

MAPLE: An encoder for bridging multi-angle polarimetric measurements and machine learning aerosol retrievals

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Multi-Angle Polarimeters (MAPs) have demonstrated strong potential for reducing uncertainties in aerosol retrieval by providing enhanced sensitivity to aerosol microphysical properties. The Chinese Directional Polarimetric Camera (DPC) series has played an important role in addressing the lack of on-orbit MAP measurements between POLDER-3/PARASOL and SPEXone/PACE.

To fully exploit the information content of polarimetric measurements, we develop a machine-learning-based aerosol retrieval framework incorporating a general Multi-Angle PoLarimetric Encoder (MAPLE). This encoder is designed to bridge MAP measurements and machine learning models by efficiently organizing MAP inputs while reducing redundancy and mitigating overfitting.

In this talk, we present first aerosol retrieval results derived from the MAPLE-LightGBM framework using DPC-3/DQ-1 measurements. The performance is validated against ground-based observations, demonstrating the potential of the proposed approach for robust aerosol retrieval from MAP measurements.

Preferred mode of presentation: Invited