

An overview of NASA's aerosols and clouds–convection–precipitation study

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The 2017 Decadal Survey highlighted Earth System Science themes, science and application questions, and several high priority objectives that have led to the inclusion of Aerosols (A) and Clouds–Convection–Precipitation (CCP) as *Designated Observables* (DOs) for NASA. On June 1, 2018, several NASA centers (GSFC, LaRC, JPL, MSFC, GRC and ARC) submitted a joint Study Plan to the NASA Earth Science Division for the Aerosol (A) and Cloud, Convection, and Precipitation (CCP) Pre-formulation Study (A-CCP). The DS and the A-CCP team recognized the science merit in combining the A and CCP DOs for both enhancing the ability to address a number of science objectives and also to provide an expanded capability to address additional objectives beyond those addressed by individual DOs.

A critical element of the A-CCP observing strategy is to make extensive use of new passive and active sensors as well as of the so-called Program-of-Record (PoR), complemented by a fully integrated sub-orbital component. Central to this observing system design is the adoption of a *Value Framework* in which quantitative assessment of the science benefits of space- and air-borne assets is a key element. Given pre-defined A-CCP science objectives and geophysical variables with desired accuracies, A-CCP relies on a spectrum of Observing System Simulation Experiments (OSSEs) aimed at addressing pixel level retrieval uncertainties and sampling trade-offs.

In this talk we will present an overview of the A-CCP Study. We will describe the A-CCP science goals and objectives, highlighting some of the architectures being considered. Furthermore, we will discuss a subset of *Retrieval OSSEs* being considered for A-CCP, namely, synergistic lidar-polarimeter retrievals of particular relevance for the A-CCP aerosol science objectives, and examples of how polarimetry contribute to the cloud related objectives.

Mode of presentation: Invited