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Night sky background at ASTRI Mini-Array site: correlation between the Sky Quality Meter fluxes and ASTRI-1 variance data.

The ASTRI Mini-Array, an array of nine innovative Imaging Atmospheric Cherenkov Telescopes with large field of view (10.6°), is an INAF project devoted to the study of gamma-ray sources emitting at very high energy in the TeV spectral band. It is situated at the Teide Astronomical Observatory, Instituto de Astrofisica de Canarias, on Mount Teide in Tenerife (Canary Islands, Spain), where the first telescope of the array, ASTRI-1, is operational since 2024 and a second telescope, ASTRI-3, is under construction.

ASTRI Mini-Array cameras implement the so-called Variance method, an ancillary output dedicated to the imaging of the night sky background in the field of view. This method is based on the statistical analysis of the signal detected by the front-end electronics, whose variance is proportional to the flux impinging on the camera pixels. ASTRI-1 is also equipped with a Sky Quality Meter, an auxiliary device mounted on the back of the secondary mirror to measure the brightness of the night sky in the region pointed by the telescope. The field of view of the Sky Quality Meter is coaxial with the telescope and about two times larger (~20°), providing integral information in units of mag/arcsec. A correlation of fluxes between Sky Quality Meter and Variance data has already been obtained with ASTRI-Horn, the ASTRI Mini-Array telescope prototype operating at the INAF "M.C. Fracastoro" observing station (Serra La Nave, Mount Etna, Italy).

In this work we present the correlation between the Sky Quality Meter values of the sky brightness and the variance data from ASTRI-1. This correlation can be used to convert the Variance into absolute sky flux helping in identifying periods of high background levels. Knowing this correlation is useful for evaluating the instrumental duty cycle, preparing observation schedules, and discriminating among runs with different night sky background levels for the data acquisition and analysis processes.

Collaboration(s)

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