SEAFLUX

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URL: www.gfdi.fsu.edu/SEAFLUX

SEAFLUX is a project dedicated to producing climatological data sets of air-sea fluxes of heat, moisture, and momentum, under the auspices of the GEWEX Radiation Panel. The Third SEAFLUX Workshop was recently held at Wakulla Springs, Florida on March 2 -3, 2006 with 28 participants from the Americas, Europe and Asia. Funding for the workshop itself was supplied by the NOAA Office of Climate Observation.

The workshop consisted of one and a half days of overview presentations combined with time for discussions. The overall goals of the presentations were to discuss issues associated with the SEAFLUX Intercomparison Project, the issues associated with the retrievals of various parameters necessary for the production of air-sea fluxes, new directions in bulk flux algorithms, and issues associated with gridding, blending, and assimilation of data. Further scientific presentations covered recent analyses of variability of satellite flux data sets, relationships between satellite-derived fluxes and models, and in situ data needs for validation and assimilation into the satellite flux fields. A final workshop report is being produced and can be obtained from the SEAFLUX website. Several flux products are being produced by the members of SEAFLUX, including both operational and historical products.

The highlights of the scientific results presented include:

- There is some benefit to the use of NWP or reanalysis products for estimations of near-surface specific humidity, but especially in the tropics it creates a very homogeneous field. Other very promising satellite-only methods include the use of multi-sensors including sounders to determine near surface air temperature and specific humidity. Regional and seasonal biases still exist in the products, and more data is needed at high and low extremes of temperature and humidity.
- The use of satellite-derived surface flux fields leads to improvements in modeling of the equatorial Pacific and other regions as compared to model simulations using ECMWF fluxes. The IPCC models show too little variability in tropics, and have bimodal latent heat flux populations (Figure 1).
- Sea surface temperature fields from satellite products can vary by over 1 ^{o}C on average, with seasonal and regional (especially over western boundary currents) biases. The use of skin temperature is important, and diurnal warming is a factor in flux determination.
- Several bulk flux parameterizations work well in the lower wind speeds cases, and the use of a displacement height with wave information greatly improves flux estimation at higher wind speeds.
- There are alternative methods to the bulk parameterizations for latent heat flux retrievals on longer time scales that can be used for comparisons of the budgets.
- The use of multiple sensors and multiple times requires careful work with gridding and blending of the products, but can significantly reduce errors.
- More in situ data is needed at high wind speeds. More data is available from ships of opportunity, and there is some high-quality data available that can be used for comparison, algorithm development.
- Several different satellite products show evidence of increased evaporation over the last 15 years, which seems to be dependent on wind speed and is consistent with a strengthened Hadley circulation. Precipitation does not display a significant trend.

Some of the high priority recommendations from the workshop include:

- Create several test beds of data for developers of satellite-derived surface fluxes. These include: wave data for use in developing parameterizations for wind speeds on the order of 20 – 30 m s-1, sea

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surface temperature diurnal warming data sets to investigate effects on fluxes and for inclusion in SST products, monthly evaporation budgets based on hydrologic balance, and longer time series of near surface air temperature and specific humidity from sounder data.

- Encourage further in situ measurements of fluxes, including wave data, especially in regions of high winds and ocean fronts such as western boundary currents. Continue to make such data widely available to the SEAFLUX community (these data can be found online at the SEAFLUX web page).
- Continue to explore intercomparisons, and encourage continued understanding of differing flux data sets by using ocean models to study oceanic energy transport and sea surface temperatures.
- Continue to update the SEAFLUX web page with further details of different satellite data sets and their characteristics for general community dissemination.
- Encourage continued research into methods of blending and gridding and error characterization of fields based on multiple satellites, multiple time and spatial resolutions.
- Identify cause of differences between data sets and models, in long term and zonally averaged latent heat fluxes.
- Ensure that the community is aware that such data and products as ocean vector winds, microwave imagers and sounders, and sea surface temperatures continue with a fairly high spatial and temporal sampling in order to insure our ability to determine correct variability in the surface fluxes.

The recommendations have produced an action item list that will be tracked and discussed at the next SEAFLUX Workshop, which is now tentatively set to coincide with the 2007 EUMETSAT Meteorological Satellite Conference and the 15th AMS Satellite Meteorology and Oceanography Conference in Amsterdam, September 24 – 28, 2007.

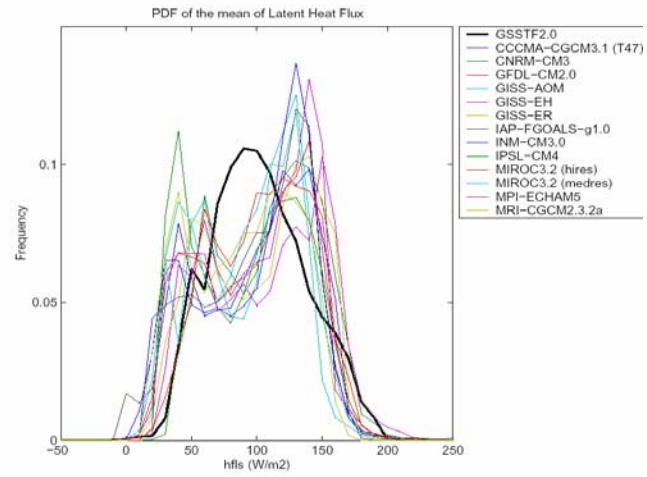

Figure 1. PDF of the mean field of latent heat flux from 1988 – 2000, from the Goddard satellite flux data set (GSSTF2.0) and the IPCC models (from A. Romanou, W. B. Rossow, and R. Roehrig).