Proposal title: A Study of Arctic Radiation Budget using CERES/MODIS Satellite and ARM NSA Surface Observations and NASA GISS Model

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1. Scientific goals
We plan to use DOE ARM surface observations, the NASA CERES on *Terra* and *Aqua* flux measurements and coincident MODIS cloud and aerosol products, cloud and radiation flux products from GOES-10 to fill in gaps at the ARM Northern Slope Alaska (NSA, 71° 19' N, 156° 37' W) site during 2000-2006 period. Based on 6-yr dataset, we propose to develop a long-term merged aerosol-cloud-radiation vertical distribution product. In particular, we will develop the vertical profiles using two differently subsetted EOS datasets and a pseudo-EOS dataset based on GOES data. NASA CERES SW and LW fluxes and MODIS cloud and aerosol properties will be averaged in a 1° box centered on the ARM NSA site. Also, data from all CERES FOVs that include the site will be averaged for a given overpass. The GOES data are currently being analyzed at NASA LaRC and will be converted to CERES-like data using site specific narrowband-broadband conversion functions. A radiative transfer model will be used as input, the vertical distributions of cloud properties determined from the ARM ground-based radar-lidar-radiometer data, surface fluxes, and temperature and humidity profiles to compute the vertical distribution of radiative divergence. The satellite flux, cloud, and aerosol measurements will be used to constrain the calculations. Since large uncertainties are possible in the cloud and aerosol properties, they will be adjusted to ensure consistency between the TOA and surface fluxes. We will then study the seasonal and diurnal variations of surface, TOA and atmosphere SW and LW radiation budgets using the 6 years of surface-satellite data. Finally we will investigate the impacts of clouds on the surface/TOA/atmosphere radiation budgets in duration and strength and study the relationships between the radiation budget and the cloud vertical distributions for both multi-layered and single-layered cloud systems.

2. Presentations
The following presentations are partially supported by NASA NEWS project during the period of 09/2008-09/2009:


3. Accomplishments and Summary of Research

Publications:
The following papers are primarily supported by this funded project, and the NEWS grant has been listed in the acknowledgements.

Thesis:
The following theses are primarily supported by this funded project, and the NEWS grant has been listed in the acknowledgements.

Graduated students:

Current graduate students: