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# Detailed Aerosol Characterization using Polarimetric Measurements

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Anthropogenic aerosols are believed to cause the second most important anthropogenic forcing of climate change after greenhouse gases. In contrast to the climate effect of greenhouse gases, which is understood relatively well, the negative forcing (cooling effect) caused by aerosols represents the largest reported uncertainty in the most recent assessment of the International Panel on Climate Change (IPCC). To reduce the large uncertainty on the aerosol effects on cloud formation and climate, accurate satellite measurements of aerosol optical properties (optical thickness, single scattering albedo, phase function) and microphysical properties (size distribution, refractive index, shape) are essential. There is growing consensus in the aerosol remote sensing community that multi-angle measurements of intensity and polarization are essential to unambiguously determine all relevant aerosol properties. This presentations adresses the different aspects of polarimetric remote sensing of atmospheric aerosols, including retrieval algorithm development, validation, and data needs for climate and air quality applications. During past years, at SRON-Netherlands Instite for Space Research retrieval algorithms have been developed that make full use of the capabilities of polarimetric measurements. We will show results of detailed aerosol properties from ground-based- (groundSPEX), airborne- (NASA Research Scanning Polarimeter), and satellite (POLDER) measurements. Also we will discuss observational needs for future instrumentation in order to improve our understanding of the role of aerosols in climate change and air quality.