(FRIPON) FIREBALL RECOVERY AND INTERPLANETARY MATTER OBSERVATION NETWORK.

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Introduction: The aim of the project FRIPON (Fireball Recovery and Planetary Inter Observation Network) is to answer questions regarding the connections between meteorites and asteroids. It is easy to study a meteorite in a laboratory but we have no idea from where it came from, because the orbit of its parent body is unknown. On the other hand, we currently have more than 500,000 orbits of asteroids with little or no information about their composition and mass. However these parameters are crucial to understand the origin and evolution of the solar system. In recent years, the planet migration theory have shown that it is possible to find very primitive objects in the main asteroid belt, and that they may hit the Earth due to the Yarkovsky non-gravitational forces. It is therefore essential to know the orbits of meteorites to connect their dynamic history and composition. This knowledge also works in both directions, namely that it will allow us to have an idea about the origin of meteorites, but also about the material that makes up asteroids.

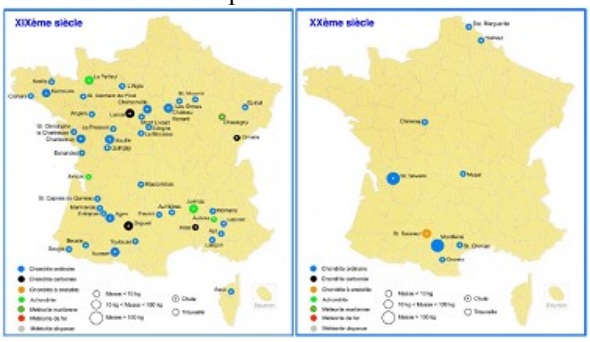

Fig 1 Comparison of meteorites discoveries in France during the 19th (left) and the 20th (right) century.

The network: To make this connection, we suggest to install a video camera network on the entire French territory. A 100km spacing network will allow us to compute the fall location better than one kilometer as shown by P. Brown [1]. We will also install radio receivers of the military radar GRAVES [2] dedicated to the observation of space debris at 143 Mhz. It will allow us to get accurate speed by measuring the doppler effect. Combined with optical data for the geometry, we will get orbital data with an unprecedent quality to explore the dynamic history of the asteroidal phase. We hope to get one to three meteorites per year with a typical impact rate as measured by Halliday et al [3]. This is also coherent with historical recoveries in France (Fig 1) showing a recovery rate of 0,5 meteorite per year in the 19th century without any video device!

One of the originality of our project is that it is a social network that will form the basis of our organization. We will use public interest in meteorites and asteroids for outreach purposes. Our network will be based on regional laboratories. They will be responsible for four or five cameras and a radar receiver. The cameras will be installed in all structures disseminating science like planetariums, amateur observatories, etc...

Another originality of the project is that we associate the know-how of two old laboratories working on celestial mechanic (IMCCE-Paris Observatory) and on meteorites (LMCM-National Museum of Natural History). To connect asteroids and meteorites is also up to connect two laboratories!

Conclusion : At the end of the project, we will have very little altered meteorites for the national collection of the museum but also a unique database combining the best available information on these objects. After 10 years we hope to have about thirty meteorites with statistically rare items.

Independently, we will determine hundreds of quality orbits, which in turn will allow us to constrain the source regions of meteorites as well as some parent bodies. We will also have good trajectories fall to restrict the size of the searching areas. Finally, it will necessarily happen that we collect a rare meteorite type. This event will generate years of work for not only the French but the worldwide meteoritic community.

References: [1] Brown P.et al (2009) *Meteoritics & Planetary Science, 46, 339-363,* [2] http://www.leshommesdufutur.com/onera-projet-graves.html, [3] Halliday I. et al (1996) *Meteoritics and Planetary Science, 31, 185*