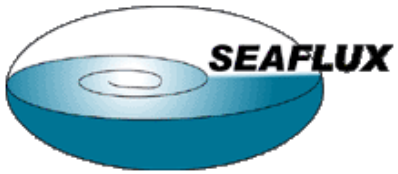
Ocean wind and other near-surface properties from SSMI

Carol Anne Clayson
Florida State University
Department of Meteorology
Geophysical Fluid Dynamics Institute

2010 Workshop on Climate Data Records from Satellite Microwave Radiometry
March 22-24, 2010
Silver Spring, MD



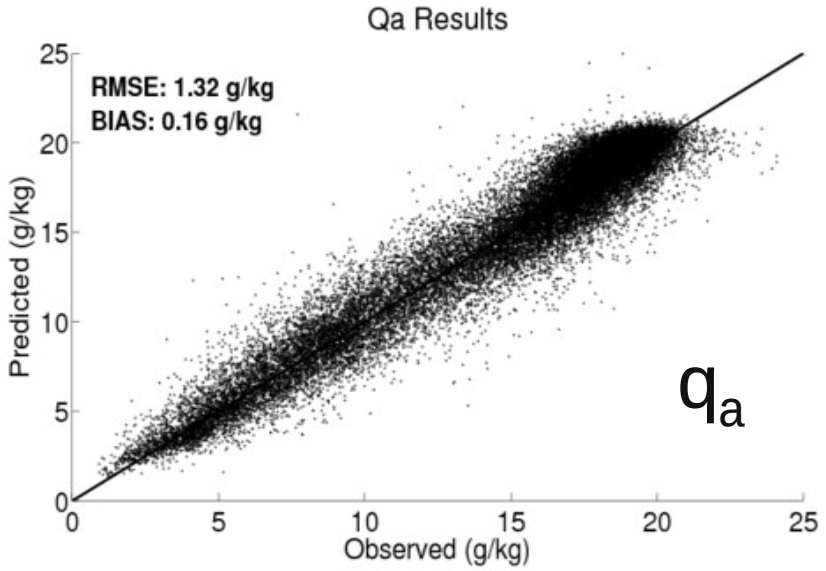
SeaFlux Overview

- Program initiated under the WCRP Global Energy and Water Experiment (GEWEX) Radiation Panel
- SeaFlux Project has the following elements:
  - Provide library of in-situ datasets from research ships, buoys, SOP
  - Provide library of available flux datasets, co-located with in situ datasets and also converted to equal area for comparisons
  - Evaluation/improvement of bulk turbulent flux models
  - Evaluation and improvement of methods for air temperature and specific humidity
  - Evaluation of global flux products in context of applications
  - Production of high-resolution skin SST including diurnal cycle
  - Production of open-ocean global high-resolution (0.25°, 3 hourly) turbulent flux dataset
- Just completed joint US CLIVAR/SeaFlux Workshop, roughly 60 participants, including representatives from all major flux products

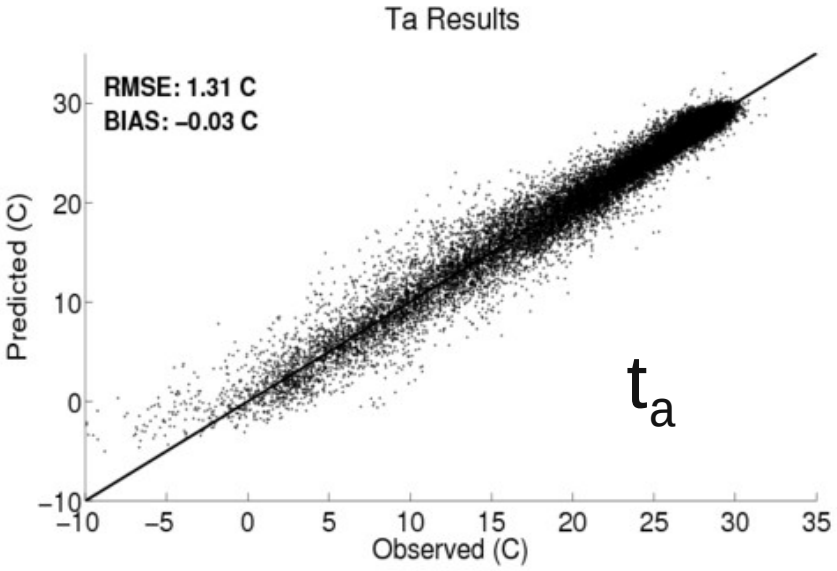
Version 1.0 of SeaFlux Climatological Data Set

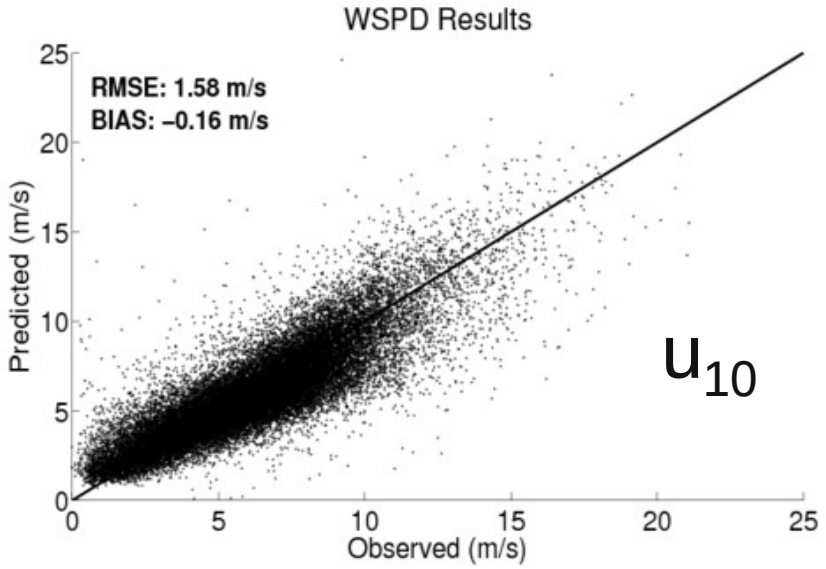
- Uses SSM/I inputs only for entire data set
  - Currently using CSU calibrated values; will include earlier values when they are in similar format (extending dataset back to mid-1987)
- Currently covers Dec 1997 – 2006
- q_a and t_a
  - Uses Roberts et al. (2010) neural net technique
  - Gap-filling methodology – 3 hour but roughly 50 km resolution
- Winds: NCDC product
- Uses version 1.0 SeaFlux Diurnal SST
- Uses neural net version of COARE

