P3.1 IMPROVED SURFACE RADIATION BUDGETS FOR THE GLOBAL ENERGY AND WATER CYCLE EXPERIMENT (GEWEX) CONTINENTAL-SCALE INTERNATIONAL PROJECT AND THE GEWEX AMERICAS PREDICTION PROJECT (GCIP/GAPP)

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1. BACKGROUND

Surface radiation budget parameters are being produced operationally in real time at NOAA/NESDIS from GOES observations at hourly time scale, at 0.5-degree spatial resolution, and delivered to the GCIP/GAPP community and to the public, in real time via:

http://atmos.umd.edu/~srb/gcip/webgcip.htm

The current product is being used extensively in a wide range of applications, such as validation of numerical weather prediction models, land data assimilation activities (http://ldas.gsfc.nasa.gov/index.shtml), hydrological modeling, net primary productivity assessment, snow melt estimation, solar energy applications, and air quality modeling. Extensive product evaluations against ground observations have shown that the product is of high quality at both daily and hourly time scales, during average snow-free conditions. However, the product needs to be improved under situations frequented with sub-pixel clouds, clouds over snow, and in respect to calibration of the satellite sensors. In the operational version of the model, cloud detection is based on the visible channel alone; till 1999, snow information was obtained from the US Air Force Shared Processing Program (SPP) product; from 1999, snow information came from the Satellite Analysis Branch (SAB) of the Satellite Services Division using the NOAA/NESDIS Interactive Multisensor Snow and Ice Mapping System (IMS); and no adjustments for calibration degradation were made.

2. WORK IN PROGRESS

To introduce improvements, a new version of the model is being developed in which Clouds for AVHRR (CLAVR) (Stowe et al., 1999) methods are modified for the GOES satellites, including contrast signatures, spectral signatures, and spatial signatures. Cloud typing is also produced in the following categories: clear; partly cloudy; liquid cloud; mixed phase Cloud; glaciated cloud; and cirrus. New snow detection techniques are experimented with; updated surface type classifications are being implemented in the radiative transfer schemes; and new and improved aerosol climatologies have been developed and are being incorporated. In this presentation we report on progress made towards improving the GCIP/GAPP surface radiation product in respect to cloud detection over snow.

3. RESULTS

Results will be presented for Version 3.0 of the model, where:

- A modified CLAVR (MCLAVR) version was used, by adding a test to better identify clouds over snow
- A modified snow mapping method (Romanov et al., 2000) at pixel level was applied.to first identify snow areas
- A Clear-sky Composite Map (CCM) for snow free and snow covered scenes was used.

In Figure 1 (left panel), a comparison of satellite based estimates of surface radiative fluxes as obtained from the NOAA/NESDIS operational model against ground observations at nineteen stations in Illinois (Hollinger et al.,) is presented. In Figure 1 (right panel), similar results from model Version 3.0 are presented, showing significant improvements. The high resolution satellite data used for the new experiments were provided by NCAR (S.Williams).

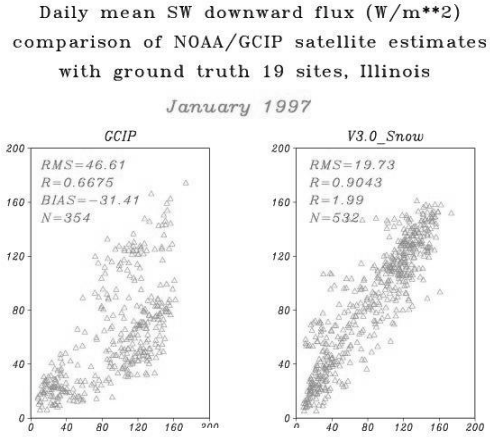

Figure 1.

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