



Contribution ID: 59

Type: Poster

On-board and on-ground operations for the Mini-EUSO telescope on-board the International Space

Thursday 15 May 2025 22:16 (2 minutes)

Since 2019, the Mini-EUSO (Multiwavelength Imaging New Instrument for the Extreme Universe Space Observatory) telescope has been observing the Earth from the International Space Station (ISS) with a field of view of 44 degrees and a spatial resolution of about 6 km at Earth's surface.

Mini-EUSO main detector is a UV camera consisting of two Fresnel lenses and a focal surface composed of an array of 36 Hamamatsu multi-anode photo-multiplier tubes, for a total of 2304 pixels.

The telescope is capable of observing UV emissions (290-430 nm) of cosmic, atmospheric and terrestrial origin on different time scales: 2.5 μ s, 320 μ s, and 40.96 ms. To date Mini-EUSO has completed nearly 150 observation sessions over five years, accumulating approximately 750 hours of data.

The instrument is located in the interior of the ISS and is positioned by the crew on an UV-transparent, nadir facing window when observation sessions are planned. After each session, a sample of the scientific and engineering data are downlinked to the ground to assess the status of the instrument. The full amount of data can be physically sent to Earth via Soyuz capsule or downlinked gradually. Conversely, new software patches and operating parameters can be uplinked from the ground, copied on USB sticks and uploaded on the instrument, ensuring maximization of the observational capabilities of the detector.

To this purpose, various ground-based operations are required: planning sessions on moonless nights (to reduce the background light) or in combination with meteor showers, processing in quasi-real time the newly available data for fine-tuning the acquisition parameters of later sessions, and performing periodic ground-to-station end-to-end calibrations from the ground.

In this work we will provide an overview of the on-board and on-ground operations performed during these five years of mission on the Mini-EUSO instrument.

Eligibility for "Best presentation for young researcher" or "Best poster for young researcher" prize

No

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Session Classification: Posters