



FRIPON

Fireball Recovery and Inter Planetary Observation Network

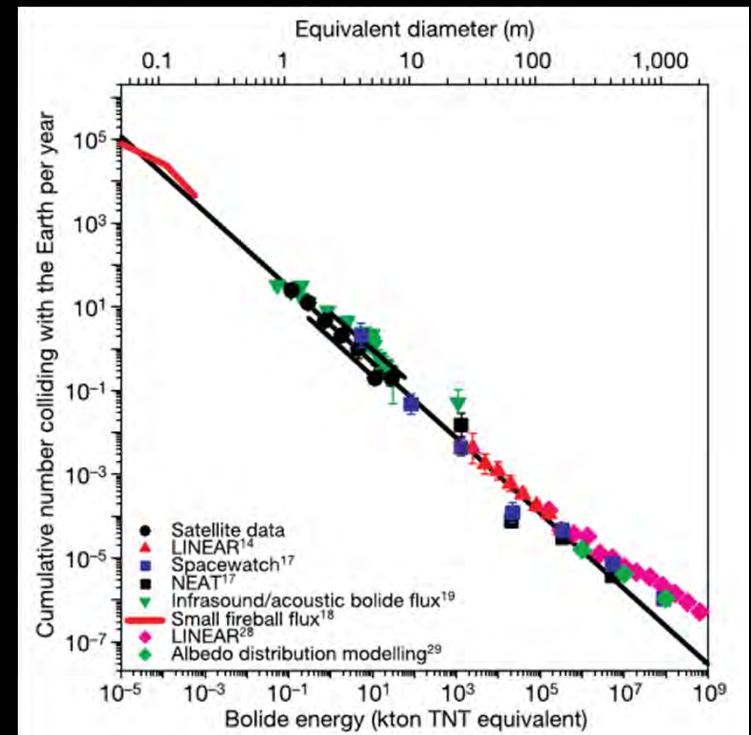
Jérémie Vaubaillon and François Colas – IMCCE/Observatoire de Paris

Sylvain Bouley – IDES Université Paris Sud

Brigitte Zanda – LMCM/Museum National d'Histoire Naturelle

Pierre Vernazza et Jérôme Gatatecca – OSU Pytheas

Impact flux over France



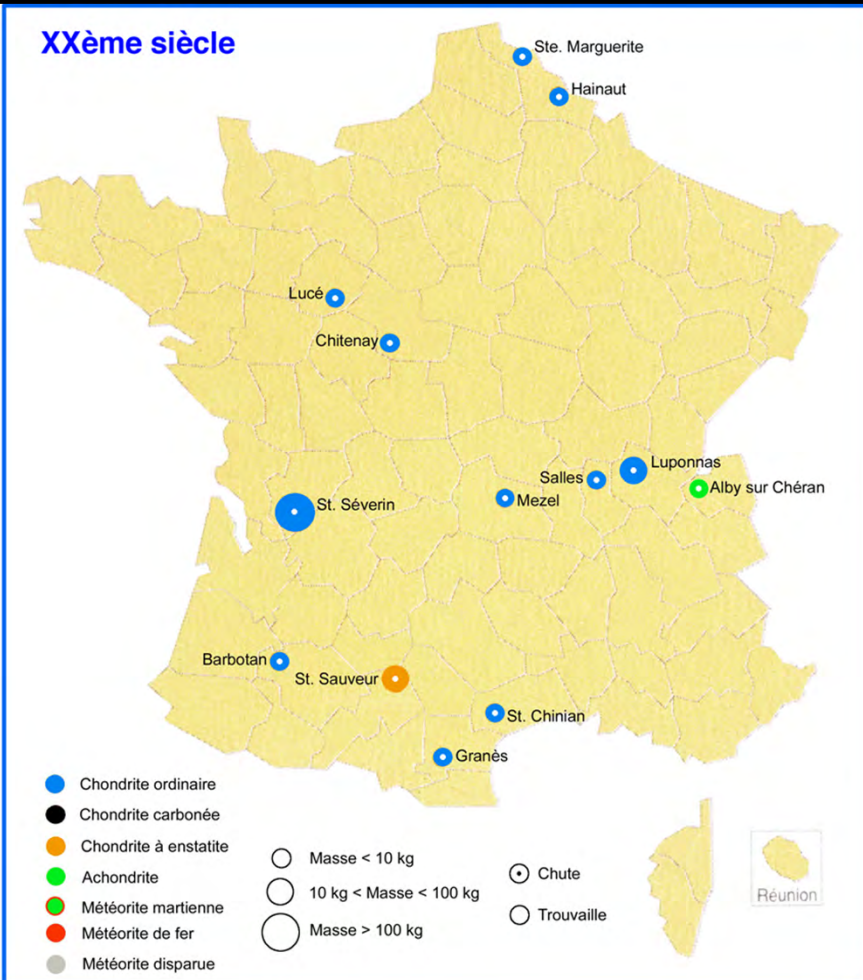
Over French territory

20 météoroids of 10 cm /an

1 météoroid of 30 cm/an

1 météoroid of 1m/10 ans

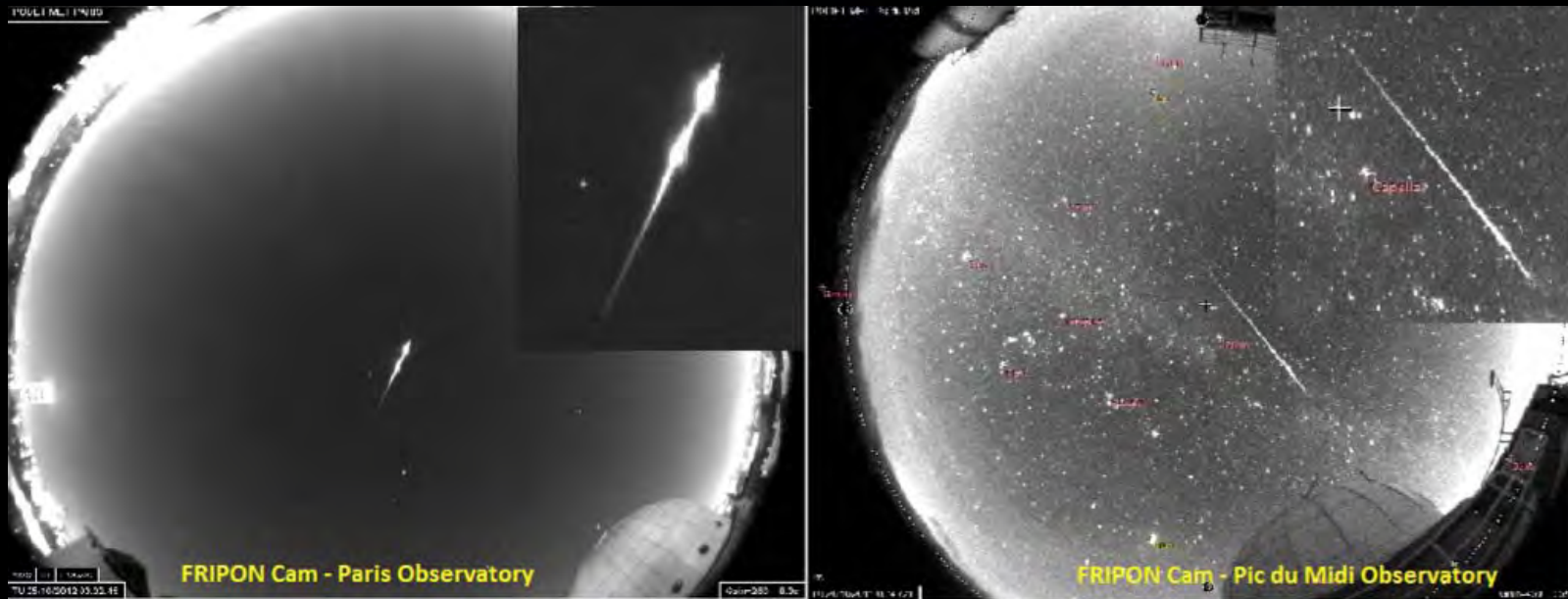
Météorites recoveries during XIX et XX century



