



**COOPERATIVE INSTITUTE
FOR
CLIMATE and SATELLITES (CICS)**

Scientific Report

For the period:

April 1, 2011 – March 31, 2012

NOAA Grant NA09NES4400006

Dr. Phillip Arkin

Director

April 1, 2012

A Terrestrial Surface Climate Data Record for Global Change Studies

Task Leader	Eric Vermote
Task Code	GEOG-10
Contribution to CICS Themes	Theme 1: 50%; Theme2: 50%
Contribution to NOAA Goals	Goal 1: 100%

BACKGROUND

The overall objective of this project is to produce, validate and distribute a global land surface climate data record (CDR) using a combination of mature and tested algorithms and the best available land imaging polar orbiting satellite data from the past to the present (1981-2011), and which will be extendable into the JPSS era. The data record consists of one fundamental climate data record (FCDR), the surface reflectance product. Two Thematic CDRs (TCDRs) are also derived from the FCDR, the normalized difference vegetation index (NDVI) and LAI/fAPAR. These two products are used extensively for climate change research and are listed as Essential Climate Variables (ECVs) by the Global Climate Observing System (GCOS). In addition, these products are used in a number of applications of long-term societal benefit. The two TCDRs are used to assess the performance of the FCDR through a rigorous validation program and will provide feedback on the requirements for the Surface Reflectance FCDR.

ACCOMPLISHMENTS

Several improvements have been applied to the dataset, improved geolocation, calibration, cloud mask, and aggregation scheme. The AVHRR data record compared favorably to the MODIS coincident data record (used a reference) as it has been verified for NOAA16 during the 2003-2004 period (figure 1). We have also started the generation of the LAI/fAPAR product and the product compared well to the climatology developed by Frederic Baret at INRA (see Figure 2), the Boston University algorithm for LAI/fAPAR have also been implemented and is under testing. We have developed the code for the processing of the 1km AVHRR data that will be used to process the 1992-1998 AVHRR HRPT record. We have used the Climate Data Record in application of societal benefit (Yield prediction for agriculture). We have started transitioning the code and dataset to NOAA NCDC in Asheville.

PLANNED WORK

We are planning to make final improvements to the AVHRR atmospheric correction (water vapor and aerosol) that will be possible when the updated calibration of the longwave bands on AVHRR (4,11 and 12 microns) is available. Processing of the 1km AVHRR data, The VEGETATION data record (in collaboration with INRA), and the use of the full record (MODIS, AVHRR and VEGETATION) in drought monitoring/impact applications.

PRESENTATIONS

A Terrestrial Surface Climate Data Record for Global Change studies, Vermote et al.,
2nd Annual CICS Science Meeting, National Climatic Data Center in Asheville,
North Carolina on November 2-3, 2011.

A Terrestrial Surface Climate Data Record for Global Change studies, Vermote et al.,
AGU Falls Meeting, San Francisco, 5-9 December 2011 (Poster).

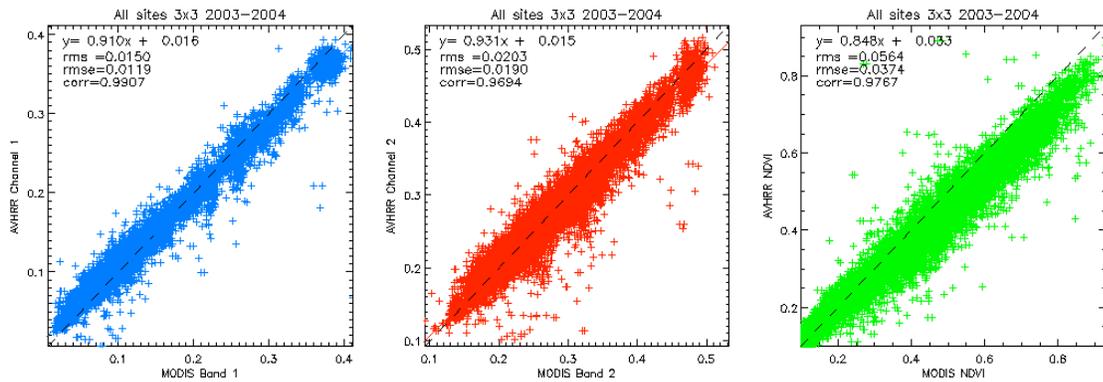


Figure 1: Comparison of MODIS (x axis) with AVHRR (y axis) for 2003-2004 for 150 sites, Left panel with the blue crosses is channel 1, center panel with red crosses is channel 2, right panel with green crosses is NDVI.

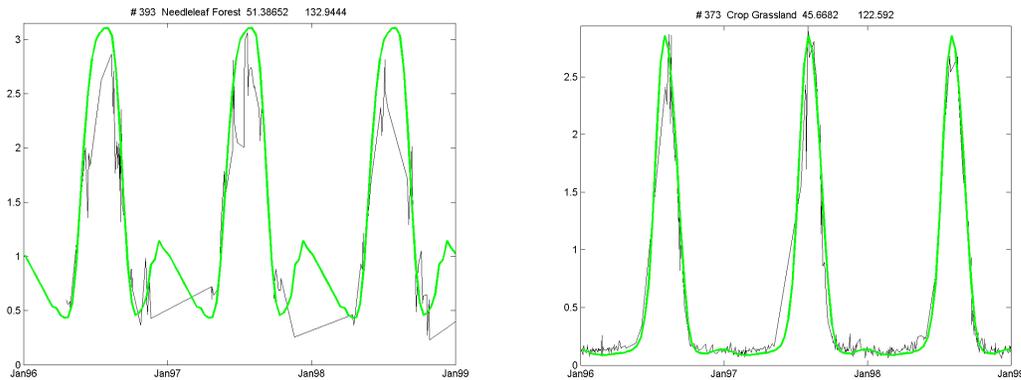


Figure 2: Two sites extracted from the comparison of the LAI product generated by this project for NOAA14 (black line) over 420 sites with the INRA LAI climatology (1999-2007)