B.WIELICKI NEWS POC REPORT 3/25/08

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

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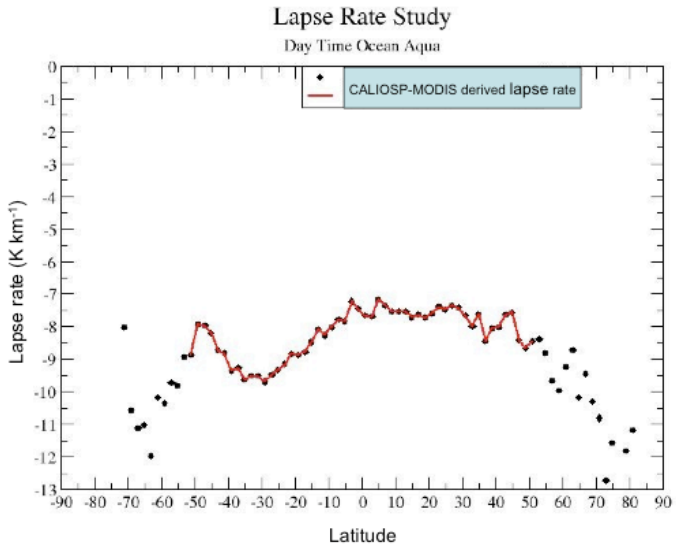
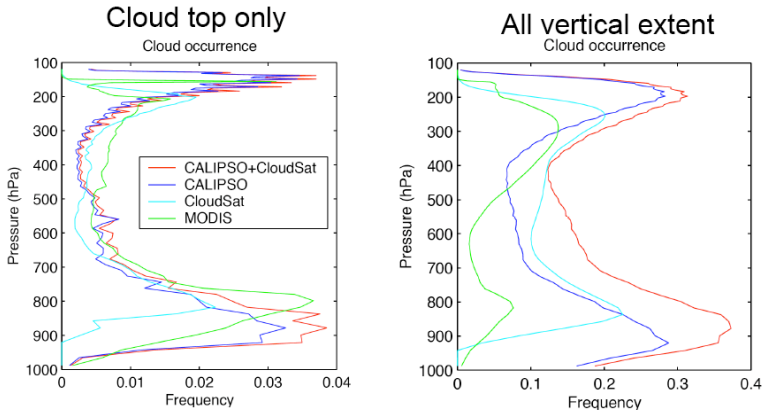
1) Project Status & Progress: Highlight recent progress, and overall status

We have merged CALIPSO, CloudSat and MODIS cloud mask. Using this intermediate product, we have:

1) Improved the lapse rate estimate (work in progress). The lapse rate in the marine boundary layer is difficult to observe and model. The error causes a significant problem estimating cloud top height from a passive sensor. Combining CALIPSO derived cloud top height, cloud top temperature from MODIS, and modeled surface temperature (GEOS-5), we are able to improve the lapse rate estimate significantly. Figure shows improved zonal mean lapse rates over daytime ocean.



2) Derived cloud overlap and vertical extent statistics. Identifying vertical cloud extent significantly improves the surface radiative energy budget estimate especially over polar regions. Figure shows the monthly mean cloud occurrence derived from 0 to 30N in April 2007 as a function of height.



Progress status: CALIPSO cloud and aerosol extinction profile products were released in January 2008. We are incorporating CALIPSO 5 km cloud extinction profile and 5 km aerosol optical thickness, and CloudSat liquid and ice water content profile. We have also started merging CALIPSO, CloudSat and MODIS data with CERES.

This is our third year of the 5-year project. Basically, we have three major processes, CALIPSO-CloudSat-MODIS merge, merging into CERES footprints, and heating rate computations. We have started two of these three processes and are expecting significant progress this year. We are coordinating with CALIPSO and CloudSat data release schedules, and they have released data we plan to incorporate into our product. The project is progressing as initially planed (archiving version 1 data in the third year) and is expected to stay on schedule this year.

2) Collaboration: What connections were made, and how did NEWS benefit from your collaborations?

Collaboration with CALIPSO, CloudSat and CERES science team members. We are constantly communicating with their science team members to understand their products. In addition, merging CALIPSO and CloudSat products with MODIS is an effective way to validate their products. By merging CALIPSO, CloudSat, and MODIS, 3-way cloud mask comparisons from which all are directly benefited are possible. We presented our results described above in the CALIPSO science team meeting in March 2008. In addition, our CLAIPSO-CloudSat derived clouds and MODIS derived clouds comparison improves the cloud algorithm used in the CERES production. The improvement of the cloud algorithm, in turn, improves scene identification over CERES footprints, and consequently, TOA radiative flux estimates.

Our product includes clouds and aerosols from CALIPSO, CloudSat, MODIS, precipitation type from CoudSat, radiative flux from CERES, and spectral surface albedo from MODIS. We are integrating all these data into a data product so that NEWS science team members and users from climate community who study radiative energy spatial, seasonal, or inter-annual variations and relate those with cloud and aerosol properties can benefit from our merged product directly. In addition, cloud fields derived from CALIPSO, CloudSat, and MODIS will be used in the CLARREO NRC decadal survey mission in determining its scientific observational requirements.

3) Issues: Are there any problems or issues that your POC can help you with?

We have received 150K for this year so far. The third year budget from our proposal is 267K (without Langley's overhead). Receiving the full amount of our budget is critical for our project to progress on schedule this year.

4) Products: If product driven research; what products are, or will be ready to be posted on the NDIC in the near future? What products are you using that you found useful, that can be added to NDIC?

Near the end of this year or early next year, we expect to release our first version of the product. It includes, best estimate of cloud and aerosol vertical profiles from CALIPSO and CloudSat, precipitation flag (drizzle, liquid, and solid) from CloudSat, aerosol type from CALIPSO, cloud and aerosol optical properties from CALIPSO, CloudSat, and MODIS, liquid and ice water content from CloudSat, TOA radiative flux from CERES, and modeled radiative heating rate profile. We are planning to release our product through the Langley atmospheric data center but data will be linked from NDIC.

One NEWS member asked if we were merging precipitation data. We only have a precipitation type flag from CloudSat. We need to produce our product as we planned this year. However, we would like to collaborate with NEWS members who produce precipitation data in future.

5) Integration: Define your project's current and near-future contribution to integration projects (both NEWS multi- PI, as well as the 3 defined questions). Define expectations for action items (a forward looking timeline) specifically; what can you commit to and who can you connect with to make progress towards answering questions.

We are collaborating with Bill Rossow, Alan Betts, Eni Njoku, and Michael Bosilovich as a part of Group 1 efforts. We expect to provide seasonal variation of cloud and aerosol properties and radiation budget. Timeline of our collaboration set by Bill Rossow is

1) Sep 08 – complete test cases for development of relational statistics, extended compilation of dataset
2) Sep 09 – complete global survey of relational statistics for land and ocean.

6) Alignment with NEWS IP: Assessment and mitigation of gaps.

Our merged product directly contributes to the NEWS central goal *to document and enable improved, observationally-based, predictions of energy and water cycle consequences of Earth system variability and change*. Because clouds are the largely responsible for interannual variability of the energy input to the Earth and clouds and aerosols are largest uncertainty in understanding climate feedback processes, our product is consistent with the Strategic Plan for the U.S. Climate Change Science Program. We also anticipate collaborating with researchers from modeling community to help improving climate prediction models.