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Constraints on Global Aerosol Types: Past, Present, and Near-Future

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Although the recent IPCC fifth assessment report (AR5) suggests that confidence in estimated direct aerosol radiative forcing (DARF) is high, indications are that there is little agreement among current climate models about the global distribution of aerosol single-scattering albedo (SSA). SSA must be associated with specific surface albedo and aerosol optical depth (AOD) values to calculate DARF with confidence, and global-scale constraints on aerosol type, including SSA, are poor at present.

Yet, some constraints on aerosol type have been demonstrated for several satellite instruments, including the NASA Earth Observing System's Multi-angle Imaging SpectroRadiometer (MISR). The time-series of approximately once-weekly, global MISR observations has grown to about 14 years. The MISR capability amounts to three-to-five bins in particle size, two-to-four bins in SSA, and spherical vs. non-spherical particle distinctions, under good retrieval conditions. As the record of coincident, suborbital validation data has increased steadily, it has become progressively more feasible to assess and to improve the operational algorithm constraints on aerosol type. This presentation will discuss planned refinements to the MISR operational algorithm, and will highlight recent efforts at using MISR results to help better represent wildfire smoke, volcanic ash, and urban pollution in climate models.