IPWG-8 Data Assimilation Working Group Report

Chairs: Benjamin Johnson (benjamin.t.johnson@noaa.gov)
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Attendees: Kazumasa Aonashi, Philippe Chambon, Jussi Leinonen, Christopher Williams, Farice Duruisseau, Sarah Ringerud, Joe Munchak, Zhiyuan Jiang, Yasutaka Ikuta, Sabatino DiMichele, Chris Grassotti, Masahiro, Kazumori, Karina McCusker, Stefan Kneifel, Chris Westbrook, Eugene Clothiaux, Alan Geer

IPWG-8, October 2016, Bologna, Italy
IPWG-8 DA WG Action Items

- **A#1** (B. Johnson; w/ T. Auligne, S. English): Collect breakout group reports and draft final recommendations from The 3rd Joint JCSDA-ECMWF Workshop on Assimilating Satellite Observations of Clouds and Precipitation into NWP Models, December 2015; share with IPWG,

- **Status: Completed / Delivered**
IPWG-8 DA WG Action Items

• **A#2** (B. Johnson): Encourage interaction with IPWG within the DA community and at community meetings.

• **Issue:** DA is a cross-cutting topic that involves elements of each I*WG, primarily Winds (IWWG), Clouds (ICWG), and Sounders/Radiances (ITWG/ITSC). IPWG role is increasing.

• **Status:** Ongoing Action Item
  • Every meeting I attend, I try to raise awareness of the I*WG meetings and the need for a unified DA effort

• **Results of email discussions:**
  • No desire for a DA working group outside of each I*WG (e.g., IDAWG)
  • There is, however, an interest in cross-WG DA-specific coordination and discussion.
• **A#2** (A. Geer, B. Johnson): Using scattering properties in radiative transfer operators

• **Issue:** Scattering and microphysical assumptions are often "hard-coded" into common radiative transfer tools

• **Action:** Developers of radiative transfer tools (e.g., RTTOV, CRTM, etc.) should start to decouple forward models from single scattering databases. A common database format is a goal.

• **Details:** A focus group of scattering databases developers has made very good progress towards a common scattering database format, including a C++ library for encoding it. The first sample files should be available this autumn. Meanwhile the new ARTS scattering database is available through RTTOV-SCATT v12.2 and another new database is being tested for inclusion in CRTM. Later, RTTOV-SCATT v13 (to be released in 2020) is intended to include more flexibility to import scattering databases, including support for the new standard format. CRTM will update table formats along with the switch to netCDF with CRTM version 3.0 in 2019.
ICWG-2
A (very) Preliminary Summary

http://cimss.ssec.wisc.edu/icwg/

ICWG-8, October 2018, Madison, Wisconsin
Local Host: Ralf Bennartz

Meeting Coordinator: Maria Vasys

ICWG co-chairs: Andrew Heidinger, Rob Roebeling (Retiring), Karl-Goran Karlsson (New)

CGMS Representatives: Next Speakers

CGMS Rapporteur: Dong Wu

Topical Groups Leads: Andi Walther, Phil Watts, Bryan Baum, Mike Foster, Michael Pavolonis, Dong Wu, Steve Wanzong, Karl-Goran Karlsson, Ralf Bennartz

Thank you All!
ICWG Sub-Working and Topical Groups

- **Algorithms**
  - Retrieval Methods (Phil Watts & Bryan Baum)
  - Cloud Masking (Karl-Goran Karlsson)
  - Microwave (Ralf Bennartz)

- **Assessments**
  - Cloud Product Intercomparisons (Andi Walther)

- **Climate Applications**
  - Climate Applications (Mike Foster)

- **Weather Applications**
  - Severe Weather (Mike Pavolonis)
  - Winds (Steve Wanzong, Dong Wu)

- **International Collaboration**
  - International Collaboration (Dong Wu, Andrew Heidinger)

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Sub-Working Groups are permanent

Topical Groups can modified based on ICWG feedback
ICWG: Some science issues

• New sensors (sub-millimeter, CubeSats, etc.)
• Synergies (active/passive, MW/ VIS-NIR/IR)
• Unified RT modeling (scattering, RT-solvers, DA, etc)
• Climate applications
• Long-term data continuity
• Collaboration with aerosol as well as precipitation communities
ICWG Summary
IPWG Relevant Recommendations

**Radiative transfer modeling:** With several upcoming missions covering the high-frequency microwave and sub-millimeter wavelength range. The MW encourages international agencies to continue supporting radiative transfer model development in those spectral regions.

**Continuity of existing conically scanning passive MW sensors:** The long-term time series conically scanning passive MW sensors reaching back to at least 1987 is one of the few long-term satellite-based climate datasets available. It already provides mature climate data records on various products including cloud liquid water path over ocean, precipitation, total column water vapor content, and others.

**Preparations for upcoming SUBMM missions:** Various upcoming sensors will frequency coverage extend beyond the 183 GHz band (e.g. ICI, TROPICS).
Validation of cloud products: For validation of MW-derived cloud products, the WG recognizes the continued importance of:

- Space agencies to consider providing follow-up missions to CloudSat/CALIPSO, which are heavily used for cloud parameter validation. In particular the continued availability of W-band radars with low detectability threshold (< -25 dBz) is of importance for cloud studies and validation.
- Combining VIS/NIR/IR observations globally with passive MW observations provides opportunities to study systematic errors in both datasets.
- Validation of cloud properties from ground-based observations over ocean proves challenging. Ship transects equipped with upward-looking MW radiometers haven proven valuable for ground-based validation of MW retrievals over a wide variety of different cloud systems. The research community is encouraged to exploit opportunistic mid- to long-term deployments of such upward-looking radiometers e.g. on research vessels or other ships transecting the oceans.
ICWG (Some) Needs for further research

- Multilayered clouds pose numerous challenges for passive sensors
- Ice particle optical properties:
  - **Suggestion**: link with IPWG and form sub-working group on ice models
- Cloud phase / mixed phase / supercooled (also cloud type):
  - **Suggestion**: form working group to refine the cloud type definitions
  - **Suggestion**: work towards harmonization of cloud type/phase across groups
  - **Suggestion** to profile vertical profile of phase
  - **Suggestion**: Explore Machine learning (e.g., neural networks; big data exploration)
  - **Suggestion**: Need to harmonize definitions of cloud types across various groups
- Uncertainties (calculation, categorization, provision in L2, reporting in L3):
  - **Suggestion**: resurrect working group on uncertainties across the retrieval process