

RACORO: ROUTINE AERIAL VEHICLE PROGRAM (AVP) CLOUDS WITH LOW OPTICAL WATER DEPTHS (CLOWD) OPTICAL RADIATIVE OBSERVATIONS

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ABSTRACT

Our knowledge of boundary layer clouds and their cloud processes is insufficient to resolve pressing scientific problems. Boundary layer clouds often have liquid-water paths (LWPs) less than 100 g m^{-2} , which are defined here as being “thin” Clouds with Low Optical Water Depths (CLOWD). This type of cloud is common globally, and the Earth’s radiative energy balance is particularly sensitive to small changes in their LWPs. However, it is difficult to retrieve accurately their cloud properties because they are tenuous and often broken, which interferes with our ability to obtain the routine, long-term statistics needed to resolve associated uncertainties in climate models. To resolve this dilemma, a better understanding of this cloud type is needed that can only be achieved by acquiring in situ data that are needed for process studies and for evaluation and refinement of existing retrieval algorithms from ground-based instruments. Coordinated by the ARM Aerial Vehicles Program (AVP), the Routine AVP CLOWD Optical Radiative Observations (RACORO) field campaign will fill this knowledge gap by conducting long-term, systematic flights in boundary layer, liquid-water clouds over the ACRF Southern Great Plains site. Operating between 22 January and 30 June 2009, this is the first time that a long-term aircraft campaign has been undertaken for systematic in situ sampling of cloud properties. The Center for Interdisciplinary Remotely Piloted Aircraft Studies (CIRPAS) Twin Otter aircraft, equipped with a full payload of research instrumentation, will be used to obtain representative statistics of cloud microphysical, aerosol, and radiative properties of the atmosphere. These data will be used to validate retrieval algorithms and support process studies and model simulations of boundary layer clouds and, in particular, CLOWD-type clouds. For RACORO to operate as a routine, long-term program, flight operations must be kept as simple as possible to achieve its objectives, which require an operating paradigm different from typical, short-term, intensive aircraft field programs. This poster summarizes RACORO operations, measurements and instruments.

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