XIX century : 46 météorites

XX century : 13 météorites, *why ?*

Fish eye network

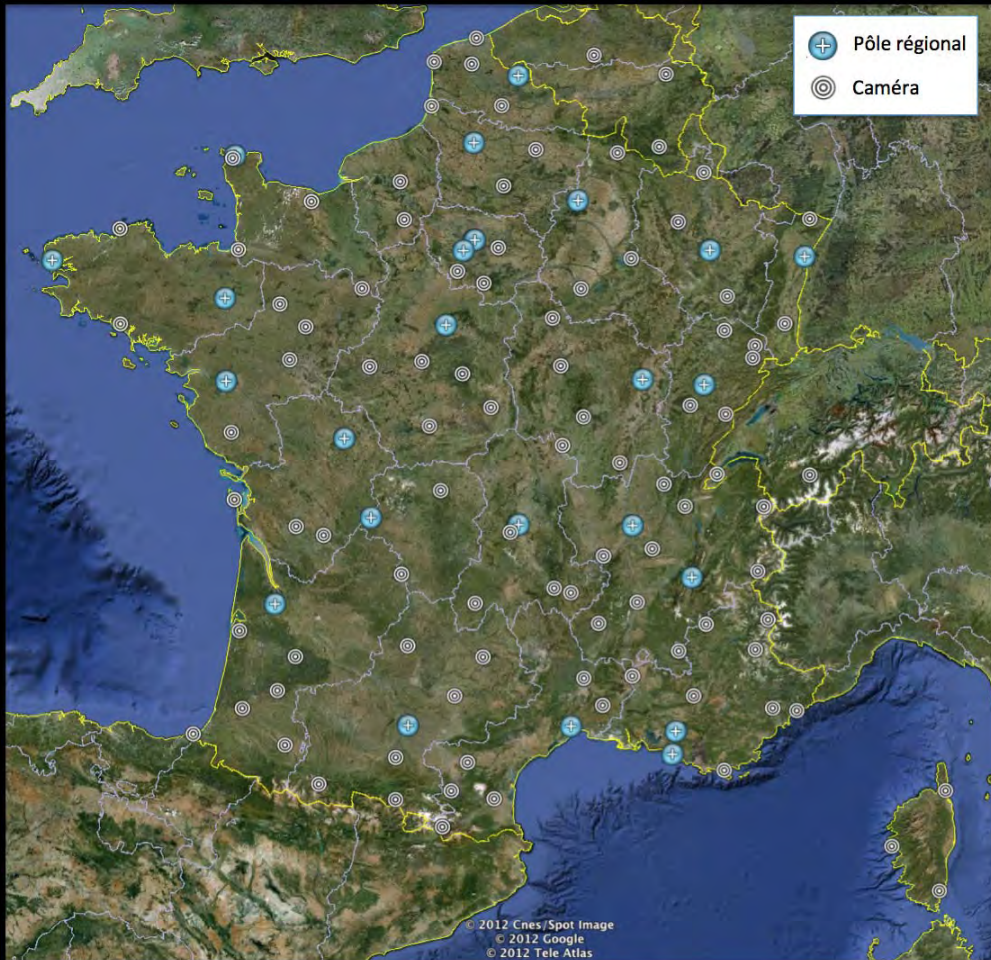


Only the last 48h Raw data are saved

Only real time detection are saved

One stack image is saved every minute

The FRIPON network



IMCCE/Observatoire de Paris

→ Orbit determination / hardware (camera...)

LMCM/Muséum National d'Histoire Naturelle

→ Ground meteorite research/ Citizen science

IDES/OSUPS Université Paris Sud:

→ Network organisation (data and team)