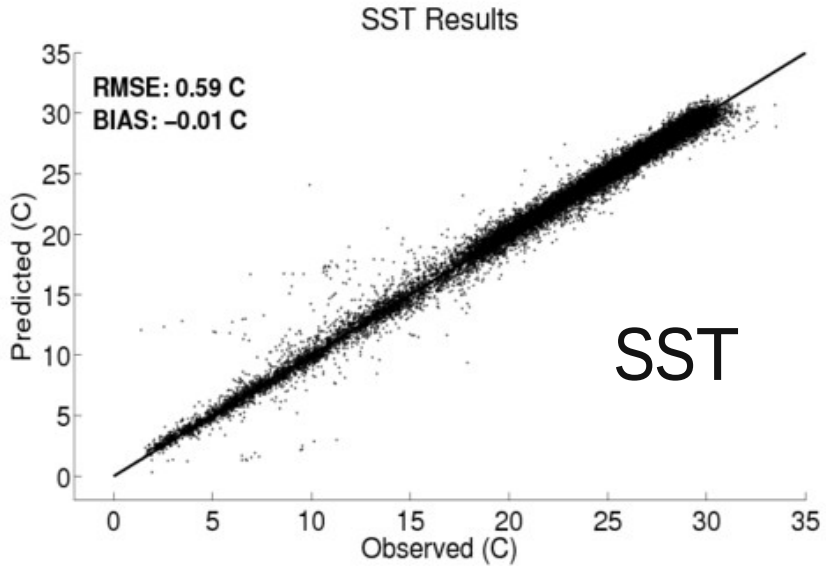
Neural Network Improvements



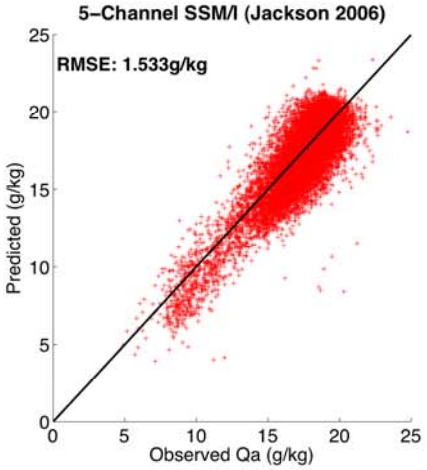
a

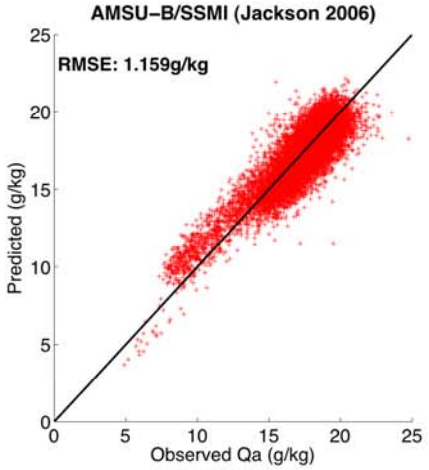


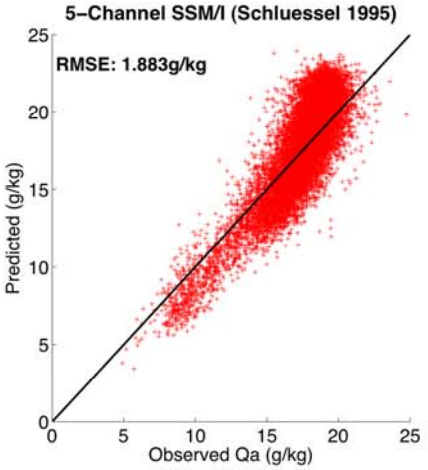


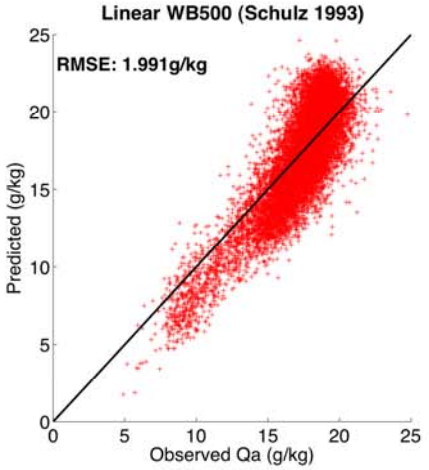


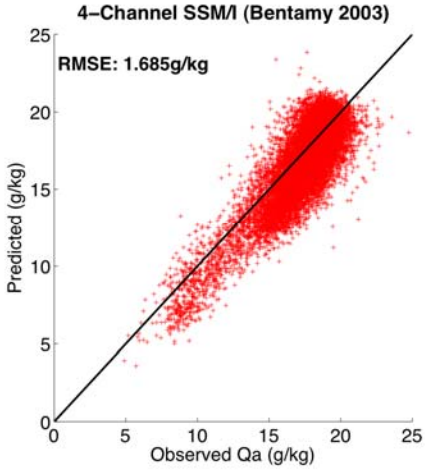
Retrievals of q_a

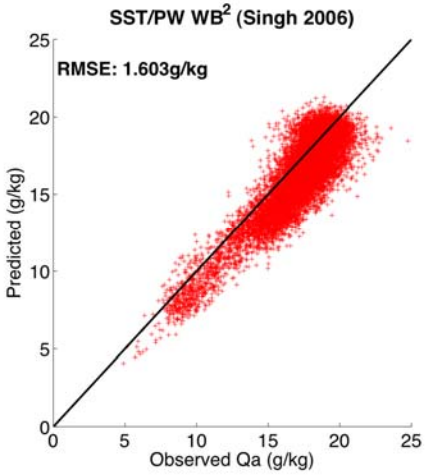


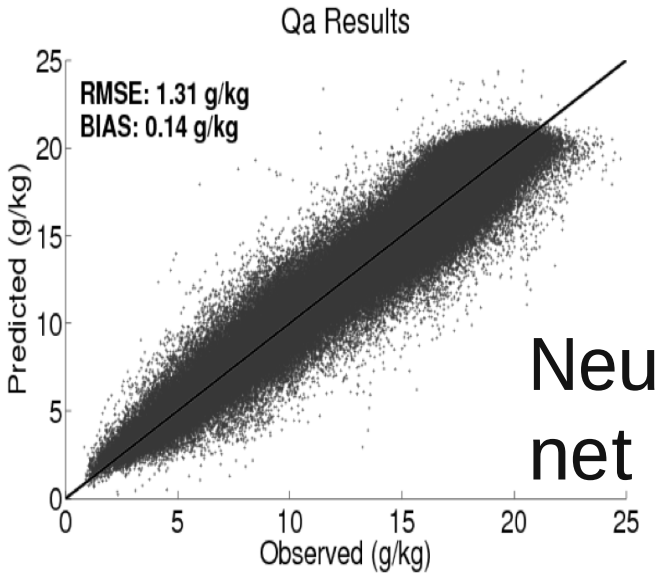






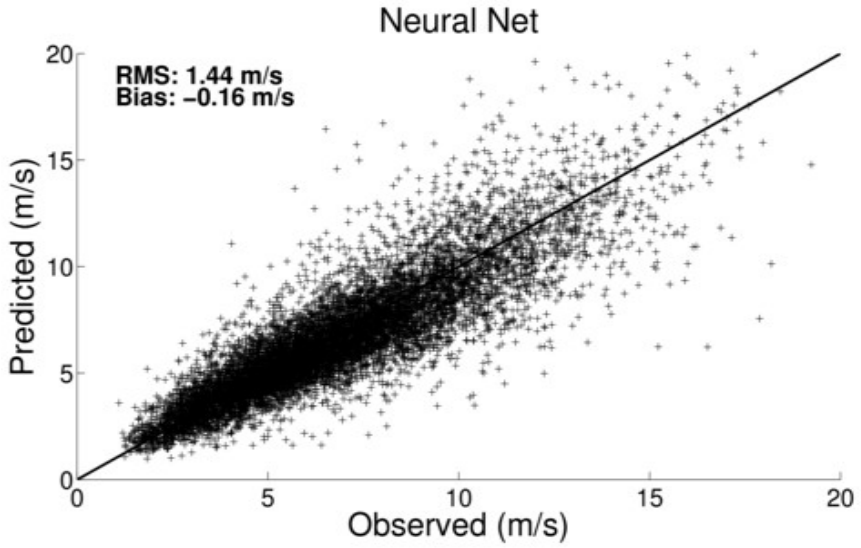


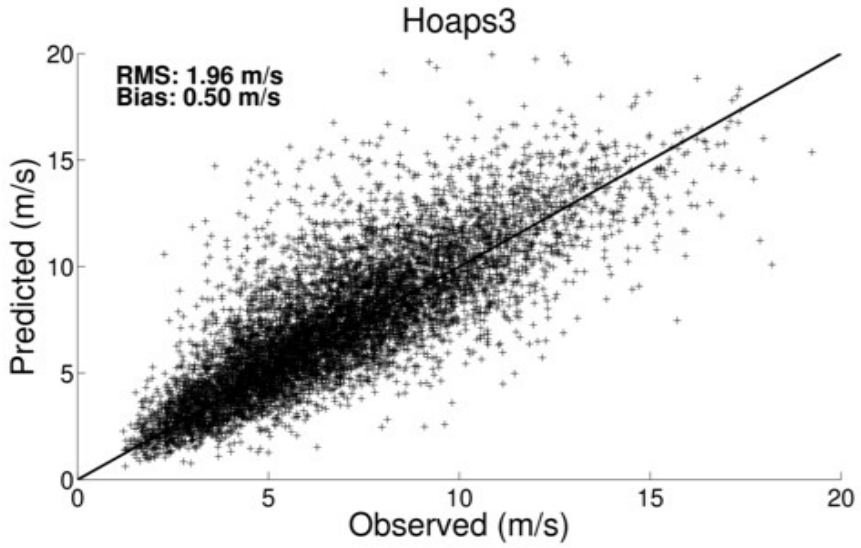


