PROGRESS REPORT

Award Number:	NA10NES4400001
Award Period:	07/01/2010 - 06/30/2013
Project Title:	The Development of a 20-Year Database of Ocean Surface and Near-Surface Properties Suitable for Climate Analysis
Recipient Name:	Florida State University
FSU PI:	Mark Bourassa
Reporting PI:	Carol Anne Clayson (at WHOI)

The subcontract for the WHOI transfers was put in place in mid-December. Thus there were a few months of delay in getting funding, but we are making good progress as outlined below. In the interim, a new data server and processor was set up and is live at WHOI, with much expanded data storage. This has allowed us to work on an evaluation of multiple calibrated brightness temperature datasets, as described below. We have also now in place the new SeaFlux web page (seaflux.org), which is scheduled to go live on February 1st. This has now improved access to the SeaFlux datasets (the SeaFlux v 1.0 dataset, which uses the CSU brightness temperature dataset as was available at the time, covering the period of 1998 through 2007). These were previously only available on an "as requested" basis, but will now be widely available while we work on the full time period version that is required for this work.

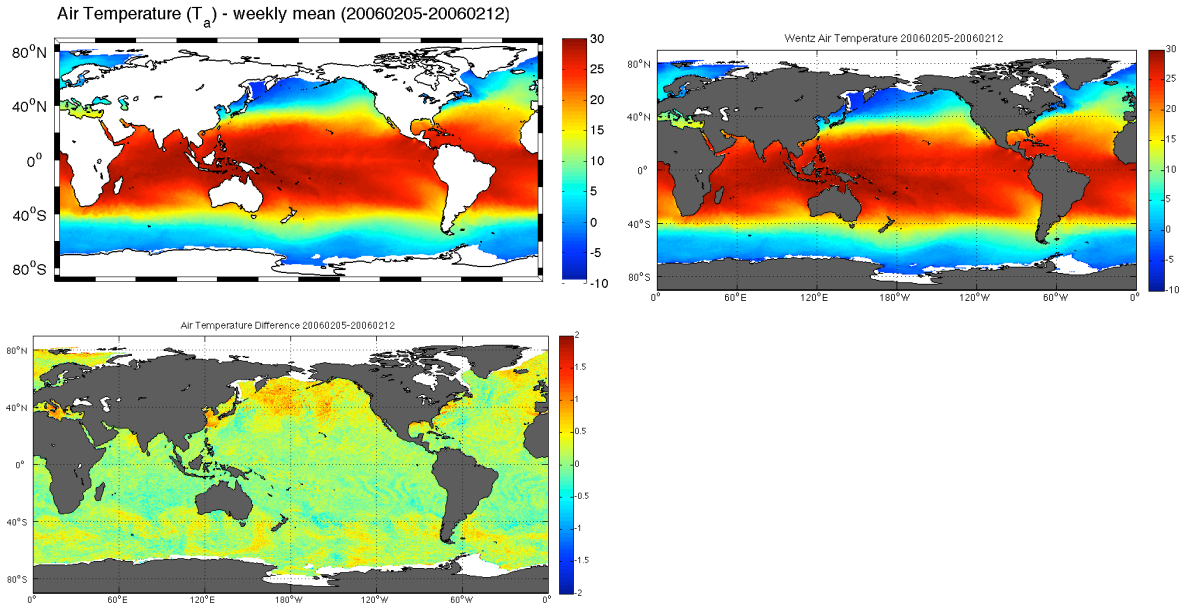
<u>Year 2 goals as listed in proposal:</u>

- Produce gridded Qa, Ta, and U fields
- Produce objectively gridded sea surface temperature fields
- Begin calculations of surface flux fields
- Begin estimations of uncertainties, errors in data sets

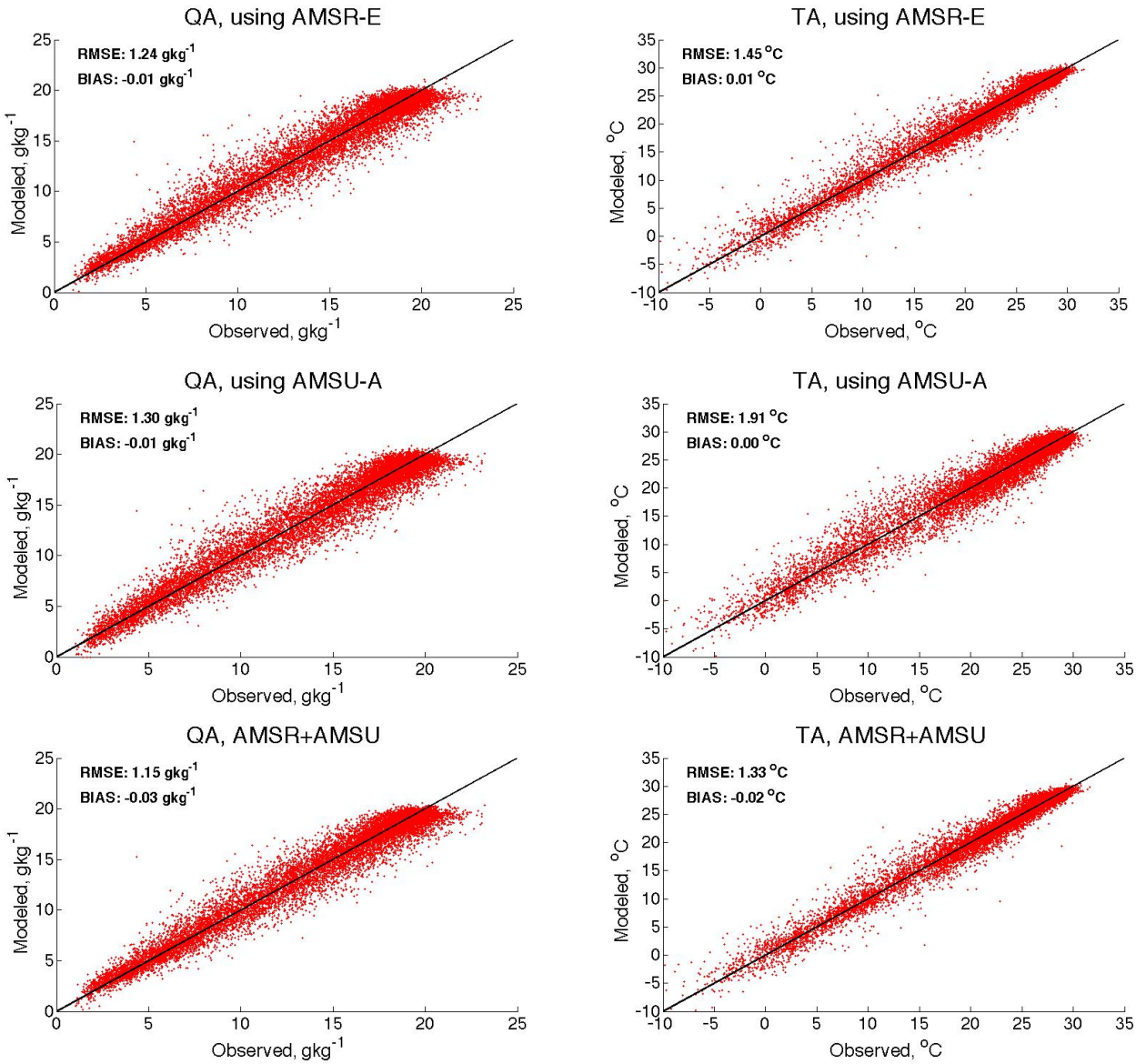
(1) Produce gridded U, Qa, Ta fields

We have used the Wentz SSM/I calibrated brightness temperatures for applying our neural net technique to these temperatures for retrieving U, Qa, and Ta. We have now also downloaded and decoded the new version of the CSU brightness temperature dataset, which covers the time period from 1987 on. Thus, we are prepared to now process the full 20 year temperature dataset. To that end, we are currently processing BOTH datastreams and will evaluate the differences between the data sets. This will give us some understanding of the differences in the datasets and how these will affect the final surface flux fields. Given some features that we have come to understand about how these calibrated brightness temperature datasets were produced, it is our current anticipation that we will be using the CSU TB dataset, but further exploration and understanding is ongoing. An 8-day average of air temperature using the new CSU brightness temperature is shown below, along with a comparison to the air temperatures calculated from teh Wentz brightness temperature dataset, and the difference between these two 8-day averages.

SeaFlux version 1.0 dataset (using the previous CSU brightness temperature dataset). The patterns are similar between the two, but there are some local differences, and in general there is an offset between the two datasets. We will continue to evaluate these differences over the entire dataset. These results are similar whether looking at windspeed or Qa as well.



We have continued to investigate the use of the AMSU-AMSR data as well in the final data set. The figure below shows results using these datasets independently and also combined, indicating that a combined retrieval works better than the individual retrievals, which we had originally been working on.



The goals for this for the rest of this year then are to finish the neural net versions using the new Wentz calibrated brightness temperatures plus the AMSU-AMSR data, and also to work with the CSU brightness temperatures to see if there is any difference in the means/trends of the datasets. The resulting swath-level fields will then be gridded.

