

Directional Polarimetric Camera (DPC): Monitoring aerosol spectral optical properties over land from satellite observations

Zhengqiang Li and Weizhen Hou*

State Environment Protection Key Laboratory of Satellite Remote Sensing, Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences, Beijing 100101, China

*Presenting author (houwz@radi.ac.cn)

The Directional Polarimetric Camera (DPC) is the first Chinese multi-angle polarized earth observation satellite sensor, which will be launched onboard the GaoFen-5 Satellite in Chinese High-resolution Earth Observation Program [1]. GaoFen-5 runs in a sun-synchronous orbit with an inclination angle of 98° , a 13:30 PM local overpass time, a 2-day revisiting period. The DPC employed a charge coupled device detection unit with 512×512 effective pixels from the 544×512 useful pixels, realizing a spatial resolution of 3.3 km with a swath width of 1850 km. Furthermore, the DPC has three polarized channels (at 490, 670, and 865 nm) together with five non-polarized bands (at 443, 565, 763, 765, and 910 nm), and can obtain at least nine viewing angles by continuously capturing series images over the same target on orbit [2].

Based on the optimal estimation theory and improved bidirectional reflectance distribution function model, an inversion framework for the simultaneous retrieval of aerosol and surface parameters is presented by taking full advantage of available radiometric and polarimetric measurements. The retrieved wavelength-independent fine-mode and coarse-mode aerosol volumes are used to assess the DPC performance on the inversion capability of spectral aerosol optical depth, from which the Ångström exponent and fine-mode fraction could be further obtained. In addition, based on the synthetic DPC data for various observation geometries, aerosol and surface types, the aerosol inversion capabilities are systematically evaluated, and the information content analysis results show that the aerosol spectral optical properties can be well retrieved over various land surfaces [2,3].

References

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