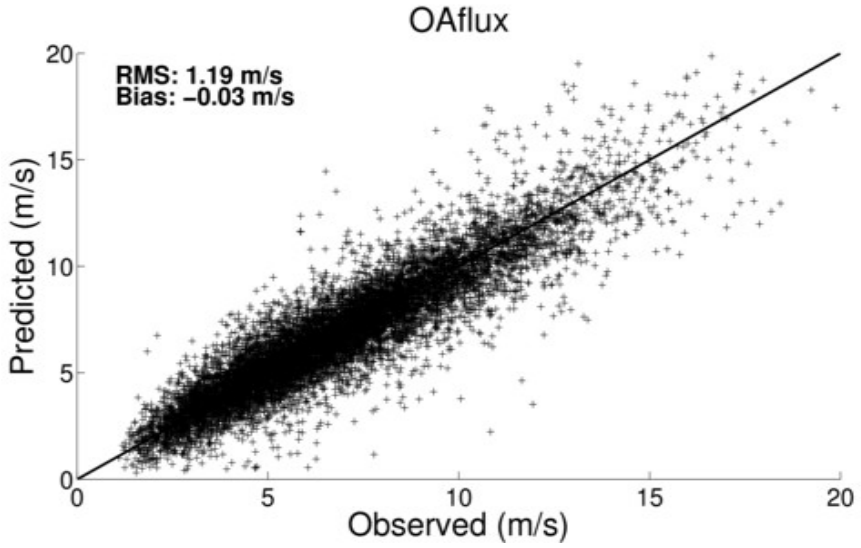


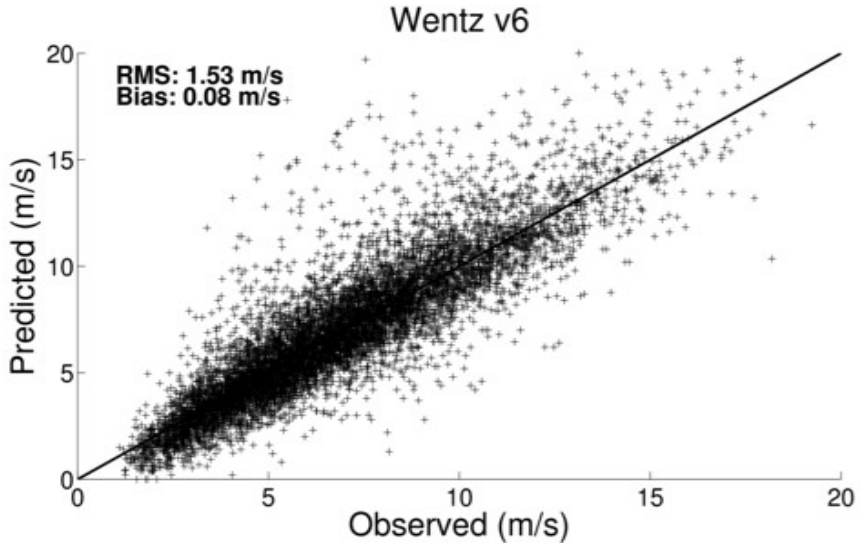
Neural net

A closer look at the winds

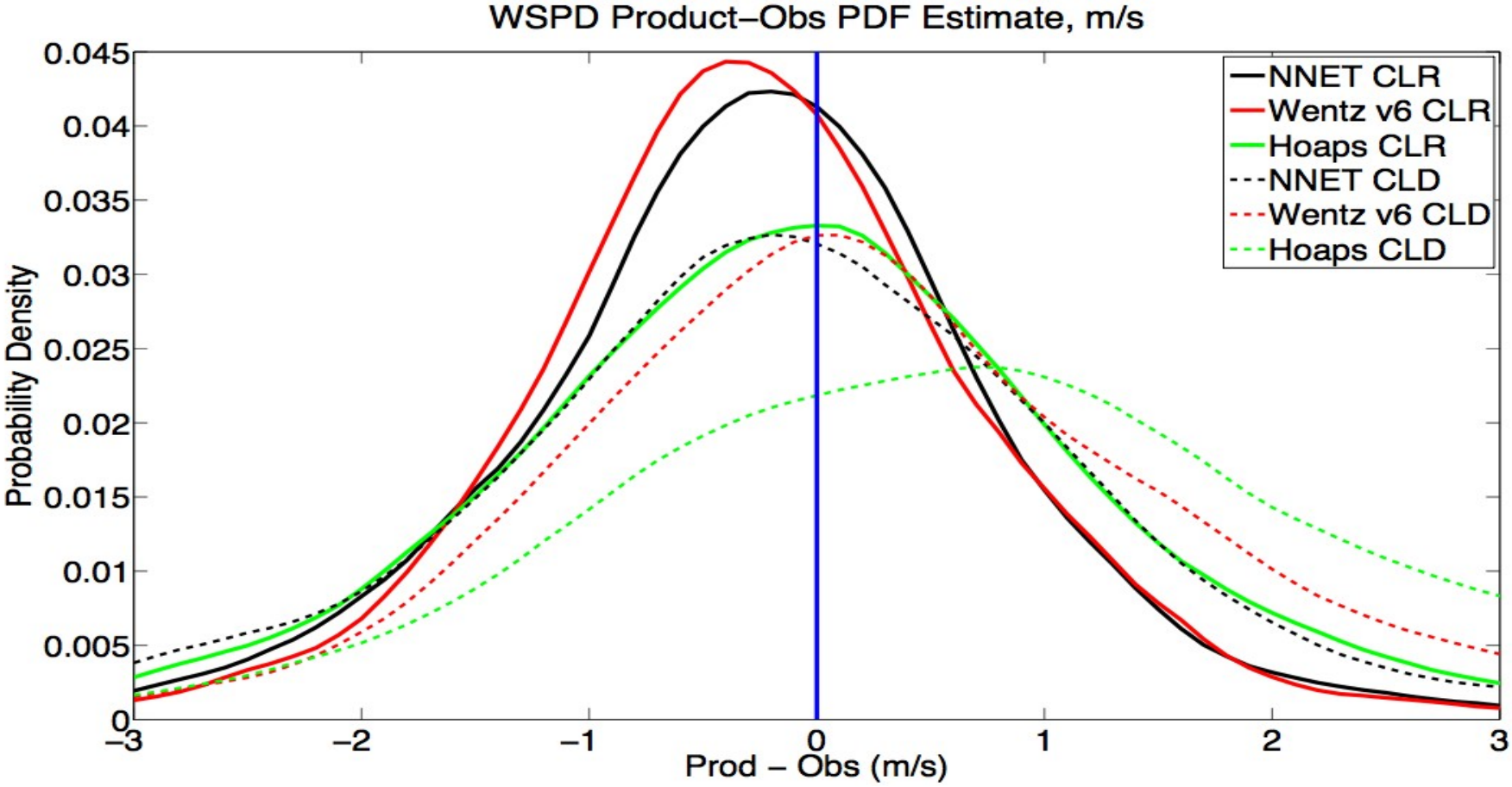






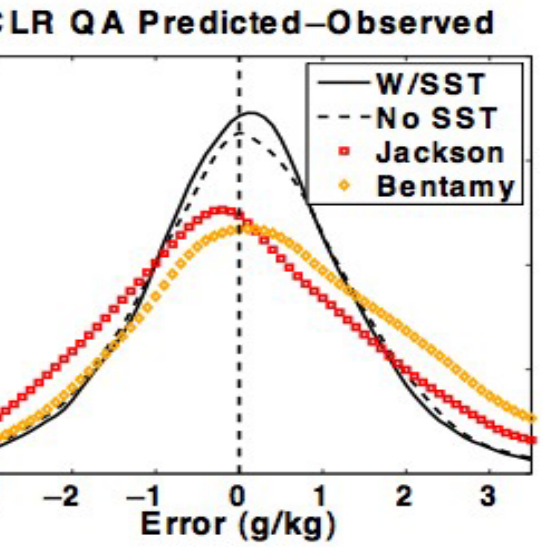


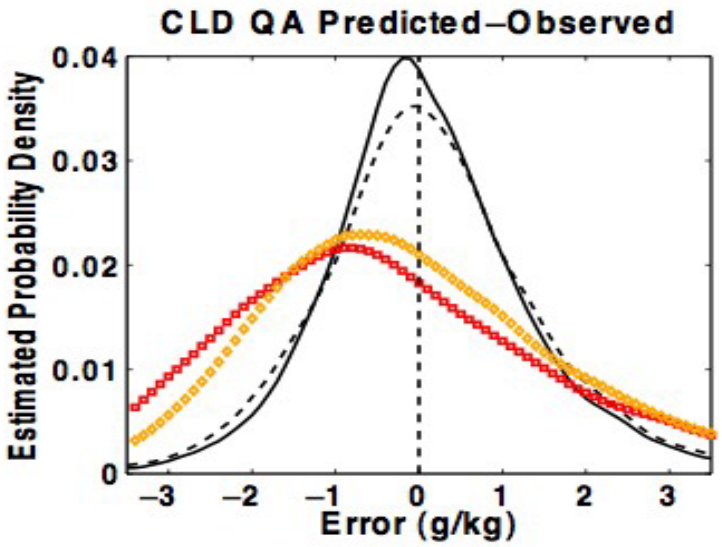
Cloudiness effects on wind speed

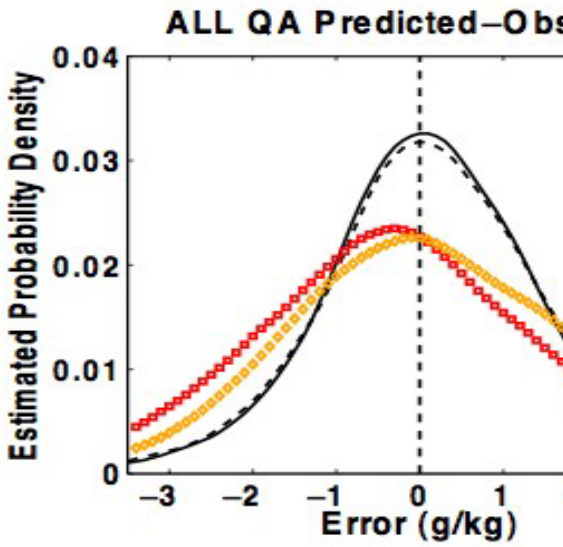


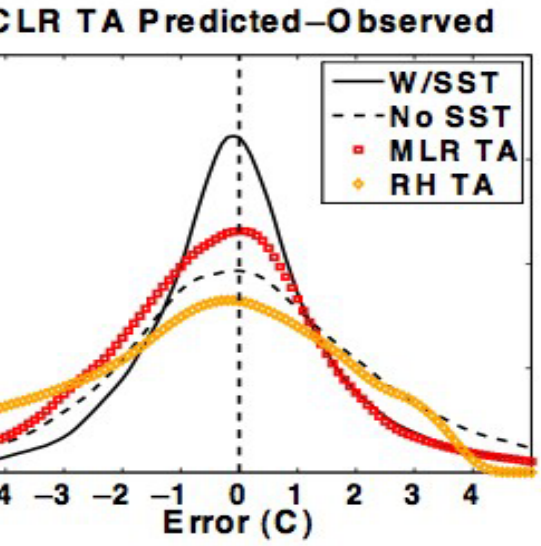
•Additional frequencies with varying cloud liquid water sensitivities would improve retrievals