(2) Produce objectively gridded sea surface temperatures.

The diurnal warming dataset is now available online. Several papers have been submitted or are underway regarding the improvements (described in last year's report). We still anticipate working with the NOAA/NESDIS STAR group as well, and we will be using this parameterization with their SQUAM work to determine to what extent we can reduce errors in

their foundation SSTs. We anticipate that we will all be learning something from that exercise. We were hoping that some of the folks proposing working on issues including aerosols this last year to the CDR group would be funded, but as they were not we need to continue moving forward with our current best estimates. This will need to be a focus in the next year.

(3) Begin calculations of surface flux fields, and (4) begin estimates of uncertainties, errors

These two tasks will make use of the full 20 year gridded dataset described above, and will be a feature of the next six month's effort.

Papers we anticipate finishing within the next six months:

(1) The new version of the ocean model, with a focus on how such issues as length of daylight affect diurnal SSTs
(2) The new parameterization of diurnal warming
(3) The new Ta, Qa, U, and SST from AMSU-AMSR combined fields
(4) A description of the original SeaFlux version 1.0 dataset

3/31/2012 PROGRESS REPORT

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We have now in place the new SeaFlux web page (seaflux.org). This is a recent development and has not been advertised widely yet, but already has over 40 users who have downloaded the available data (the SeaFlux v 1.0 dataset, which uses the CSU brightness temperature dataset as was available at the time, covering the period of 1998 through 2007). These were previously only available on an "as requested" basis, but are now widely available while we work on the full time period version that is required for this work.

<u>Year 2 goals as listed in proposal:</u>

- Produce gridded Qa, Ta, and U fields
- Produce objectively gridded sea surface temperature fields
- Begin calculations of surface flux fields
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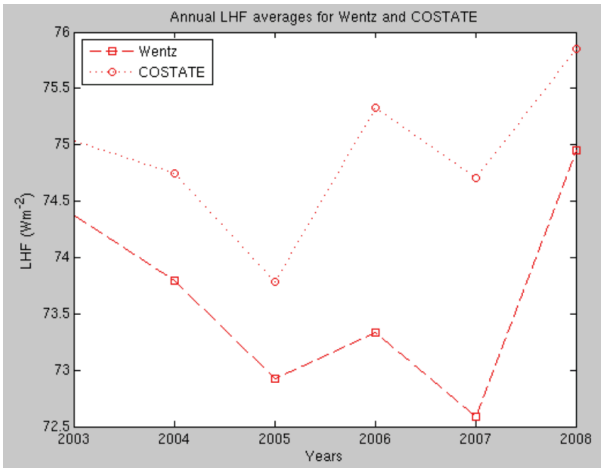
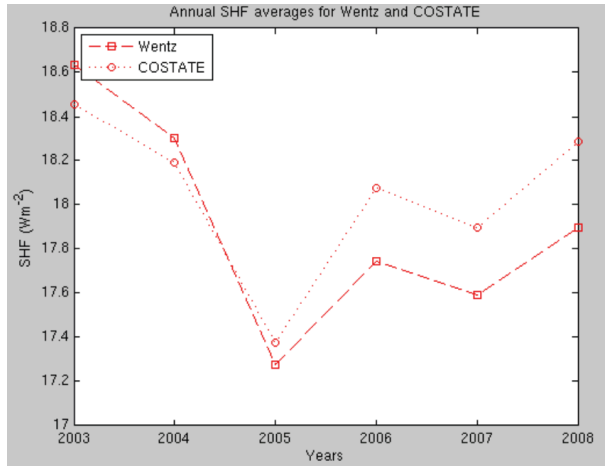
(1) Produce gridded U, Qa, Ta fields

We are using the Wentz SSM/I calibrated brightness temperatures for applying our neural net technique to these temperatures for retrieving U, Qa, and Ta. We have now also downloaded and decoded the new version of the CSU brightness temperature dataset, which covers the time period from 1987 on. Thus, we are prepared to now process the full 20 year temperature dataset. We are however at this time currently creating a unique matchup dataset for each sensor, to develop a NN retrieval that is appropriate for each SSM/I sensor individually. This will also take into account the changes that may be experienced through the changes in the earth incidence angle, which does vary from satellite to satellite. Once this is finished, final processing of the data streams can also occur.

We are currently processing both datastreams with the original NN retrieval methodology and will evaluate the differences between the data sets. This will give us some understanding of the differences in the datasets and how these will affect the final surface flux fields. Given some features that we have come to understand about how these calibrated brightness temperature datasets were produced, it is our current anticipation that we will be using the CSU TB dataset, but further exploration and understanding is ongoing. We have now completed 6 years of processing with both the Wentz and the CSU TB dataset, and can report on some initial comparisons below.