OSU Pytheas Observatoire de Marseille

→ Meteorite characterisation / Source region

100 stations

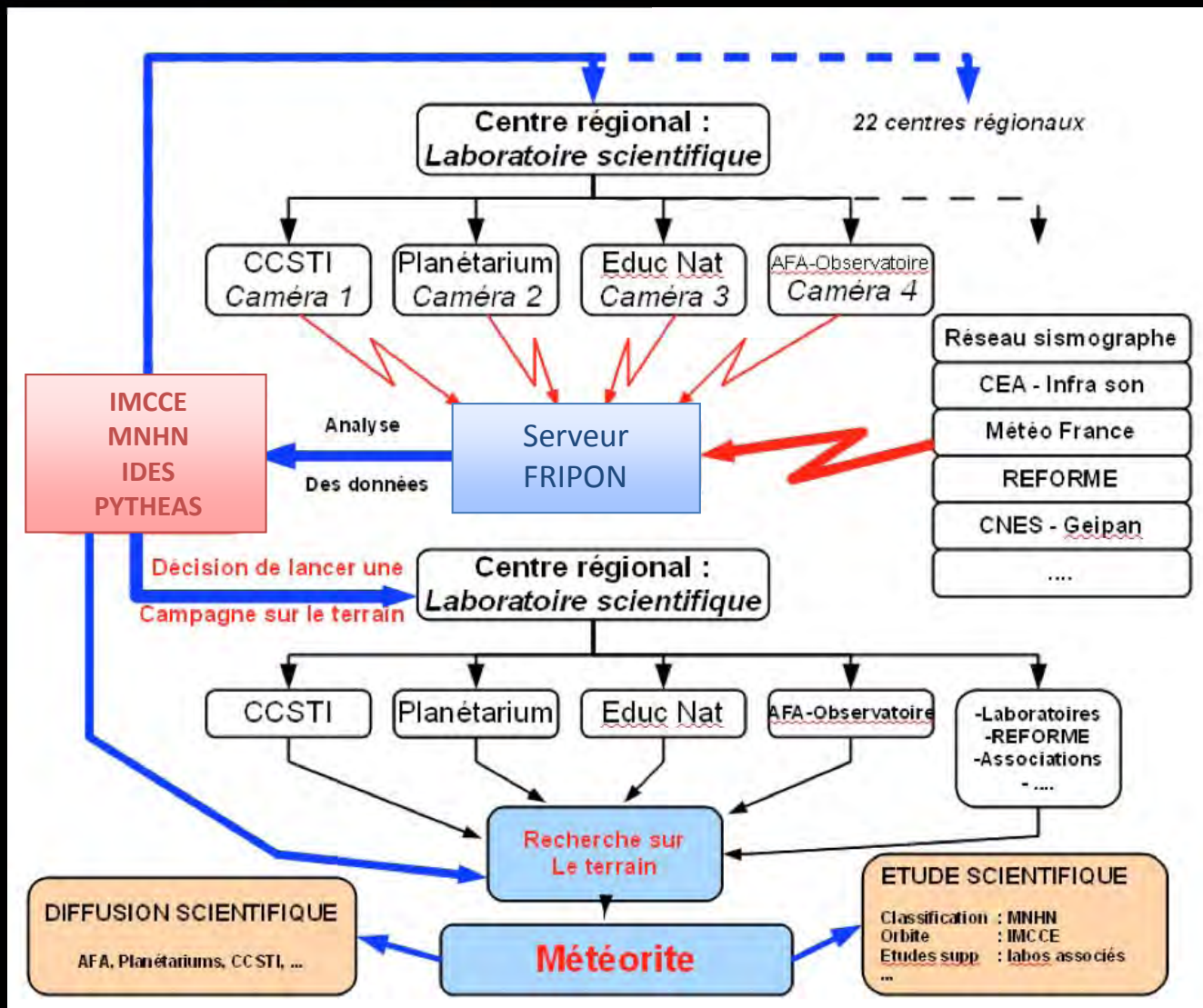
24 régional center

→ Astronomical labs / Earth science lab s/ Universities

75 other locations

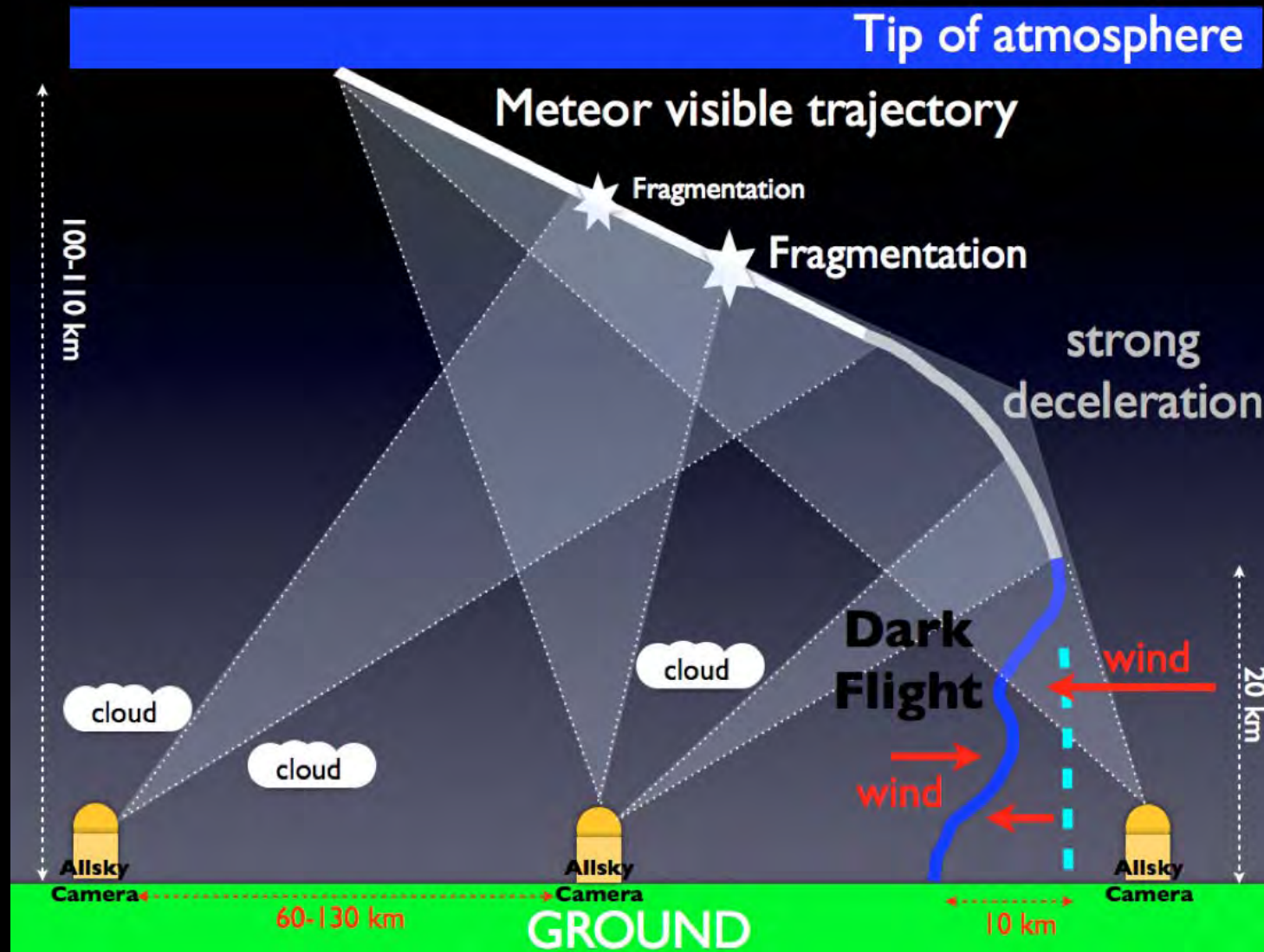
→ Amateurs observatories, muséums and natural sites, CCSTI, schools , Planétariums

The network !



Orbit détermination

100 caméras and 10 radio stations radio (radar GRAVES receiver for velocity)



Data

Observations

- *Orbit and strewn field (fish eye station and radio data, meteo data)*
- *Bolide characteristics from photometric light curve (size, mass)*
- *Composition (spectroscopy)*

Search for meteorite and curation

- *Search within the strewn field*
- *Ground campaign organize within 24h*
- *Discovery of météorites for muséum collection*

