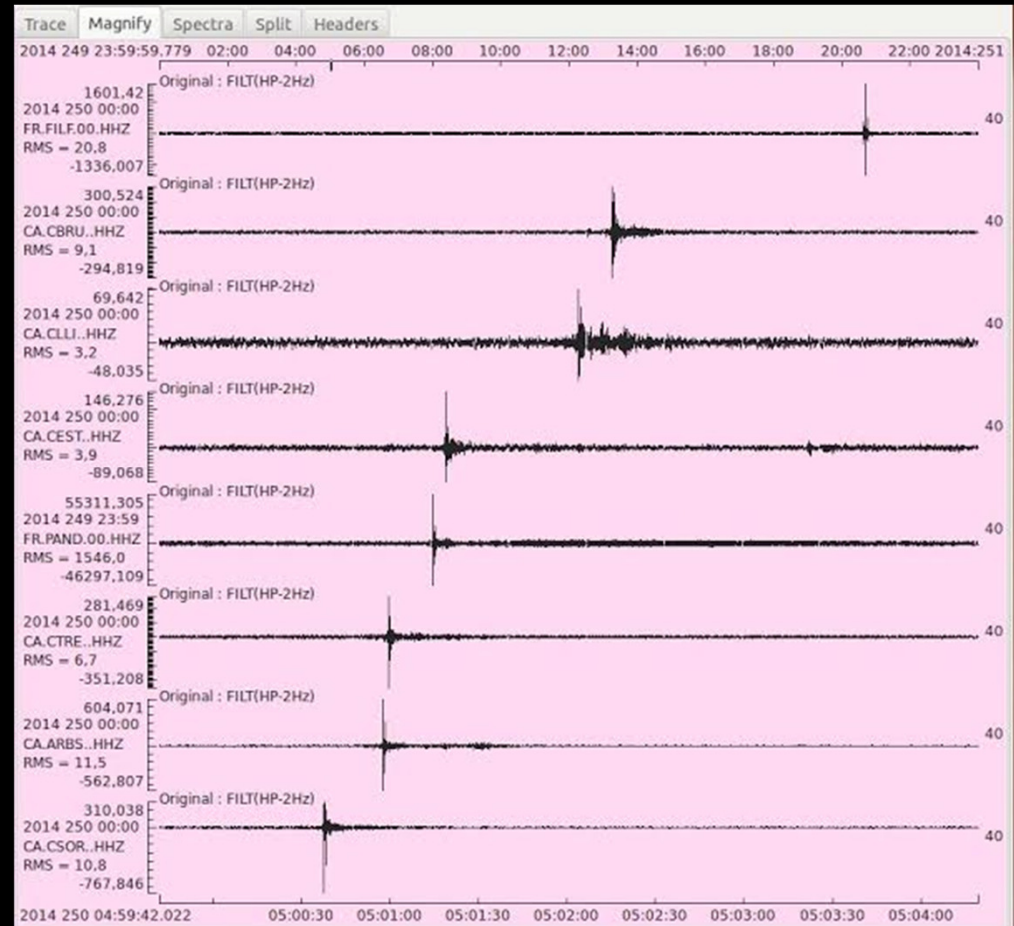
Meteor Spectra (ongoing)



Recording of the fragmentation by sismometers



2014 september 2014, Spain / France
Bolide (J.M. Trigo Rodrigez)



Chasser la météorite



Festival d'astronomie Fleurance, 2014

(+80%)
about to be...
works under linux
soon

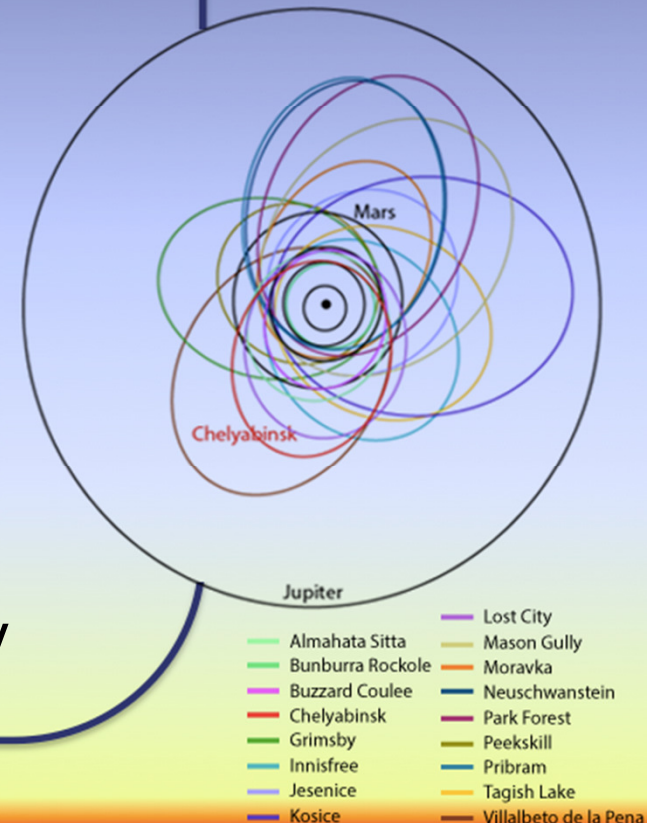
ok
ok
on going
ok
ok
ongoing
ongoing
ongoing

Working stations : 11

FRIPON: a scientific network to reconstruct meteorite orbits

FRIPON's strong points :

- ✓ Coupling cameras with detection of radio echoes → high precision orbits (geometry & velocity) + BRAMS = better understanding of meteor phenomenon
- ✓ Observation of meteors even when the incoming object doesn't reach the ground → statistics, origin
- ✓ Low-cost and all open-source: easy to implement → Belgium, Austria





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