

## **Astrometric calibration of allsky camera for aircraft spotting and meteor observations**

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For the new SLR station at the Yebes Observatory, an all-sky camera was purchased to aid observers in their operations. The primary function of these instruments in SLR stations is environmental awareness, e.g. cloud presence, illumination conditions, Sun and Moon positions, and laser beam direction. Due to the limited angular resolution and often moderate sensitivity of these cameras, their use for air safety purposes is at best secondary. Still, provided that a suitable calibration is performed, they can complement other safety systems providing positional information that can be employed for validation purposes. The astrometric calibration of these optical systems has been researched for meteor astrometry, where positional measurements of the same event by geographically distributed cameras are used for orbit determination. We have implemented a calibration system for our camera following a selection of methods described in the literature, achieving subpixel positional precision ( $<2$  arcmin RMS in Az/EI). The calibration system requires no manual intervention after an initial coarse setup, and includes the steps of source extraction, selection, matching, and least squares fit of the camera model. A fully calibrated all-sky camera allows for pixel-perfect accurate overlays (e.g. in operational GUIs with predicted satellites or ADS-B relayed aircraft) as well as their use for meteor observations within dedicated networks. It also makes feasible to employ these cameras for complementary safety purposes.