ARC Status Report for SSMI Hydrological Products

NOAA CPO - Climate Change Data and Detection (C^{2}D^2)
Applied Research Center (ARC) for Data Set Development

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Background

This ongoing project generates global monthly mean (1 deg and 2.5 deg spatial resolutions) hydrological products from the DMSP SSM/I (F8, F10, F11, F13, F15) and SSMIS (F16 and F17) for the period July 1987 – present. The product suite includes rainfall and rain frequency of occurrence; cloud liquid water and frequency of occurrence; total precipitable water; sea-ice concentration; snow cover frequency of occurrence; oceanic wind speed, satellite sampling. Additionally, specialized products are generated for the GEWEX/Global Precipitation Climatology Project (GPCP), including pentad rainfall. The products are updated at the beginning of each month and are archived and accessible at NCDC (http://lwf.ncdc.noaa.gov/oa/satellite/ssmi/ssmiproducts.html).

Work Status

During the past year, we continued to work with Hilawe Semunegus at NCDC on the transition of the products from STAR (and CICS) to NCDC. Redundant processing has been achieved and we hope to finalize the complete transition during the summer of 2010. We anticipate that we'll be a "level 4" of maturity by early 2011. The figure below summarizes the various processing steps that are now running in parallel at NCDC and STAR.
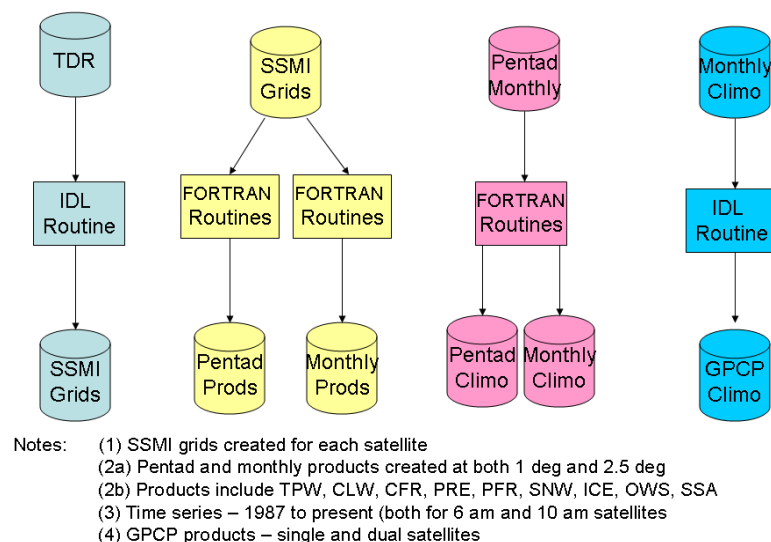

Notes: (1) SSMI grids created for each satellite
(2a) Pentad and monthly products created at both 1 deg and 2.5 deg
(2b) Products include TPW, CLW, CFR, PRE, PFR, SNW, ICE, OWS, SSA
(3) Time series – 1987 to present (both for 6 am and 10 am satellites
(4) GPCP products – single and dual satellites

Figure 1 - Summary of the ARC SSM/I Processing Steps.

