

A Compact Multi-Angle Polarimeter, C-MAP

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Multi-spectral, multi-angle polarimetric (MAP) observations provide unparalleled information content for aerosol remote sensing compared with measurements of reflected intensity alone [1]. Consequently, passive polarimetric remote sensing has become a key technique for aerosol characterisation from spaceborne platforms [2]. Airborne polarimetric observations, although less common, offer unique advantages, including higher spatial resolution, flexibility in deployment, validation opportunities for satellite missions, and a testbed for the development of future sensors and retrieval methodologies. Realising these benefits requires compact, lightweight instruments with highly accurate, stable focal plane array (FPA) designs capable of delivering low-noise polarimetric measurements. Improving the design of these instruments and their retrievals in conjunction with other measurements, such as ground-based sun photometers [3], can lead to higher spatial and resolution (e.g., on a city-scale and revisits on timescales of hours or minutes) enhanced snapshots of aerosol data when linked with operational satellites, provide a better understanding of (1) direct and indirect effects of aerosols in the Earth-atmosphere system, and (2) air-quality, with implications for human health, as well as providing important validation data.

Here we present recent developments and first retrieval results from the Compact Multi-Angle Polarimeter (C-MAP), developed by Thales Alenia Space UK in collaboration with the University of Leicester through a UKSA/CEOI-funded programme. C-MAP, closely based on the CO2M MAP instrument [4], has undergone the final stages of its calibration campaign, resulting in a framework and an end-to-end processing pipeline to convert raw measurements into geolocated, radiometrically and polarimetrically calibrated observations. Ground-based deployments and airborne measurements acquired during a flight campaign over UK AERONET sites have been used to assess instrument performance.

References

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