HELIOCENTRIC ORBITS OF FIREBALLS FROM THE MOROI PROJECT

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Introduction: The Fireball Recovery and Inter Planetary Observation Network (FRIPON) [1] started in 2016 with the aim of monitoring fireballs. As of May 2022 it contains more than 150 all-sky cameras installed in 20 countries. The updated list of countries and cameras and involved in the FRIPON project are updated regularly [1]. One of the main purposes of the FRIPON network is to determine the orbit of the meteoroids. In this work we focus on a sample of meteors recorded by the Meteorite Orbits Reconstruction by Optical Imaging (MOROI) component [2] of the FRIPON network, namely the heliocentric orbit and the association of meteoroids at the origin of fireballs to a parent body.

Methods: A very powerful tool for of the determination of the orbits of meteoroids that has been successfully validated is Meteor Toolkit [3]. The Meteor Toolkit uses the integration of the equations of motion, does rigorous computation of error propagation and is an open-source software [4]. The input data for the Meteor Toolkit are the Start time (UTC), the azimuth, elevation, velocity and the geodetic latitude, longitude and height of the detected event. Based on this the orbital elements and the parent body of the meteoroid are determined. The parent body can be determined also by using other metrics among which we mention the Asher metric [5].

Results: We determine the orbital elements and the parent bodies using the Meteor Toolkit. We review the other metrics from the literature earlier proposed in order to determine the parent body of a meteoroid. We present the results of the application of the metrics to a sample of fireballs detected by the FRIPON-MOROI network in Romania. We compare and discuss the results obtained.

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