



Towards Quantitative Ocean Precipitation Validation

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A thorough knowledge of global ocean precipitation is an indispensable prerequisite for the understanding and successful modelling of the global climate system as it is an important component of the water cycle. However, reliable detection of quantitative precipitation over the global oceans, especially at high latitudes during the cold season remains a challenging task for remote sensing and model based estimates. Quantitative ship validation data using reliable instruments for measuring rain and snowfall hardly exist but are highly demanded for ground validation of such products.

The satellite based HOAPS (Hamburg Ocean Atmosphere Parameters and Fluxes from Satellite Data) climatology contains fields of precipitation, evaporation and the resulting freshwater flux along with 12 additional atmospheric parameters over the global ice-free ocean between 1987 and 2005. Except for the NOAA Pathfinder SST, all basic state variables are calculated from SSM/I passive microwave radiometer measurements. HOAPS contains three main data subsets that originate from one common pixel-level data source. Gridded 0.5 degree monthly, pentad and twice daily data products are freely available from www.hoaps.org.

Especially for North Atlantic mid-latitude mix-phase precipitation, the HOAPS precipitation retrieval has been investigated in some depth. This analysis revealed that the HOAPS retrieval qualitatively well represents cyclonic and intense mesoscale precipitation in agreement with ship observations and Cloudsat data, while GPCP, ECMWF forecast, ERA-40 and regional model data miss mesoscale precipitation substantially.

As the differences between the investigated data sets are already large under mix-phase precipitation conditions, further work is carried out on snowfall validation during the cold season at high-latitudes. A Norwegian Sea field campaign in winter 2005 was carried out using an optical disdrometer capable of measuring quantitative amounts of snowfall over the ocean even under high wind speeds. Results show that collocated HOAPS data compares well to the in-situ data set for these cases.

This calls for a systematic effort to establish such a disdrometer based ground validation precipitation data set in the Nordic Seas. This new project embedded in the Integrated Climate System Analysis and Prediction (CliSAP) of the University of Hamburg will be presented. Optical disdrometers will be mounted onboard three Norwegian Coast Guard ships for five successive cold season's half-year periods beginning in 2009. The ships frequently operate in the Nordic Seas in the area of the Lofoten Islands, Bear Island, Svalbard and Jan Mayen. This data base will be part of the GPM ground validation activities. Statistical analysis and comparison of this data set against collocated passive microwave data will also involve the inclusion of SSMIS data into HOAPS in close cooperation with IPWG.