Geophysical Research Abstracts
Vol. 19, EGU2017-18749, 2017
EGU General Assembly 2017

Multi-Frequency Radar/Passive Microwave retrievals of Cold Season Precipitation from OLYMPEX data

Frederic Tridon (1), Alessandro Battaglia (1,2), Joe Turk (3), Simone Tanelli (3), Stefan Kneifel (4), Jussi Leinonen (3), and Pavlos Kollias (5)

(1) Leicester, Physics, United Kingdom, (2) National Center Earth Observation, University of Leicester, Leicester, UK, (3) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA, (4) Institute for Geophysics and Meteorology, University of Cologne, Cologne, Germany, (5) School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, New York, USA

Due to the large natural variability of its microphysical properties, the characterization of solid precipitation over the variety of Earth surface conditions remain a longstanding open issue for space-based radar and passive microwave (MW) observing systems, such those on board the current NASA-JAXA Global Precipitation measurement (GPM) core and constellation satellites.
Observations from the NASA DC-8 including radar profiles from the triple frequency Advanced Precipitation Radar (APR-3) and brightness temperatures from PMW radiometers with frequencies ranging from 89 to 183 GHz were collected during November-December 2015 as part of the OLYMPEX-RADEX campaign in western Washington state. Observations cover orographically-driven precipitation events with flight transects over ocean, coastal areas, vegetated and snow-covered surfaces.
This study presents results obtained by a retrieval optimal estimation technique capable of combining the various radar and radiometer measurements in order to retrieve the snow properties such as equivalent water mass and characteristic size. The retrieval is constrained by microphysical a-priori defined by in situ measurements whilst the most recent ice scattering models are used in the forward modelling. The vast dataset collected during OLYMPEX is particular valuable because it can provide very strong tests for the fidelity of ice scattering models deep in the non-Rayleigh regime. In addition, the various scattering tables of snow aggregates with different degrees of riming can be exploited to assess the potential of multi-wavelength active and passive microwave systems in identifying the primary ice growth process (i.e. aggregation vs riming vs deposition). First comparisons with in-situ observations from the coordinated flights of the Citation aircraft will also be presented.