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Learning from ASTRI-Horn: how to monitor observation quality using the Variance

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ASTRI is an Italian project aimed at the study of the cosmic very high-energy gamma radiation. In the past decade, ASTRI has developed a new kind of Cherenkov telescope, based on a dual mirror Schwarzschild-Couder optical configuration and miniaturized silicon photomultiplier sensors. Nowadays, the realization of a nine-telescopes array of the ASTRI kind working in stereoscopic mode, the so-called ASTRI Mini-Array, is in progress at the Observatorio del Teide, in the Canary Islands. However, the prototype instrument ASTRI-Horn, installed in Italy, is still serving as an important test bench for both observation strategies, hardware upgrades and software solutions. In particular, during the observing campaign of winter 22/23, we implemented major improvements in the usage of the so-called "Variance"mode, an auxiliary output of the ASTRI Cherenkov camera imaging the night sky background in the spectral range between 200-500 nm. As a result, the Variance is currently processed online and onsite by a dedicated pipeline producing a tech file aggregating several relevant quantities: telescope mis-pointing, background level, the number of stars identified by the custom astrometry routine, and also an estimation of the optical point spread function. In this contribution we illustrate these quantities and their importance, together with the algorithms adopted for their calculation. All together, they provide essential pieces of information of the observations quality (health status of the telescope and sky conditions) during scientific data-taking, offering the opportunity to select the best time sequences for Cherenkov data reduction.

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