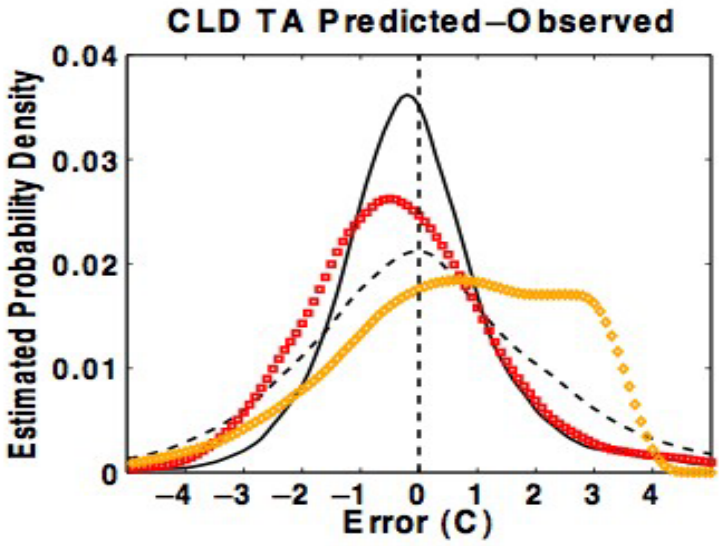
Cloud liquid water effects on T_a, q_a

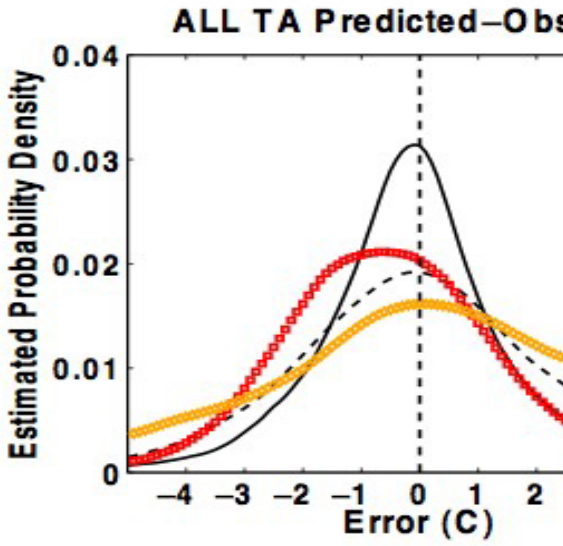




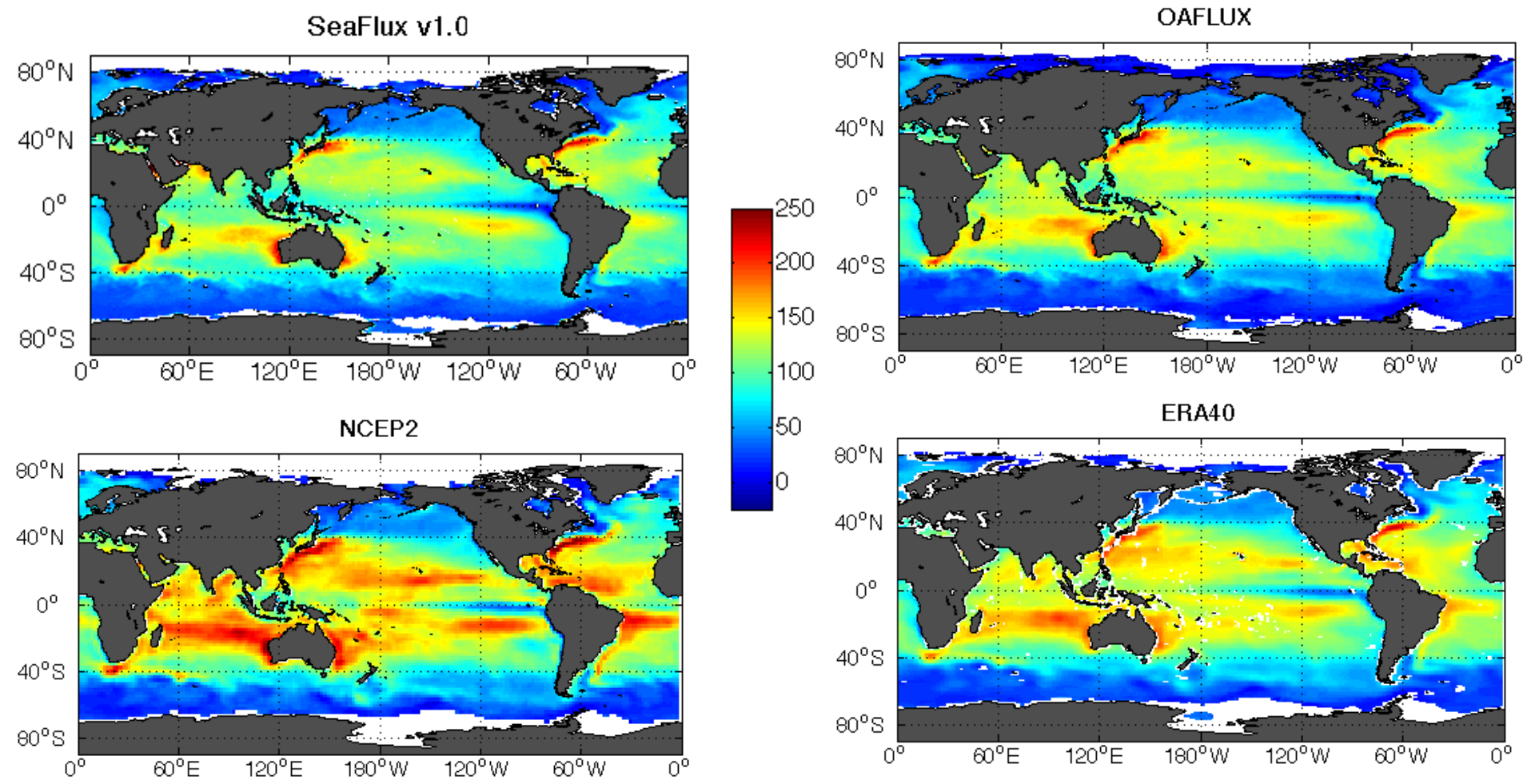




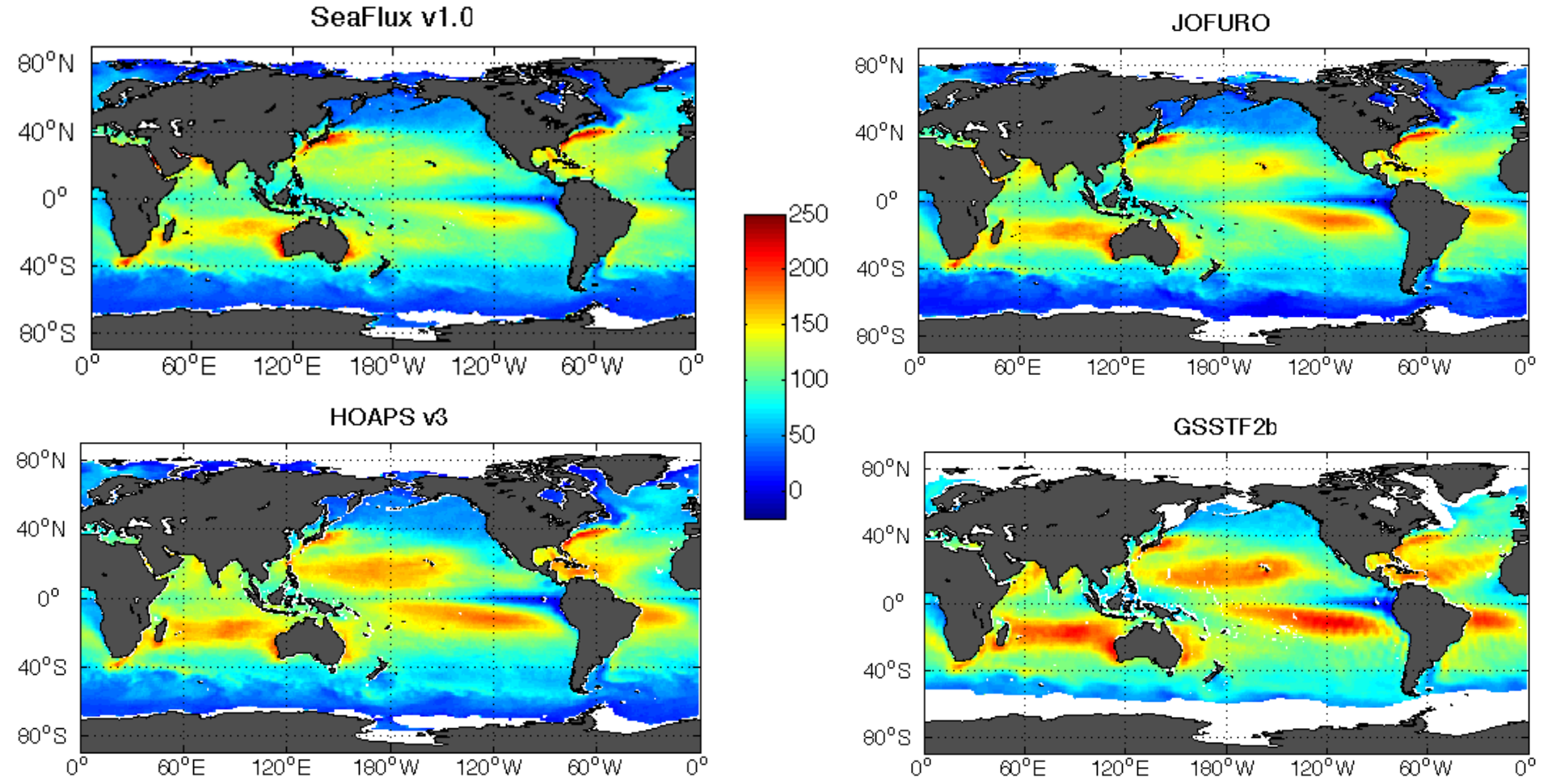




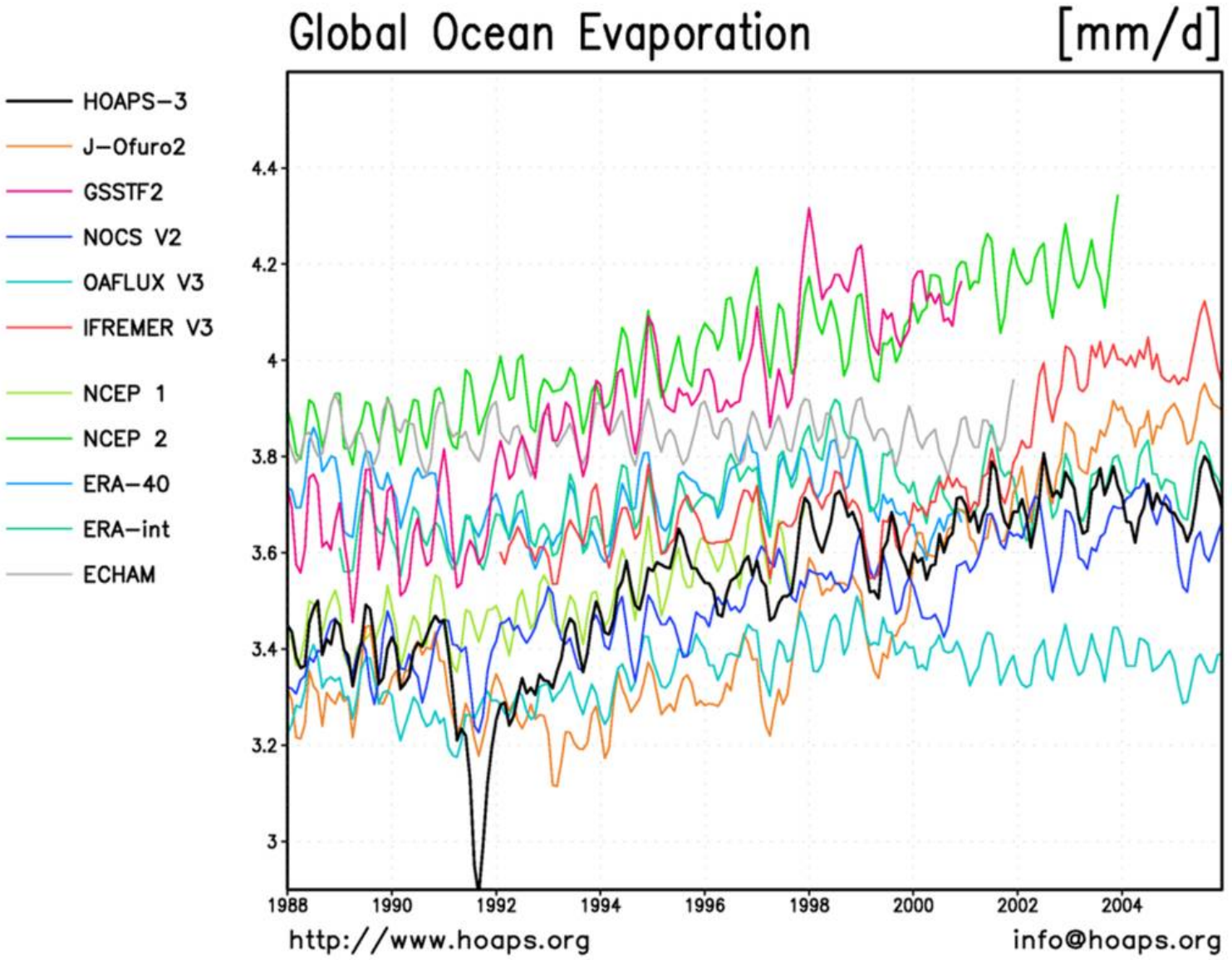
Latent Heat Flux: 1999



