FRIPON, a French fireball network for the recovery of both fresh and rare meteorite types

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The meteorite fall rate over a territory the size of France must be somewhere between 5 and 25/yr [1], most likely closer to the higher number if we consider recent works on Chelyabinsk event [2]. Most meteorites presently in collections are "finds" (as opposed to "falls"), i.e. meteorites found a significant amount of time after their fall, often weathered from being exposed to terrestrial alteration, which makes them scientifically less valuable. Some of the most precious meteorites, which have not been significantly heated on their parent-body and have chemical compositions closest to that of the Sun (CI chondrites — such as Orgueil, which fell in France in 1864, and CM chondrites — such as Murchison and Paris), also happen to be the most fragile ones. It is thus essential that meteorites be collected shortly after they fall, ideally within a few days. This was frequently the case in the 19th century, at least in France, where 45 witnessed falls were recovered, amounting to almost one tenth for actual falls.

The goal of the FRIPON network is to measure accurate orbit in order to pinpoint the parents bodies. This work will not only be done for the few meteorite falls but also for all the bright meteors, we hope to get about one thousand of accurate orbits per year. The idea is to search for meteorite streams as it is done for meteoroids. It will be far more easy to associate a single meteorite orbit with a stream of objects and perhaps a parent body.

The FRIPON project was approved by the National Research Agency (ANR) in July 2013. The funding received will allow us to cover the whole French territory with "Fish Eye" cameras and radio receivers of GRAVES radar signal. We made an extensive test of hardware (camera and lens). The hardware used in the previous network was mainly based on analogical devices with fixed parameters whereas new digital cameras allow a change of acquisition parameters in real time. So it is now possible to observe during day time and more important to change parameters to avoid saturation for bright events. It is clear that this new technology will enable a doubling of the efficiency of the search and allows us to get more reliable data.

The equipment tests have been underway since early 2013 thanks to funding from the Scientific Council of the Observatory of Paris. We are actually testing prototypes and writing the acquisition and reduction pipeline. The entire project will be "open source" and can thus be copied anywhere. The installation will take place from Spring 2014 until the beginning of 2015, and the project will be fully operational at the end of 2015.

We will present our research on the FRIPON hardware and describe the organization. In fact the main problem will be the network as we want to install 100 cameras working in real time! The goal is to be on the strewn field within 24 hours of a fall.

Acknowledgements: Agence Nationale pour la Recherche (ANR), Paris observatory.

References: [1] Detailed data for 259 fireballs from the Canadian camera network and inferences concerning the influx of large meteoroids Halliday et al, 1996 The Meteoritical Society. [2] Chelyabinsk Airburst, Damage Assessment, Meteorite Recovery, and Characterization, Popova, O et al, 2013 Science. [3] FRIPON network : www.fripon.org.