

Progress report of the NEWS investigation entitled “An A-train integrated aerosol, cloud, and radiation data product”.

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1) Project Status & Progress: Highlight recent progress, and overall status

We have produced 4 months of data (July and October 2006 and January and April 2007). We plan to release the data in September 2009. As we continue to produce data, and should have 1 year of data by the end of 2009.

1) We submitted a paper to the Journal of Geophysical Research CALIPSO special issue. The paper discusses a cloud frequency of occurrence matrix from our integrated product. The matrix contains vertical profiles of cloud occurrence frequency as a function of the uppermost cloud top. It is shown that the cloud fraction and uppermost cloud top vertical profiles can be related by a set of equations when the correlation distance of cloud occurrence, which is interpreted as an effective cloud thickness, is introduced. The underlying assumption in establishing the above relation is that cloud overlap approaches the random overlap with increasing distance separating cloud layers and that the probability of deviating from the random overlap decreases exponentially with distance. This paper also presents initial validation results of our product.

2) CALIPSO and CloudSat merged cloud profiles were used in a pre-phase-A Climate Absolute Radiance and Refractivity Observatory (CLARREO) study. Cloud fields were used as inputs to a radiative transfer model to estimate natural variability of nadir-view spectral radiance. In addition, computed top-of-atmosphere (TOA) longwave nadir -view spectra were used to test algorithms to retrieve cloud and atmospheric changes.

3) The merged product will be presented at the twentieth session of the GEWEX Radiation Panel held in Rostock Germany during an invited talk. In addition, the data set was introduced in several meetings and conferences including the radiation and climate Gordon conference in June, EarthCARE workshop in July, and CALIPSO and CloudSat science team meeting in July. The new dataset will provide better cloud vertical profiles, which leads to a better understanding of radiative heating rate in the atmosphere. Some heating rate plots extracted from presentations are shown in Figure 1.

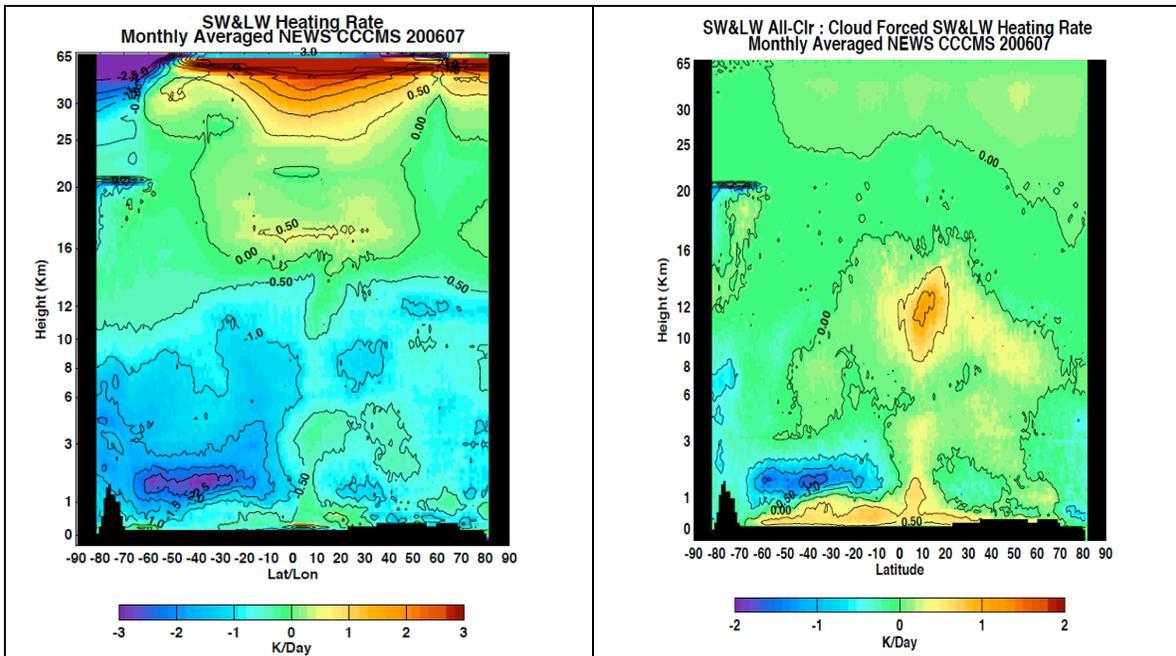


Figure 1: left) Zonal mean heating rate in the all-sky atmosphere computed from CALIPSO and CloudSat cloud profiles and MODIS derived cloud and aerosol properties. Right) Cloud radiative effect obtained by subtracting the zonal mean clear-sky heating rate from all-sky heating rate. Data are from July 2006.

Progress status: This is our fourth year of the 5-year project. Basically, we have developed codes to produce the product. We produced 4 months of data. These data went through our quality control and ready to be released. We are spending more time on validation. We have a major change of computer system at Langley, which requires converting production codes. We are making some progress for the code conversion. Because of the code conversion and due to a hard-drive problem we experienced at Langley in 2008, a rough estimate of current schedule is about a 6-month delay from our original plan described in the proposal.