In-flight calibration of Chinese polarimetric sensors based on various calibration methods using natural targets

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Polarization detection provides an independent information dimension for atmospheric remote sensing and is considered the most promising observational approach to improve the inversion accuracy of physical parameters of aerosols and clouds [1]. In recent years, many satellite polarimetric instruments and missions have been deployed or scheduled for launch by national space agencies. In China, several multi-angular multi-spectral planimetries developed by AIOFM, CAS have been successfully launched and operate in-orbit, such as the DPC/GF-5 [2], PSAC/HJ-2A&B, PCF/GF-5(02) [3], PCF/DQ-1, and DPC/CM-1, providing global multi-angle polarization observations of the earth-atmosphere system. The observed data are very important for global atmospheric aerosol, cloud observation, climate change research and atmospheric environmental monitoring. Reliable in-flight radiometric and polarimetric calibration of these polarimeters are essential for improving its application efficiency. In order to evaluate and monitor these Chinese sensors' in-flight performance, several approaches have been developed to calibrate the radiance and polarization measurements based on natural scenes, such as: the absolute calibration over Rayleigh scattering, the inter-band calibration over sun glint, the relative radiometric calibration using deep convective clouds (DCC), the polarization calibration using sun glint, and cross calibration with reference sensors over desert [4, 5]. The in-flight radiometric and polarimetric performance of these sensors are tested, and the temporal calibration results of DPC/GF-5(02) are provided.

References

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