

LSWG Discussion

2 July 2014

No science presentations today – Would like inputs from the group on actions and plans for the coming year, to be presented at the PMM meeting in August

Topics and ideas in the rest of this presentation are based on discussions with many of you and are meant to be modified based on your feedback

Will not have a telecall in August, will get back to the regular time (first Wednesday of the month 11 AM Eastern time), starting in September

LSWG Activities: Summary

LSWG activities encompass science studies relating to microwave land surface properties, but also practical, applied studies to find how to infuse land surface characterizations into the GPM algorithms

Also has been a go-to group for sounder retrieval, database development (model-based and empirical-based)

GPM retrieval nomenclature has adopted a three-level approach, namely S0 (“surface-blind”), S1 (“surface properties can be classified”), and S2 (“surface properties can be physically modeled”)

With the database-driven, Bayesian approach adopted for GPM algorithms, essentially the final difference between these approaches relates to how the databases are built and indexed

(1) More focus on emissivity (and radar surface backscatter) from a land surface physics perspective

Since microwave land surface emissivity is not routinely measured from the surface, most LSWG studies have focused on relative comparison of emissivity estimates from various methods - land models, observations, retrievals. Very good, but only gets one so far in physical understanding.

Detailed land surface properties (e.g., structure of canopy or other components of the vegetation water content, type, terrain, temperature, soil moisture at several depths...whatever else...) are typically only available from a relatively small number of surface sites

Focus more studies on the physics underlying the surface properties, including the “dynamic” emissivity and σ_0 (rapid change upon onset of rain, snow, snowmelt, etc.)

(2) Evaluation of PMM precipitation retrievals from land surface perspective

With now both GPM and TRMM both delivering data products (and sounder retrievals not far behind), there will be a lot of satellite data that needs to be validated and intercompared now and over the coming years

Rather than examine differences and bias by the “zonal” averages or latitude bands (which makes sense for oceanic precipitation), evaluate over-land retrievals by surface properties (e.g., surface temperature, snowcover, terrain/slope, coast and snow edges, meteorological regime, etc...)

This could include (for example) both absolute validation (GV sites) and also relative comparison (PR or DPR as a reference) evaluate relative consistency amongst GPROF from the various constellation satellites

(3) Field Campaign Data

SSMIS data from GCPEX and MC3E field campaigns were used in the initial testing of GPROF; helped to identify bugs, artifacts, shortcomings, but made limited use of surface data

Exploitation of the recent field campaigns for over-land precipitation processes- iFLOODS (2013), IPHEX (2014) and OLYMPEX (2015) will be here before we know it.

Would be helpful to have a summary of what surface and a/c data is available for users (for September telecall?)

Suggest that this be a joint discussion item between Land and GV groups at PMM meeting, the needed people will be there.

(4) Examination and comparison of S0-S1-S2-based radiometer precipitation retrievals

Have not yet fully tapped into what can be done with the S1 type (e.g., surface classification approach), e.g., use of TELSEM covariance

Only a few S2 studies going on, at least that I am aware of (Sarah Ringerud's land modeling, J. Turk/L. Li physical modeling). Need more emphasis here.

Grant Petty has been the point contact for S0, but more work needed on S0, esp. ways to transfer the method to the other radiometer-only satellites

Need a framework for testing and evaluating the effect of land surface properties on the radiometer (and combined) retrieval, comparison of S1 and S2 approaches, applicable to radar, sounders as well as imagers

(5) MW Sounders

Plenty of global coverage now from ATMS, remaining MHS, SAPHIR. Work in progress. My understanding is that iMERG will use GPROF-sounder retrievals, and presumably will transport/morph GPROF-derived precipitation across sounders and imager overpasses.

Is the database structure adequate? How different can the sounder DB's be from the imager DB's? Since these are sounders, maybe need to have more than just total column vapor in the DB (e.g, add water vapor burden at couple levels) to better “key in” the match between the 183 GHz channels observations and DB simulated, else the database could be too underconstrained (“loose”)....i.e., overabundance of entries that match, both clear- and precipitating-scene

Is there anything special that needs to be done for M-T/SAPHIR (limited geographic and precipitation regimes plus huge limitations with just its six WV channels). My understanding is that SAPHIR is a key intercalibration sensor for sounder X-Cal.

(6) Database development (over land)

The database composition for imager GPROF has likely undergone changes which will be explained more the PMM meeting. My understanding is that it is mainly empirical (NMQ matchups with TB obs), and does not use the TELSEM emissivity for forward modeling

However, the sounder GPROF (crosstrack radiometers) currently uses databases built from forward modeled TB's (MMF) and is still being tested (Karen, Toshi, Chris Kidd to update and correct me here...)

Suggests a close working with the algorithm developers, it's important to handle the land properties (needed for any forward RTM) in a self-consistent fashion, without bloating the databases too much

The structure of the databases is crucial to the algorithm performance and is currently dependent upon a few key people. Suggest the development and maintenance be a joint, key action between land, radiometer, and combined working groups for PMM meeting.