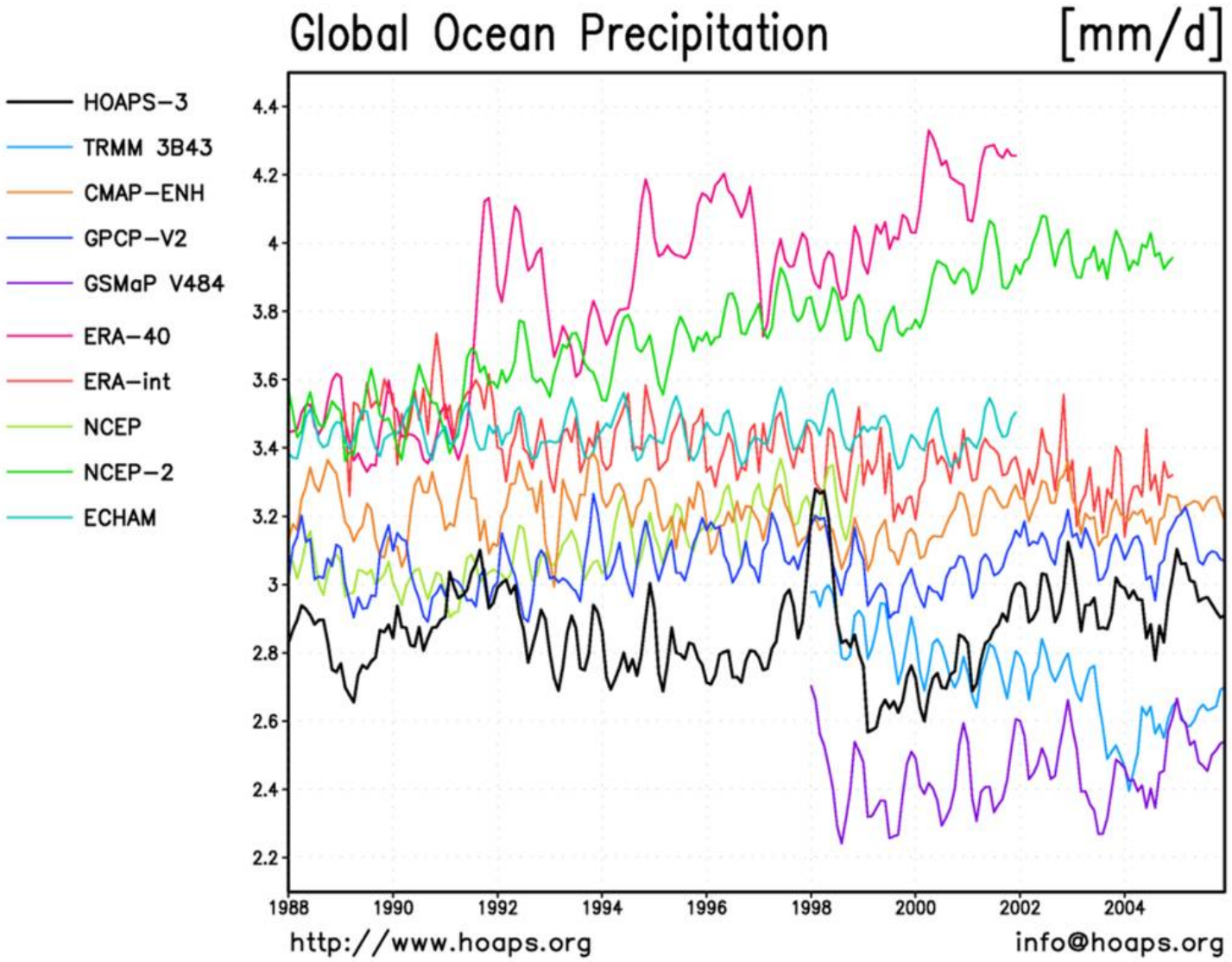
Latent Heat Flux: 1999



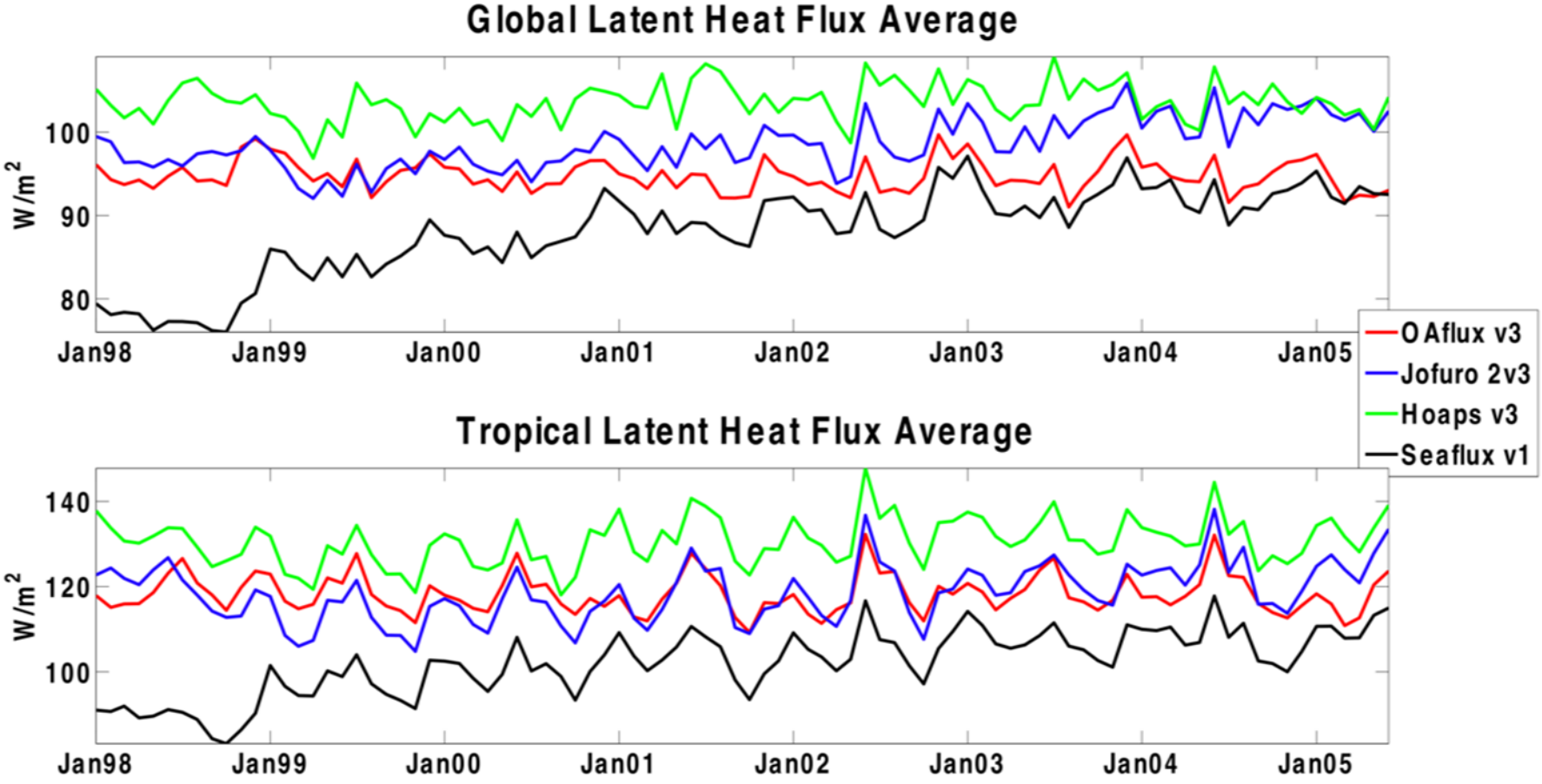
Evaporation trends



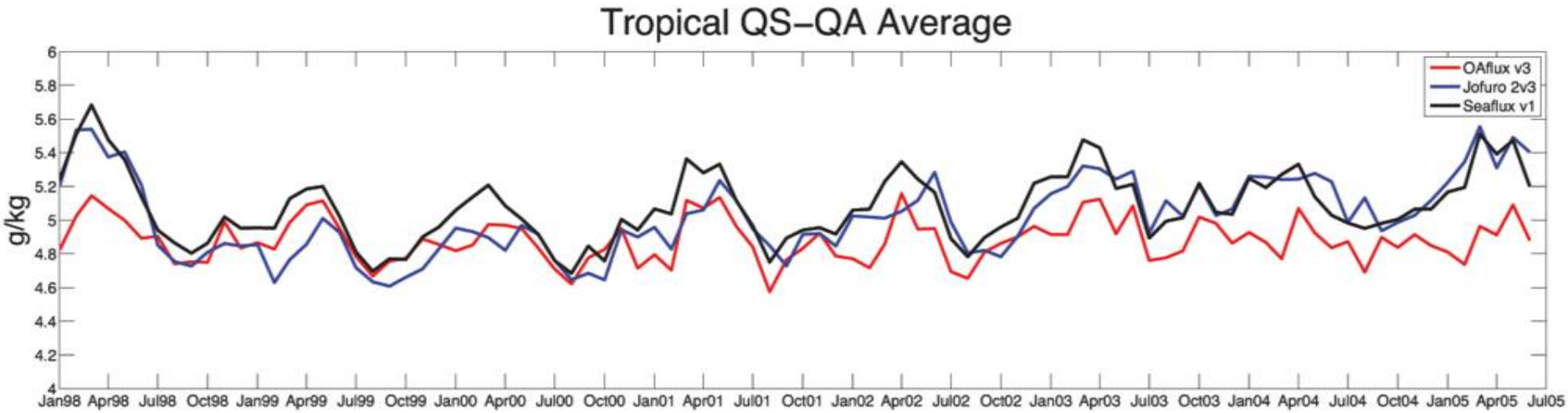
Precipitation trends

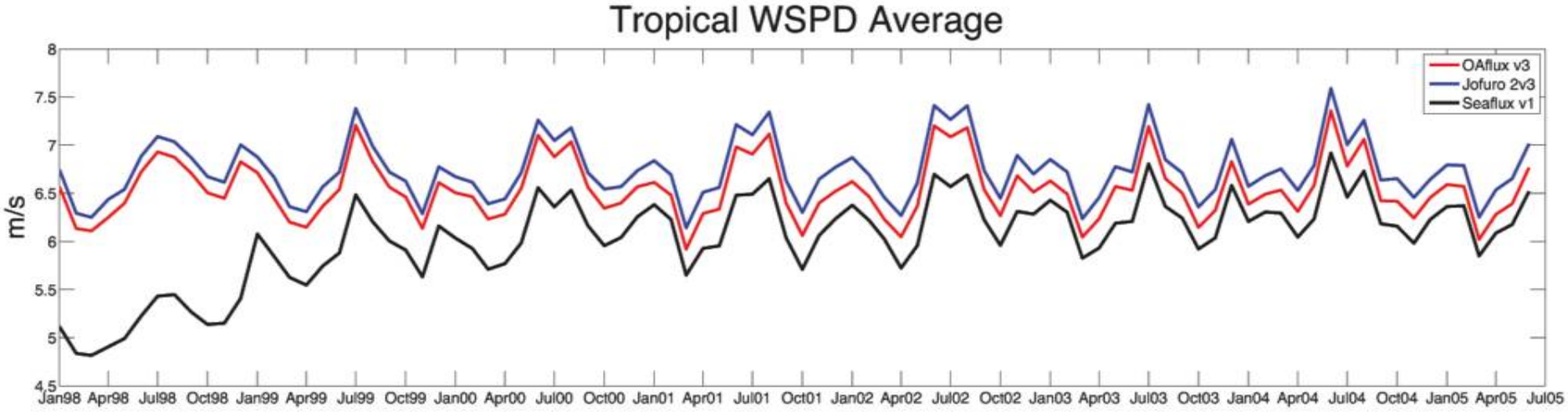


SeaFlux initial trends . . .

