Building a cloud retrieval case library for the QUICR Focus Group

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Others welcome to join !

Australian Government
Bureau of Meteorology

The Centre for Australian Weather and Climate Research
A partnership between CSIRO and the Bureau of Meteorology

CSIRO

QUICR Overall Strategy

One objective of QUICR is to develop a framework to quantify the uncertainties in existing cloud retrievals, and assist development of improved cloud retrieval techniques

Three main strategies can followed in parallel (none of them perfect !) :

1) Introduce cloud retrieval outputs in radiative transfer codes and compare RT model outputs with TOA and SURF flux measurement (BBHRP, RIPBE …) → Sally's talk

2) Build up a cloud retrieval case library that will include radar, lidar, radiometer measurements colocated with reference in-situ microphysical parameters → This talk

3) OSSEs (Observation System Simulation Experiments) : outputs from bin-microphysics models can be forward-modelled into measurements, that can be in turn used in cloud retrievals → Anyone interested ?

Pros and cons of the in-situ approach

Strengths of the in-situ approach :

* A lot of field experiments are available, in a wealth of geographical locations

* A lot of datasets include co-location with cloud radar, lidar, microwave radiometers (ground-based, airborne, and satellite)

* The co-located data can be used to refine the assumptions held in retrieval techniques

* These in-situ datasets include PSD measurements + bulk microphysics

Weaknesses of the in-situ approach :

* Difference in volume sampled by in-situ and remote sensing

* Co-location in time and space is crucial

* The in-situ measurements & microphysical retrievals also have errors and assumptions !

* A limited number of really good cases are collected during each field experiment

Building a cloud retrieval case library …

Methodology to select relevant cases ? Problem is we don't want to end up with three cases ! But we also want the the in-situ errors to be less than the retrieval errors !

Here is a suggestion for discussion

Class 1 cases : Excellent PSD measurements (with shattering somewhat mitigated and small particles well measured) + bulk IWC + extinction + radar-lidar (ground, aircraft or space).

Class 2 cases : bulk IWC + extinction + radar-lidar (ground, aircraft, or space). Can accept some flaws in the PSD measurements.

Class 3 cases : Excellent PSD measurements (with shattering somewhat mitigated and small particles well measured) + radar-lidar (ground, aircraft, or space). Can accept a limited set of bulk measurements (IWC or extinction) if CPI particle habit classification is available to constrain mass-size relationship.

Class 4 cases : Good PSD measurements + radar-lidar (either from ground or aircraft). No bulk microphysics available. Maybe we don't want to take a look at these cases if we have a sufficiently large number of class 1 to class 3 cases !

Building a cloud retrieval case library …

This is where we need all in-situ people to step up !

A questionnaire has been constructed and distributed to a few people already

Please contact us if you have datasets of interest – Comments welcome !

We expect to have some ARM infrastructure support to help build that library

Field Experiment	**Data Pis**	**Date and Time Interval**	**Cloud Type** (Liquid, Mixed, Ice, Stratiform ...)	**In-Situ Size Distribution** Which probes ?	**In-Situ Bulk IWC** Which probes ?	**In-Situ Bulk Extinction** Which probes ?	**Other In-Situ Probes** Which measurement ?	**Airborne radar** Frequency(ies) ? Doppler ? Other
MT-AFRICA	A. Schwarzenboeck A. Protat	26 August 2010 13:12 - 13:45 UTC 12:45 - 13:00 UTC	Stratiform Ice	FSSP-100, 2D-S, CIP, PIP	No	No	No	Falcon-20 RASTA 95 GHz, Doppler, multi-beam

If you are interested please send email to the co-chairs of QUICR

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