

WORKING GROUP REPORTS

RESEARCH AND NEW TECHNOLOGIES WORKING GROUP

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FROM PREVIOUS MEETING SUMMARY

RECOMMENDATIONS

IPWG website- currently has links to different datasets, but don't often get updated with changes to products, descriptions, etc. First action is to update the product lists on IPWG, action to each dataset provider or new datasets. (Algorithms and datasets)-suggest an online form that VL would provide passwd to.

Merged algorithm datasets- suggestion was to advertise to the various satellite simulator development (Matsui, Tanelli etc) the development of multi satellite datasets. Currently being done- these simulators can already do radars/radiometers, VIS/MW, etc.

Recommendations for support of incorporation of model products into precipitation products- CloudSat/PMM starting to do this in their science efforts, not so much in Europe which has not yet approved a precip mission. Suggest more synergy between related missions, eg SMAP, SMOS (soil moisture).

Recommendation- developers focus on light precip rates, such as level of ambiguous detectability threshold. Algorithm developers to specify detectability level in their product descriptions. Better methods and evaluations to determine how much light rain is being missed. 1 mm/day is the best we can do. Accumulation are often too large unless minimum detectability of Level-2 product is taken into account.

Recommendation: synergy of orbits to allow synergy (ie, A-Train). Noted that JAXA GCOM-W to fly in the A-Train orbit, allowing comparison with AMSR-E.

Recommendation- agencies to support HF channels for rain over land/ocean. AMSR3 will be on GCOM-W2, will include 150/190 GHz on AMSR3. Continue recommendation,

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noting that conically scanning imager/sounder are being used (SSMIS) in model DA, so modelers are getting used to these data also.

Recommendation- should snowfall workshops be continued? Better coordination with other communities, eg hydrology, sea ice. Need more diverse representation at the snowfall meetings. Hydrologists always want the highest resolution- incorporate more input from hydrological model groups (not sure how this is different from current recommendation). More participation from the NWP DA community since there is much overlap between the DA/precip groups (fwd models, sensor characterization). Better timing between specialty (snowfall) workshop and IPWG workshop

Reccomendation- data sharing between international agencies (eg, AMSR2, MADRAS), etc. Second ground station for M-T has already been done.

Recommendation for space radar measurements able to sense within 100-200 m of the surface with sensitivity near -20 to -30 dB. Need to update status for new recommendations.

STATEMENTS

Band protection and maintenance of specific bands. Keep as a statement for future CGMS requests.

Support for future missions with highest resolution imager or sounder (rather than saying imagers or sounders) HF channels relevant to light precip (conically scanning preferred). Discuss more in the plenary session.

Continue recommending support for geostationary microwave measurements – based on superior time sampling of the precip process. Having the precipitation even in a course scale (FOV of ~50km) is extremely useful since it can be combined with coincident GOES multi-spectral to get fine scale rain rate.

Stress the need for continued free and open access to data- fundamental to CGMSrealtime as much as possible. R ussian satellite (METEOR-M) access? (also FY-3A, M-T MADRAS, etc) - Suggest having this as action for CGMS rapporteur.

(End of review from previous meeting)

RESEARCH

ALGORITHMS AND RETRIEVALS

1. Status/direction of high latitude, light rain/snowfall- over ocean, over land? Define what we mean by light precipitation.

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HF (150/183) microwave methods can pick up stratiform precip when ice is present; if no ice not detected. Temperature sounding channels for detection of warm rain over both land and ocean. Combined CloudSat/MODIS/AMSRE data combinations to use train AMSU-only retrievals. Explore use of LPVEx (and future field expt) data to study more use of these channels with ground validation datasets to verify. Nature of error better understood today better than two years ago. Suggest more regional development of these techniques rather than trying to run it globally. Ongoing LSWG analysis to assist HF techniques with better surface emissivities. Connection with ITWG subgroup on the emissivity issue through the ITWG speciality meetings (3rd workshop in NY in June 2011). (Nai-Yu Wang, Mario Mech).

2. Further advanced in multispectral/multisensor techniques, eg ill-posed retrievals such as sfc emissivity, 3-D radtran, beamfilling, tracking/morphing, bin microphysics in CRM's, info on particle shape, size etc.

Continue exploitation cloud phase/property information from SEVIRI-like imagers (Bob Kuligowski, Ali Behrangi) to adapt to future geostationary imagers. Currently vis/WV/IR are most useful since all geosats have them. Multispectral sampling from microwave also has not been very well exploited. Do we need to develop and construct multi-geo composites of more than just longwave channel data (vis, near-IR, etc). The rising popularity of distributed hydrologic and land-surface modeling and recent enhancements of atmospheric models' resolution have contributed to the increasing demands for accurate high resolution precipitation data.

3. Leveraging non-precip specific missions eg SMAP, Aquarius, SMOS, humidity sounders, lightning, aerosol, hydrology records, etc. (Also scatterometers, GRACE, GPS, MODIS).