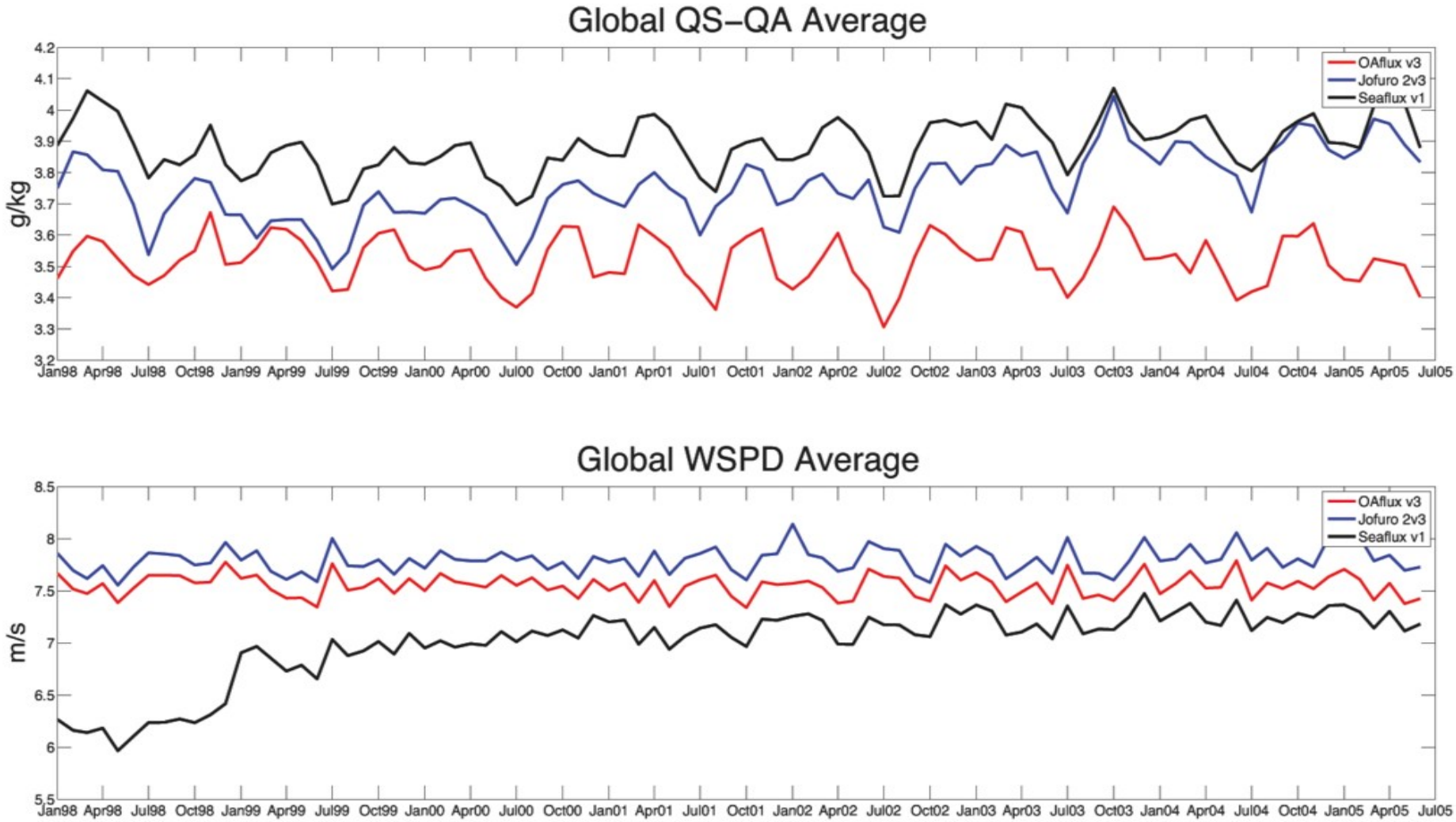


Tropical trends

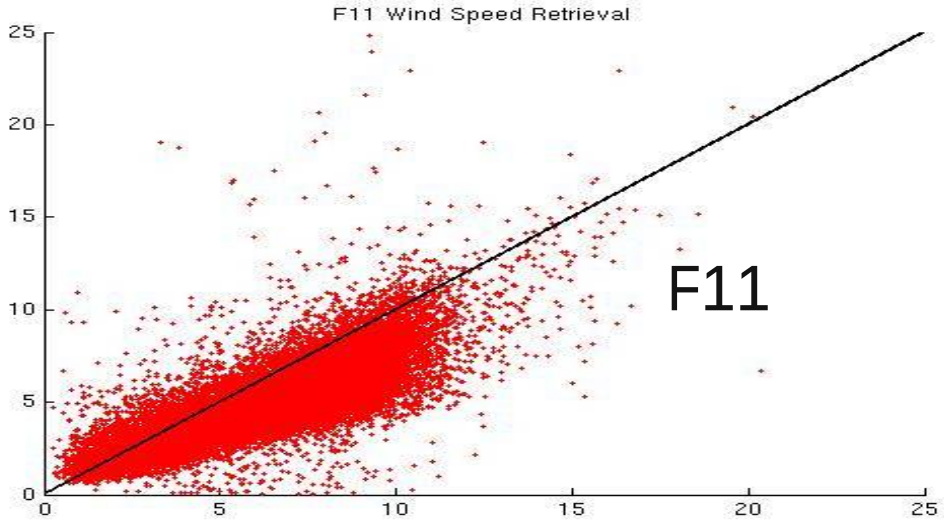


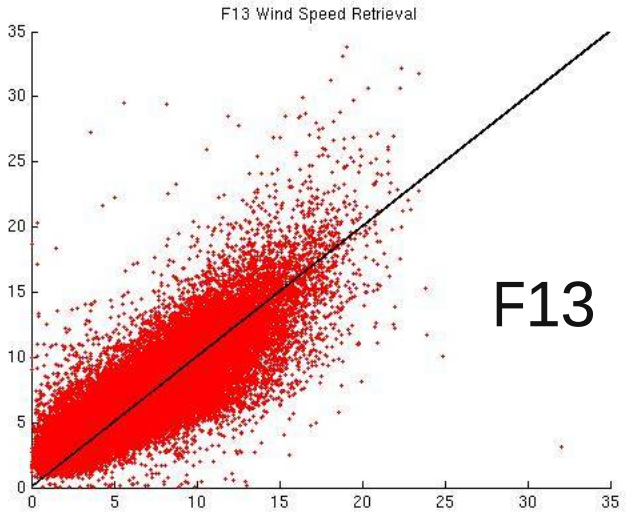


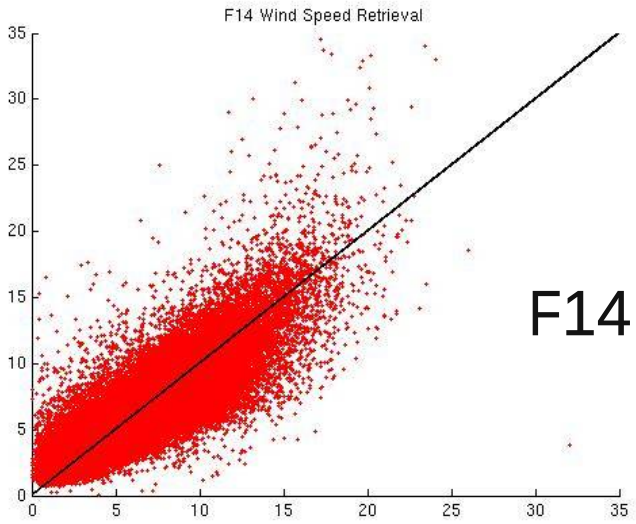
Global trends

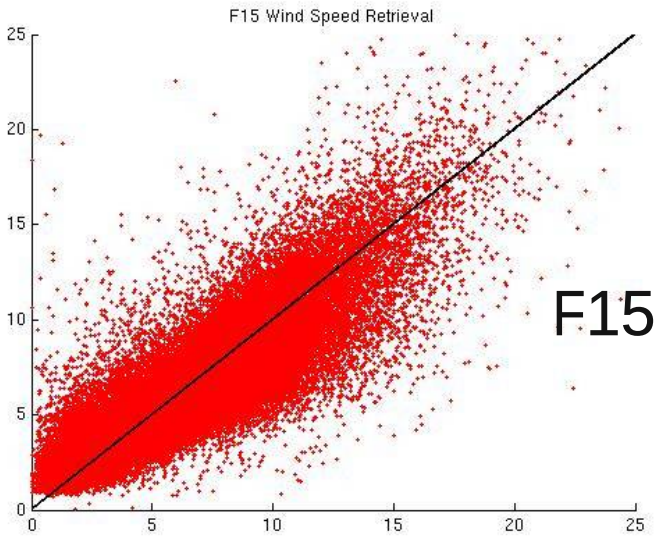


Winds from intercalibrated satellites

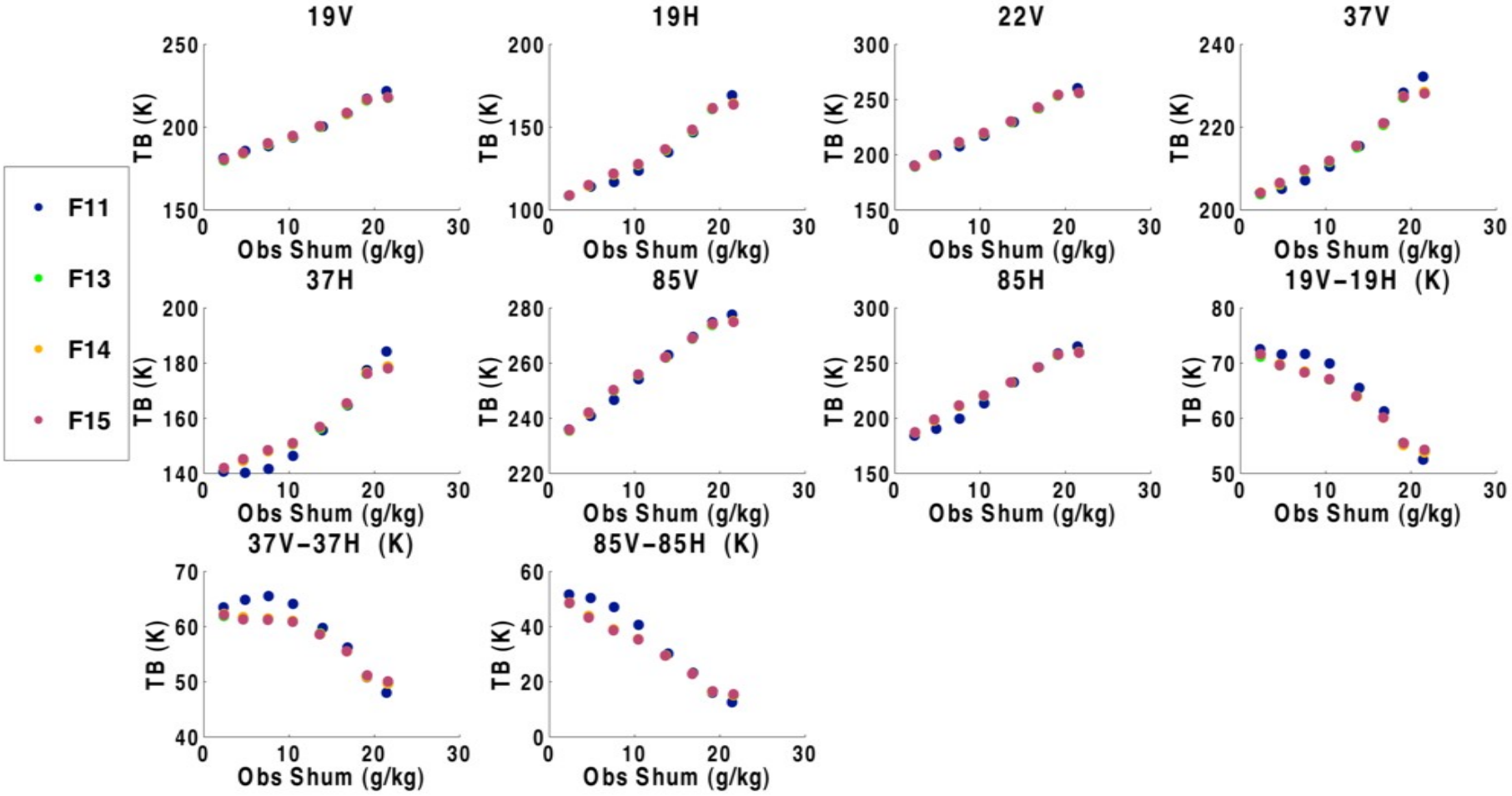




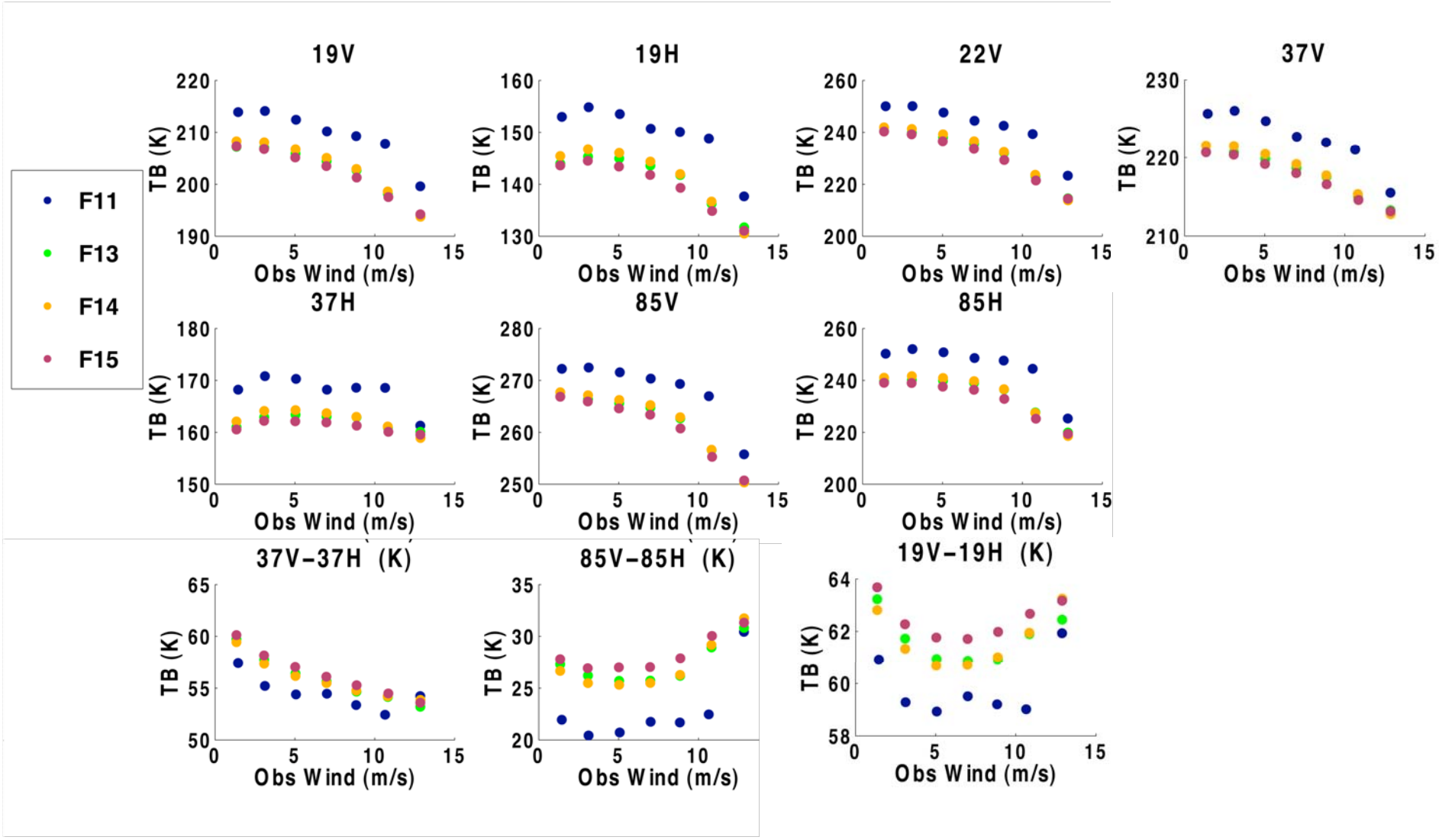