As can be seen, there is a differences between the mean latent and sensible heat fluxes over the two TB datasets. Although this is still a fairly short time series, there does seem to be an increasing difference in time. In order to understand this difference, means of the components are shown below. Although we have not yet exhaustively studied the data, a first glance indicates that the main source of the differences appears to be mostly in the wind speed.

The goals for this for the rest of this year then are to finish the new neural net retrieval algorithms, and to continue working with the CSU brightness temperatures to understand better the sources of the differences between the Wentz and CSU data sets. The resulting swath-level fields will then be gridded.

(2) Produce objectively gridded sea surface temperatures.

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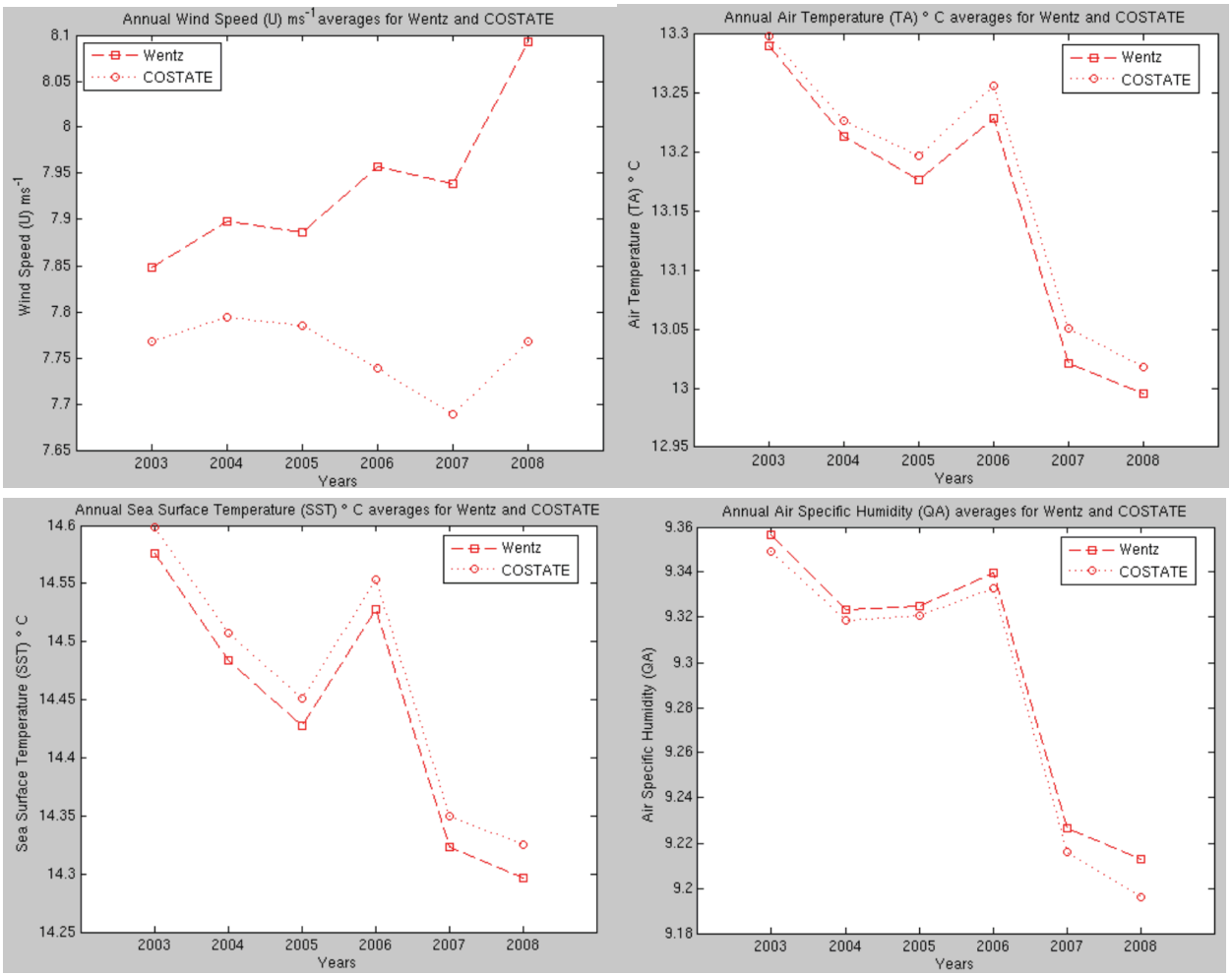

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