

Report on the ITSC sub-group:

Remote Sensing and Modeling of Surface Properties

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Remote Sensing and Modeling of Surface Properties

Following the recommendation of the International TOVS working group, this workshop focuses on the identification of scientific challenges facing surface modeling and ways to improve the use of remote sensing observations in Numerical Weather Prediction (NWP).

Three successful meetings:

- 2006, Paris (France), Special issue in IEEE-TGRS, published in 2008
- 2009, Toulouse (France), Special issue in IEEE-TGRS, published in 2011
- 2011, Beijing (China), project of a revue book being studied

Remote Sensing and Modeling of Surface Properties

The relevant topics discussed at the workshop are:

- The assimilation of surface sensitive observations:
 - IR/MW, methods for handling the surface emissivity and temperature,
 - associated impact studies,
 - better use of satellite information to improve the analyses/forecasts (horizontal and vertical correlation, observation/background error specification),
 - assimilation trials making use of observations over land, specification of land surface parameter requirements for limited area models.
- Radiative transfer modeling:
 - VIS/IR/MW,
 - all surface types,
 - review of current available parameterization for forward modeling of emissivities.

• Instrument issues and new data:

- outcomes of surface relevant missions: (SMOS mission, etc)
- calibration issues,
- IR/MW and visible
- Emissivity/reflectivity models:
- Overview and description of available land emissivity databases/atlasses (MW and IR),
- Intercomparison/validation of physical models and retrieved emissivities (MW and IR, including land, ocean, and ice surfaces).

• Retrievals of surface parameters:

- Sea surface wind,
- soil moisture,
- canopy, water content,
- sea-ice concentration,
- snow water equivalent, etc.
- surface emissivity/reflectance spectra.
- Etc

Some of the conclusions from the last meeting:

- Several studies on the assimilation of surface sensitive channels over land (IR, MW) were reported (e.g. Meteo-France)
- RTTOV-10 emissivity climatologies were found useful by the community to help assimilating remote sensing observations ==> sharing models and data for the benefit of a large community should be encouraged
- Emissivity modeling progress has been reported (in the framework of CRTM, over several surface types: sea ice, snow, etc)
- A focus should be made on the estimation/evaluation of the surface temperature (we've got few contributions on the subject)
- Assimilation of data over land surfaces are still challenging surfaces but we must also consider the snow and ice surfaces .
- inter-comparison studies (emissivity): very difficult to compare products, the comparison is application dependent ==> such an exercise is very instructive and should be promoted. (some work initiated for the emissivity, clouds, surface temperature).
- Since then, an extensive intercomparison effort (of emissivity and Tskinx Emiss) has been undertaken under the GPM framework (recognizing the importance of the surface signal in the accurate estimate of the rain fall rate over land). Effort led by R. Ferraro.

The last meeting presentations
are available from:

<http://cimss.ssec.wisc.edu/itwg/groups/rtwg/meetings/sfcem/2011/>