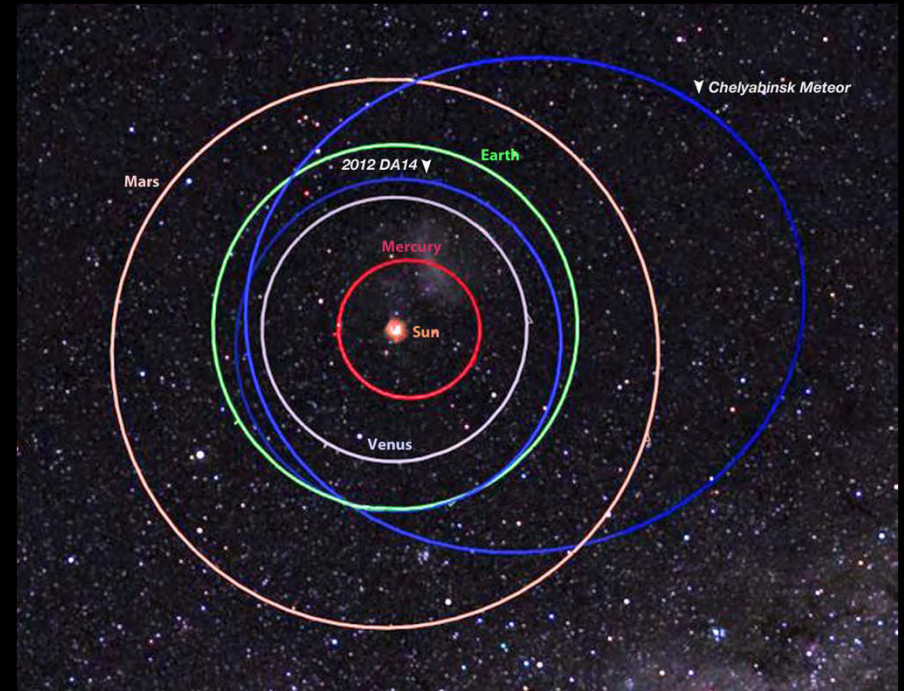


C / P.Jeniskens

La science de FRIPON

Orbites

- *Détermination of hundreds orbits (even without meteorite) and source region*
- *Determination of parent bodies (comete/astéroïdes)*
- *Connexion between the asteroid type and the asteroid family (spectral type)*
- *Interaction with Atmosphere/Meteoroïde – Fragmentation*



Météorites

- *Meteorite characterisation by MNHN (Muséum) and sharing matter with the participating teams*
- *Determination of the transfert time to Earth (Cosmic ray exposition)*
- *Oxygene isotopes (parent body)*
- *Meteorite paléomagnétisme – pristine magnetic field in the solar system*
- *Origin of rare météorites (CO CM / Comets?)*

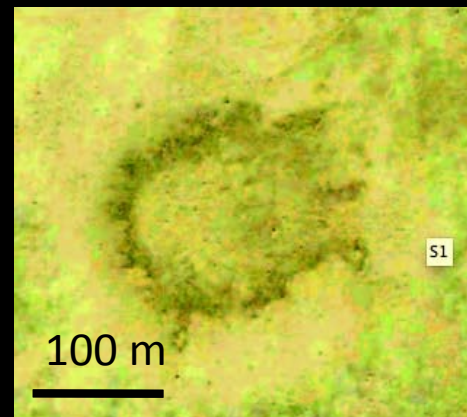
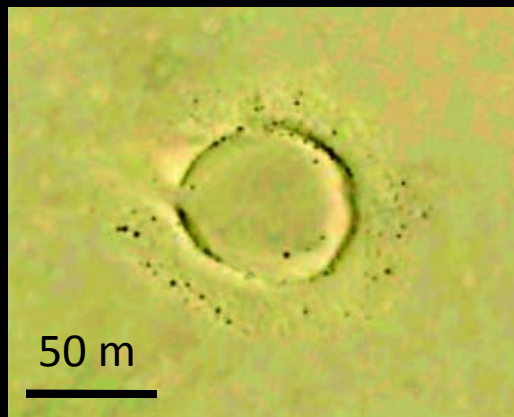
Citizen science : Vigie Ciel

Création of a pédagogique structure of citizen science : Vigie Nature « 65 millions d'observateurs »

The program « Vigie Ciel » is a part of « Vigie Nature » of the Muséum National d'Histoire Naturel (MNHN) dedicated to nature observation (butterflies, etc...)

→ Use of FRIPON data (the scientific network)

- Science outreach about small bodies, meteores, craters, etc....
- Access to a web service
- Maintain a team (professional and amateurs) for searching meteorites
- Search for impact craters with satellites images (*program IDES*)



Conclusion

Huge program – density and size of the network

- *Survey of the whole French territory (connexion with other networks)*
- *More than 30 scientific partners (Astronomy, Planetology, Atmosphere, Sismology, Géochimie,...) to study these complex events*
- *More than 100 public science partner*

SCHEDULE

- *Hardware determination (2013)*
- *Network installation (2014)*
- *First data (2015)*
- *End of the grant (ANR) 2017 (all the data / software will be public)*
- *End of the network (never!!!)*