The team also developed and tested new QC methods to remove spurious data sets that show vast improvements in the products (see papers by Semunegus et al. 2010; Vila et al. 2010a; Vila et al. 2010b); we have not transitioned to using this data set but will do so before project completion. An example is provided below.
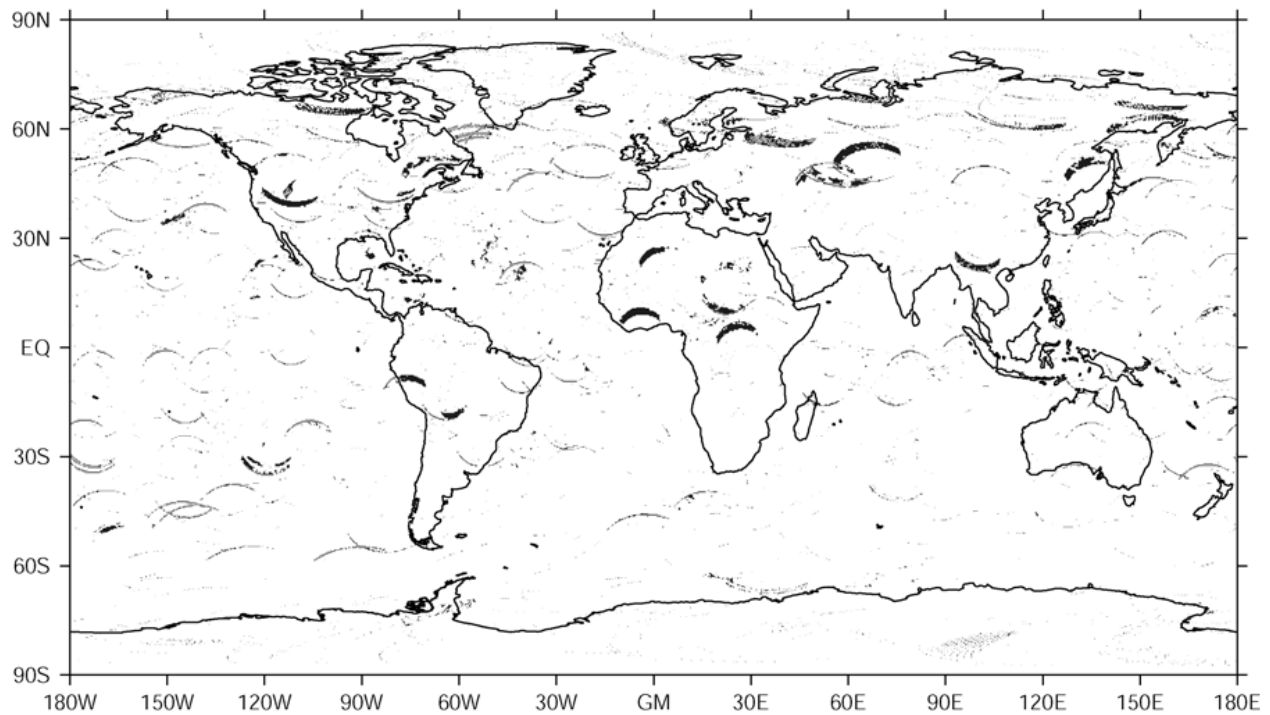

Figure 2 - Spurious data removed from August 2005. Note the 'arc' feature which indicates an entire SSM/I scan line which was spurious and removed.

We have also emphasized studies to fold in the SSMIS data sets into the time series as the last remaining SSMI's have failed and are no longer capable of being in this data set. This work is crucial for the continuity of these products and is not a simple "plug and play" because of differences between the two sensors. We believe that we have developed accurate methods that will add in the SSMIS F17 data beginning in January 2009. We are performing this work in partnership with our primary user, the GPCP. Figure 3 highlights some of this work.

Work Plan

Remaining tasks that will be performed during the upcoming year include:

- Run all products operationally at NCDC and restrict STAR production to back up mode

- Complete reformatting of products to netCDF CF-compliant (in parallel with native format)

