# A Compact Multi-Angle Polarimeter, C-MAP

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Multi-spectral, multi-angle (MAP) measurements of reflected light intensity and polarization is state of the art in aerosol remote sensing. Admittedly, for aerosol property retrievals, the information content provided by MAP observations is unparalleled when compared to observations of total light intensity only [1]. As a result, the last few decades have seen substantial developments in passive polarimetric remote sensing of aerosols, mainly in the form of spaceborne missions [2]. In contrast to satellite measurements, airborne polarimetric observations are not as frequently utilized. Nevertheless, these observations could provide aerosol information at higher spatial resolution compared to satellites, while at the same time acting as a testbed for new developments, or providing validation for future satellite missions. Airborne polarimetric measurements require a low-noise, highly accurate FPA (Focal Plane Array) design to optimize the retrieval of information, but also need to be compact and lightweight. Improving the design of these instruments and using the retrievals in conjunction with other measurements, such as the CIMEL [3], can lead to higher spatial resolution (e.g., on a city-scale) aerosol retrievals, thereby aiming towards 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.

Here we present the first data produced from the compact airborne MAP instrument (C-MAP) with lightweight optics and compact FPA. C-MAP was developed by Thales Alenia Space UK in collaboration with the University of Leicester, under a UKSA/CEOI funded activity, and it is an airborne demonstrator of the MAP sensor that will fly on board the upcoming CO2M mission [4]. Recently acquired data from lab-based calibration, ground deployment and a flight campaign will be used to analyze and demonstrate C-MAP performance. The first flight took place in March 2024 above two UK AERONET sites [5] giving the first glimpse into C-MAP's capabilities. Using the GRASP retrieval algorithm [6], this data will be processed to produce both aerosol and surface measurements which can further be validated with ground measurements.

## References

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