Information from these missions are useful to components of the precipitation retrieval problem. Encourage interaction amongst these programs at the program management level rather than only at the science level. Soil moisture retrievals to better derive surface emissivity. More representation from soil moisture community in particular (Joe Turk, Ralph Ferraro).

4. Leverage ground-based methods (radars, gauges etc) to complement space based retrievals, vertical profiles, etc.

GPM-GV program as a template of how this is to be done (GV data, algorithm and model communities come together). Exploitation of ground radar profile at the time of the satellite overpass (ground radar is at a lower frequency that is not attainable from space). Need to expand high latitude gauge data collection. Integration and incorporation of ground data to modelers and for continuous observation of surface emissivity. Ask Paul Kucera to report on ground data availability from NCAR repositories. Parameters that assist deep snow emissivity modeling (density profile).



CLIMATE PRODUCTS (AND DATA ISSUES)

1. Methods to keep track of SSMI and SSMIS data records (UPP-CP, Scope-CM, NCDC/CSU, EUMETSAT CM-SAF, RSS).

Bring up to plenary on Thursday- suggest Matt Sapiano/Wes Berg as POC, Karsten Fenning at CM-SAF. Suggest UPP-CP and CSU coordinate efforts. Exploit overlap period between SSMI/SSMIS to extend data reprocessing back to 2003 and into the future.

Ongoing thru GSICS, Scope-CM, etc. Example is the NCDC stewardship effort. Ongoing progress in this area in the creation of fundamental climate records.

Encourage better coordination of overpass times between satellite operators. Early afternoon gap is particularly vulnerable. A-Train samples at 1330 and often the NOAA satellites drift in time to slots that are not ideal for precip. Consider overpass times for NOAA/JPSS that are coordinated to drift to revisit gap periods. Maintenance of backup satellites to fill revisit time gaps as long as possible (action for operational satellite group). Currently miss late afternoon if NOAA-15 is unavailable.

Representation from the ocean fluxes community (was done this time) is a good idea and to encourage more synergy between ocean heat flux and precip communities- use of similar data, etc. And in future with ocean salinity community (eg, Aquarius). (Axel Andersson)

Common data formats- precipitation data to keep advised of changes to formats used by data providers.

DATA ASSIMILATION

- 1. Assimilation of Cloud/Rain affected radiances
- 2. Recent May 2010 meeting at ECMWF on this topic (George Ohring and Peter Bauer have report). Include their recommendations into this report. Did not have much discussion from this topic at this meeting, should encourage operational agencies to send people. However, assimilation of precipitation products directly are used by other areas (non-NWP) and there are research studies ongoing to use these products in a realtime mode. (Sid Boukabara)
- 3. Timely release of Level-1 data (radiances) from new sensors to NWP agencies for Cal/Val testing, to reduce the latency time from launch-to-operations.



NEW SENSORS AND TECHNOLOGY

- 1. Geo-MW. Encourage model simulation studies showing benefit of rapid microwave for severe weather forecasting.
- 2. Continue further studies for further microwave spectral measurements, eg 118, 220, 340 GHz, etc. in the context of NWP applications and storm intensity/track predictions. Ralph Ferraro to explore.
- Status of space based radar techniques? CloudSat/ATrain studies on cloud properties ongoing since 2006. Cloud radars finding use for precip studies. Amount of light rain that is being "missed" by passive microwave. Adaptation of community models (CRTM) to simulate active radar/lidar directly (Sid as POC). Lidar/CloudSat synergy useful for precip-aerosol studies. Studies ongoing as CloudSat and PR still operating.
- 4. Long-term continuity of cloud/precip space radars. Cloud radar has shown potential for precipitation, keeps focus on new missions eg ACE, PPM.
- 5. Improved precip radar, eg 14/35/94 GHz, addition of Doppler, polarimetric measurements, with swath capability. Promote radar technologies that are able to probe closer to the surface than current PR is able to.
- 6. Lightning mapper. GOES-R, MTG, FY-4 already slated. Also support a LEO lightning mapper (GPM will not have) for finer resolution. Continue support for studies to fuse lightning data into retrievals, model assimilation, etc. Emerging science.
- 7. Encourage the maintenance of conically scanning microwave series. Lowinclination orbits are preferred. Prefer GPM-constellation at 40-degree latitude to maintain TRMM climate continuity. Continuity for SSMIS is crucial (DWSS sensor) and AMSR2/GCOM-W for climate records and operational users. Will need at least the 10 GHz on DWSS microwave to use for cross calibration with other sensors, also for soil moisture retrieval.

SPECIFIC NEW TECHNOLOGY RECOMMENDATIONS TO CGMS:

- 1. Need for geostationary microwave.
- 2. Longterm continuity of space-based radars
- 3. Longterm continuity of conically-scanning microwave imagers on operational missions
- 4. Coordination of satellite overpass times.