    o Reformat all gridded product to netCDF

    o Plug netCDF products into NCDC's Climate Data Viewer
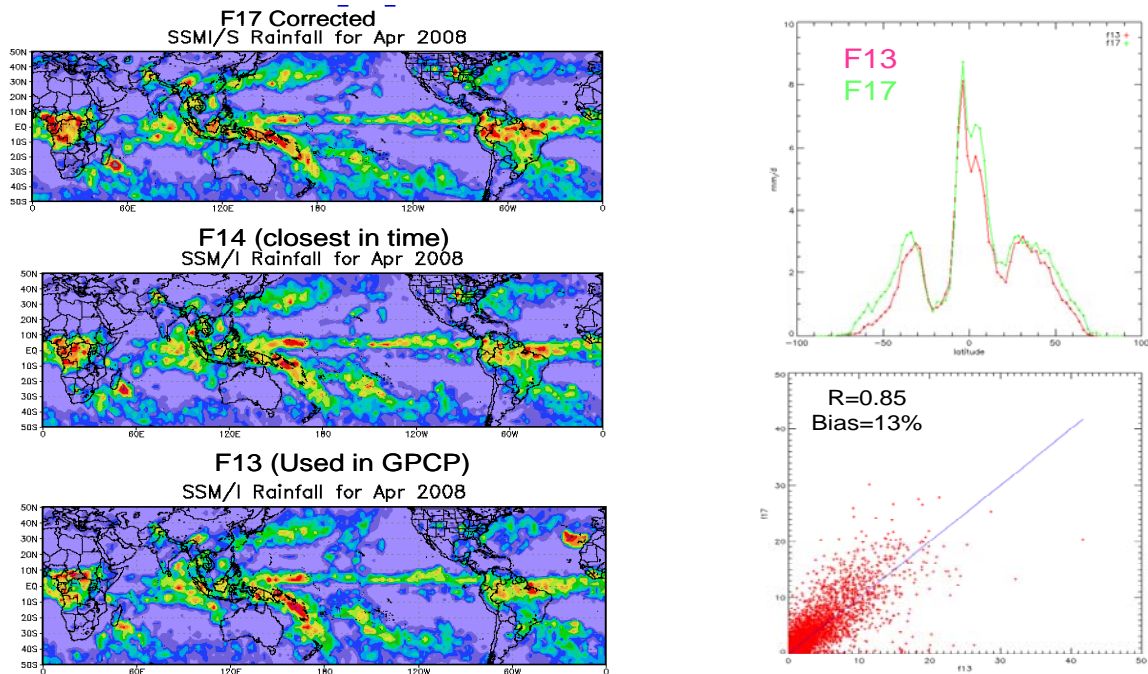
Figure 3 – Monthly mean rainfall (left) for April 2008 derived from SSMIS F17 (via newly developed calibration scheme), SSMI F14 and SSMI F13. The panels on the right show zonal means between F17 and F13, as well as the correlation between the monthly means.

- Create product imagery website at NCDC

- Update NCDC primary web page for these products

- Adapt 2.5 degree monthly product algorithm for individual platforms

- Reprocess all products from TDR daily gridded dataset using NCDC's netCDF quality-controlled TDR dataset from 1987-present and replace these as the official archive.

- Transition products to SSMIS and support the efforts of the GPCP as they develop V2.2 and V3.

Future Funding Request - 40 K/year

STAR is committed to support the science stewardship of these products. Our previous budget indicated that we would seek STAR funding beginning in FY11 at a level of 75 K. We believe that this level could be reduced to about 40 K/year, primarily to partially support a scientist at CICS to support the stewardship effort and work on specific matters associated with GPCP, SSMIS, etc.

We request that the ARC program either continue to support us, have it absorbed into CDR related projects or assist the PI in obtaining funding from STAR through a direct request from NCDC.

References

Semunegus, H., J. Bates, D. Vila and R. Ferraro, 2010: An extended and improved Special Sensor Microwave Imager (SSM/I) period of record. *In Press, J. Appl. Meteor. and Clim.*

Vila, D., R. Ferraro and H. Semunegus, 2010: Improved Global Rainfall Retrieval using the Special Sensor Microwave Imager (SSM/I). *In Press, J. Appl. Meteor. and Clim.*

Vila, D., N. Wang, R. Ferraro, J. Turk and F. Weng, 2010: A Special Sensor Microwave Imager Sounder (SSMIS) Application for Hydrological Products. *Submitted, J. Geophys. Res.*