PDC2023
Vienna, Austria

Near-Earth Object (NEO) Discovery

FIRST RESULTS OF A FIREBALL FLUX MEASUREMENT WITH THE ALLSKY7 FIREBALL NETWORK

Michael Frühauf[(1)], **Detlef Koschny**[(1,2)], **Yannic Heidegger**[(1)]
[(1)] *Technical University of Munich, Lise-Meitner-Str. 9, 85521 Ottobrunn, Germany*
m.fruehauf@tum.de, d.koschny@tum.de, yannic.heidegger@tum.de
[(2)] *ESA ESTEC, Keplerlaan 1, 2201 AZ Noordwijk, The Netherlands*

Keywords: *fireball, meteor, flux, NEO population*

ABSTRACT

As a branch of Space Safety, a goal of Planetary Defence is the protection of Earth and humanity from hazards from space [1]. In 2007, the meter-sized asteroid of the Carancas event fully penetrated through the atmosphere to the ground, leaving an impact crater. Only years later in 2013, the Chelyabinsk asteroid with a size of tens of meters caused significant damage on infrastructure and humans. But even independent of the real hazard, acoustical or optical phenomena by meteoroids or small asteroids, might distract vehicle drivers, cause fear, or can occur in politically sensitive regions [2]. Such impacts from small objects happen in timescales of a human life or even more frequently. Thus, meteoroids and small asteroids in the order of meters and tens of meters cannot be ignored for Planetary Defence.

Our goal is to constrain the fireball flux density onto Earth. In addition, this work can be a base for a future computation of a NEO size and orbit distribution model for decimeter to tens of meter-sized objects. We use meteor observations of the already existing AllSky7 fireball network [3]. The network consists of about 80 stations (December 2022), mostly located in Germany and Hungary, yet it is continuously spreading all over Europe [4]. Our focus lies on the debasing process of the data set. The spatial coverage of the network is determined by using realistic horizons, derived from calibration data of the individual stations. The time coverage is highly depended on the cloud cover, which is determined using cloud data from external providers as EUMETSAT or ECMWF [5] [6]. We will present results of the debiasing process and first results of the debiased fireball flux at the Planetary Defense Conference 2023.

References:

[1] European Space Agency, “Near-Earth Objects Coordination Centre FAQ,” [Online]. Available: https://neo.ssa.esa.int/faq. [Accessed 12 12 2022].

[2] D. Koschny and M. Frühauf, “The Relevance of Fireball Networks for Planetary Defence,” in *Meteoroids 2022*, Virtual, 2022.

[3] M. Hankey, V. Perlerin and D. Meisel, “The all-sky-6 and the Video Meteor Archive system of the AMS Ltd.,” *Planetary and Space Science,* vol. 190, 2020.

[4] S. Molau, A. Knöfel, J. Strunk and M. Kempf, “AllSky7 Fireball Network Europe,” [Online]. Available: https://www.allsky7.net. [Accessed 12 12 2022].

[5] D. Koschny, M. Frühauf, D. Deivasihamani, A. Soneji, Y. Heidegger and T. Huber, “Characterisation of the AllSky7 meteor camera systems,” in *International Meteor Conference 2022*, Poroszló (Hungary), 2022.

[6] M. Frühauf, D. Koschny, D. Deivasihamani, A. Soneji, Y. Heidegger, T. Huber and J. Vallejo Ortiz, “A Comparison of Cloud Coverage Determinations for Fireball Networks,” in *Meteoroids 2022*, Virtual, 2022.

****

Comments: