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Scientific Report

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## Shadow Awards

### A Terrestrial Surface Climate Data Record for Global Change Studies

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#### Background: Scientific Problem, Approach, Proposed Work

The overall objective of this proposal 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 polar-orbiting satellite data from the past to the present (1981-2009) and which can be extended into the NPOESS era. The data record will consist of one fundamental climate data record (FCDR), the surface reflectance product. Two Thematic CDR's (TCDRs) will also be derived from the FCDR, the normalized difference vegetation index (VI) and LAI/FAPAR. These two products are used extensively for climate change research and are listed as Essential Climate Variables (ECVs) by GCOS. In addition these products are used in a number of applications of long-term societal benefit. The two TCDRs will be used to assess the performance of the FCDR through a rigorous validation program and will provide feedback on requirements for the Surface Reflectance FCDR.

#### Accomplishments

In the first phase of the proposal several improvements were successfully implemented in the processing of the coarse resolution AVHRR GAC dataset which covers the period from 1981 to 1999. In summary, calibration, geolocation, atmospheric correction (except for aerosol), correction for surface directional effect and cloud screening. Cloud Screening is a very important step before being able to adequately analyze long time series of data. The previous version of the cloud screening algorithm, published in the peer review literature about 15 years ago, was evaluated by comparison of the NOAA16 GAC derived cloud mask with the MODIS aqua cloud globally and for the entire 2003 period. The results of this comparison for both old and new cloud mask are presented in figure 1a and 1b, the old version performances was really not adequate as it identified only 2/3 of the cloud flagged by MODIS (red points), and labeled about 1/3 of the observation flagged as clear by MODIS as cloudy (blue points).

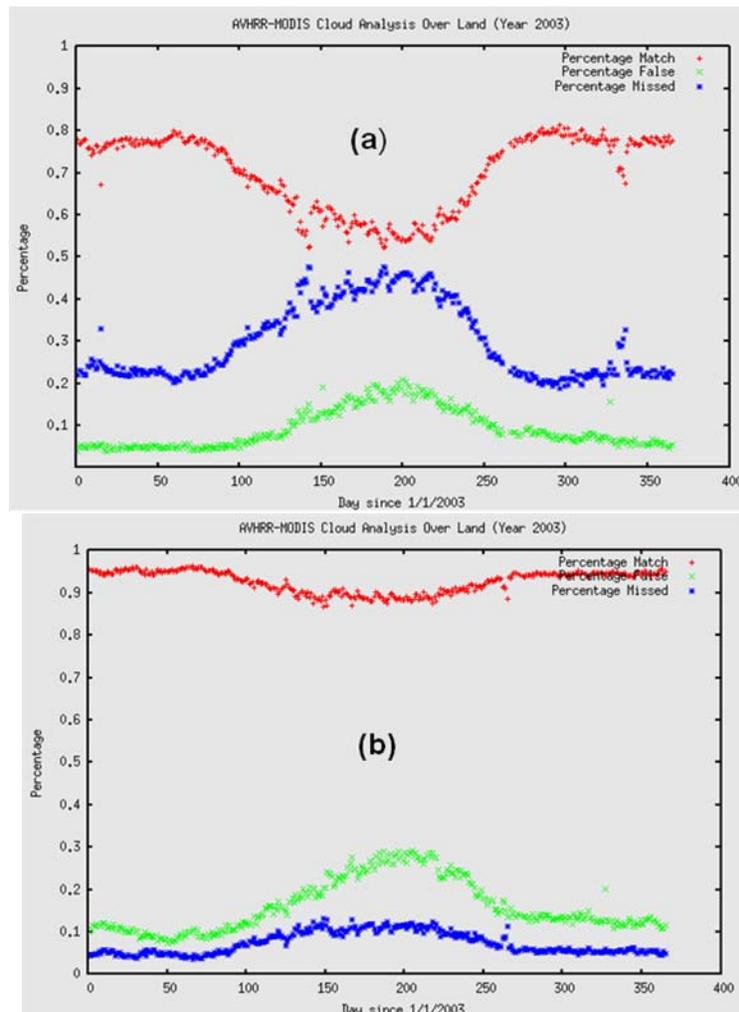


Figure 1: Evaluation of the cloud screening algorithm used in the processing of the AVHRR GAC data. (a) is the original version (b) is a new algorithm.

### Planned Work

The entire AVHRR-GAC record (1981-1999) is being reprocessed, and we expect this Version 3 of the data to be publically available before the end of March 2010. Provisional LAI/FPAR product will be derived from this version of the dataset. Subsequent improvements will be made in the atmospheric correction (aerosol) and better correction for water vapor absorption will be made.

### Presentations

Vermote E. et al., "A Terrestrial Surface Climate Data Record for Global Change Studies", American Geophysical Union, Fall Meeting 2009.