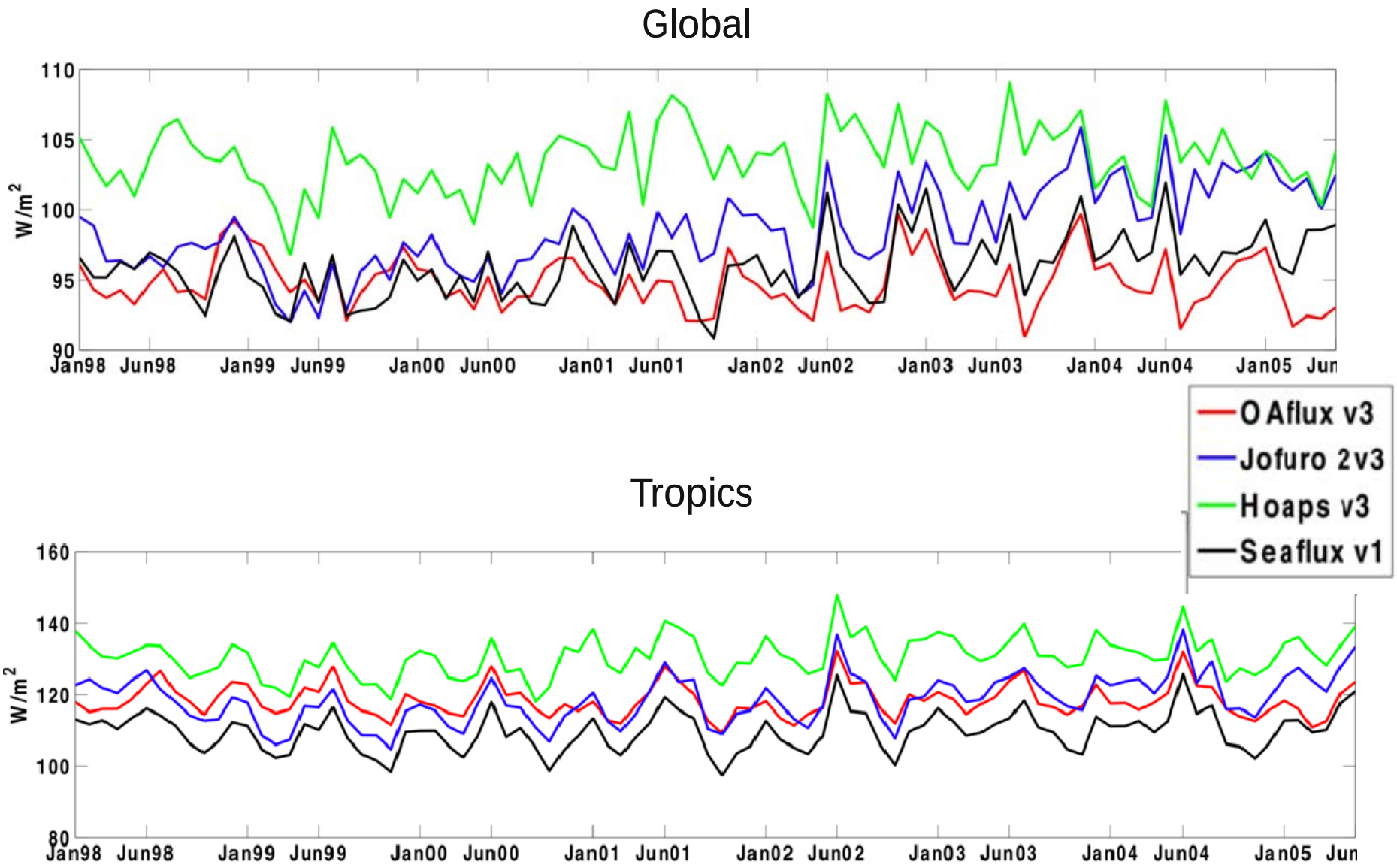
SSM/I Channels vs in situ: surface humidity



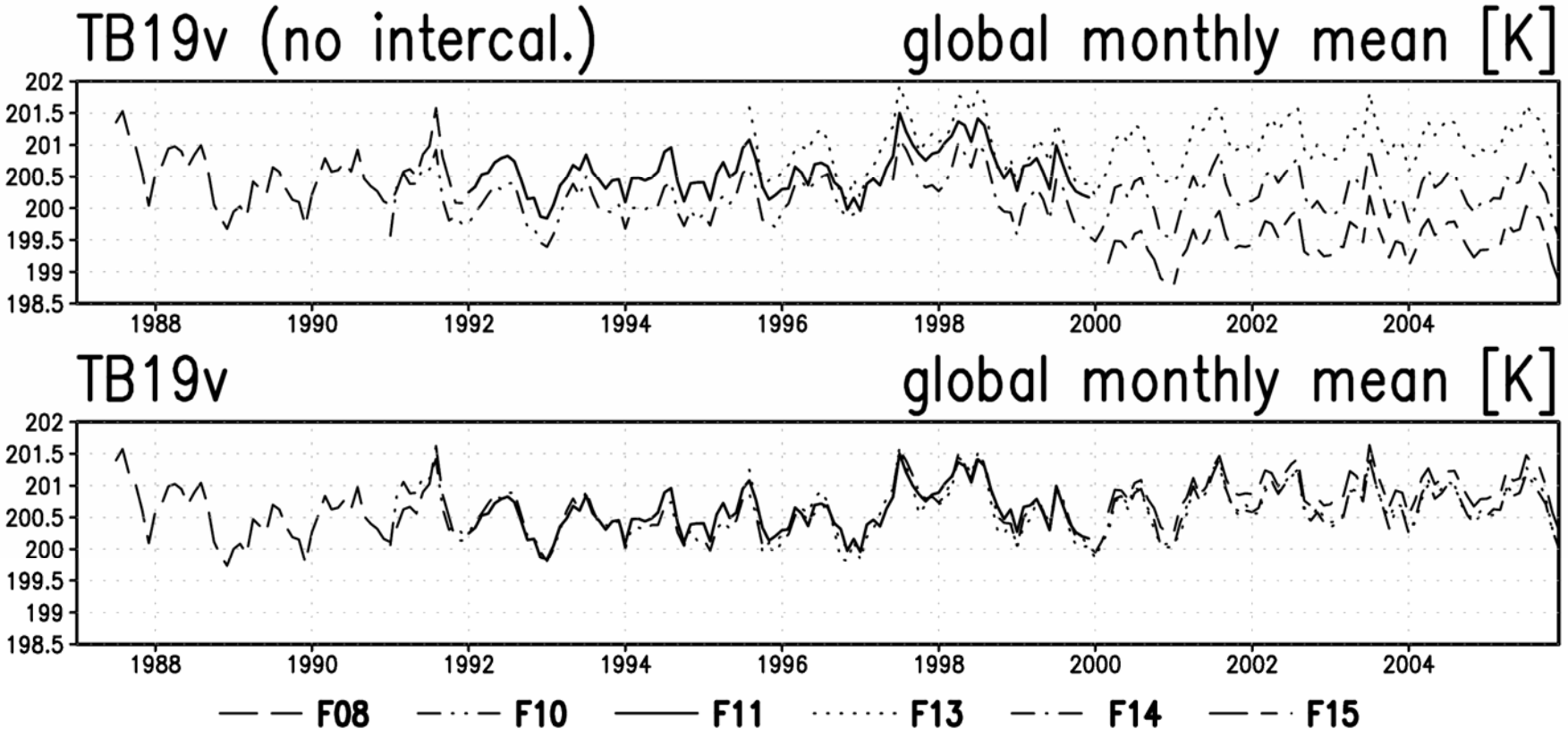
Channels vs in situ: winds



Trends in LH Flux with NCDC winds

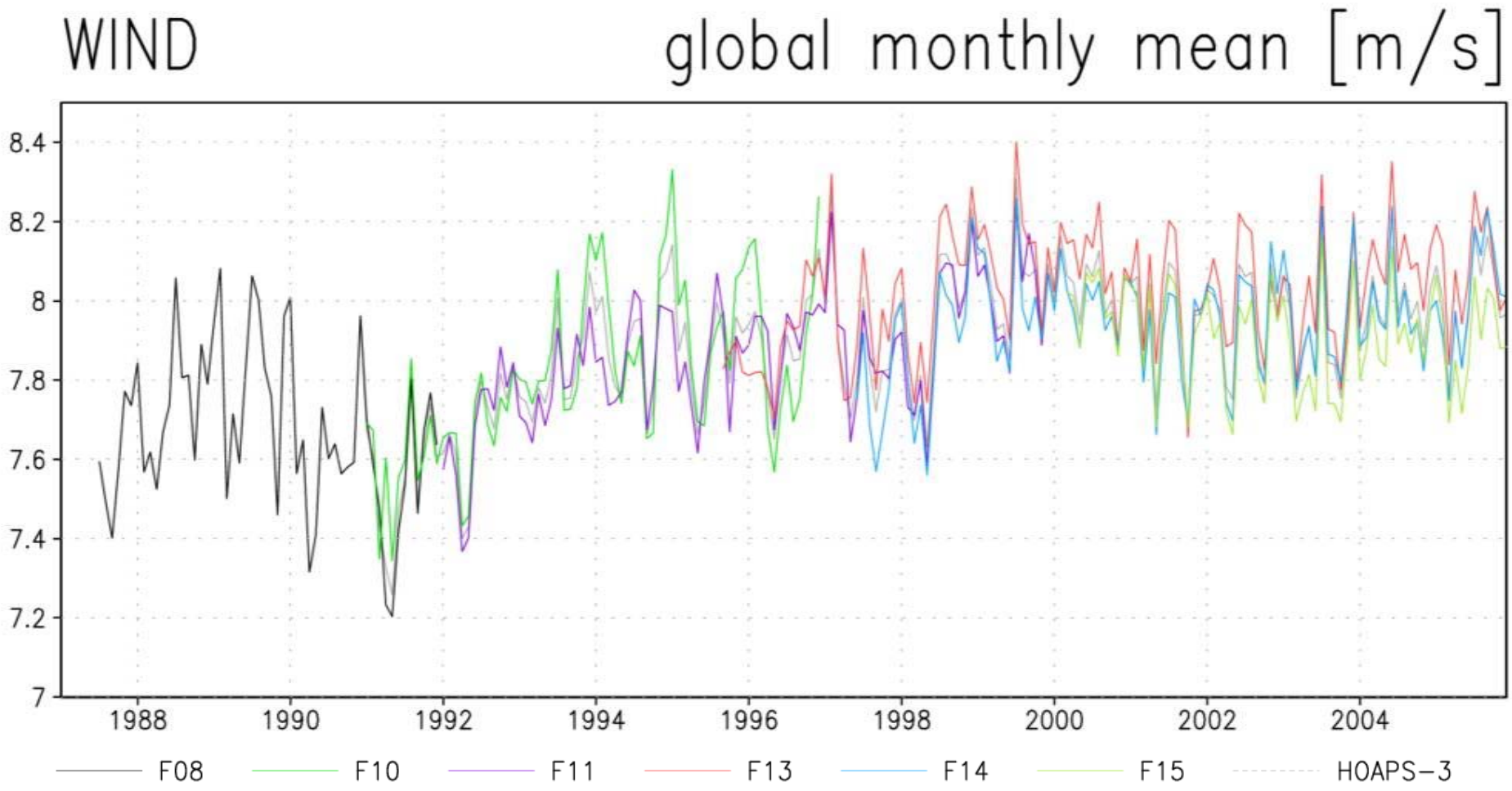


SSM/I Inter-calibration



From Axel Andersson, CM-SAF

HOAPS-3 Wind Speed



From Axel Andersson, CM-SAF

What's next

- Further iterations and discussions regarding calibration with CSU
- If possible, will get intercalibrated brightness temperatures from RSS and HOAPS, and compare resulting winds, etc.
- Find out what JOFURO, IFREMER are doing for their base brightness temperatues

- We must get to the bottom of this: what is causing the trends? Is it real? Is it our algorithms? Is it the brightness temperatures?