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CONTROL ID: 1804819

TITLE: Synergistic observations of cloud properties and their related uncertainties at JOYCE

ABSTRACT BODY: In order to improve the representation of clouds and the associated processes in numerical weather prediction and climate models, accurate observations of the macro- and microphysical properties of clouds are essential. However, depending on the retrieval algorithm applied, the results may differ substantially (e.g. Huang et al., 2012). In order to track down these differences, a “blindtest” experiment of four different liquid water cloud retrieval algorithms has been carried out within the European COST action EG-CLIMET. The need to better quantify and understand the uncertainties related to cloud retrievals has also been a key issue in recent scientific collaborations: e.g. the objective of the EU/DOE ground-based cloud and precipitation retrieval workshop held in Cologne in May 2013 was to advance algorithm development and uncertainty quantification for retrieving cloud and precipitation properties from ground-based remote sensors through international scientific collaboration and data sharing.

In this contribution, we present a 1D-VAR retrieval algorithm of microphysical properties of clouds, which integrates the information of various ground-based remote sensing instruments and provides a physically consistent picture of clouds. The use of a variational approach allows to properly assess the uncertainties due to measurement error, forward model and prior information. We will discuss the influence of the different uncertainty sources on the solution and characterize the information content from the different sensors.

The retrieval method is applied to measurements from the Jülich Observatory for Cloud Evolution (JOYCE) located at the Research Center Jülich in Germany. The core instruments of JOYCE for deriving cloud properties include cloud radar, ceilometer, Doppler lidar, a 14-channel microwave radiometer (MWR) and an infrared spectrometer. The information from the SEVIRI instrument on board the MSG satellite can be further used to constrain the solution. The JOYCE observations and retrieval products are essential to advance process understanding and will support model validation and parameterization development for climate models in the German research initiative HD(CP)2 (High Definition Cloud and Precipitaion for Advancing Climate Prediction).

CURRENT SECTION/FOCUS GROUP: Atmospheric Sciences (A)

CURRENT SESSION: A024. *Cloud Properties: Observations and Their Uncertainties

INDEX TERMS: 3360 ATMOSPHERIC PROCESSES Remote sensing, 0320 ATMOSPHERIC COMPOSITION AND STRUCTURE Cloud physics and chemistry, 3394 ATMOSPHERIC PROCESSES Instruments and techniques.

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