Geophysical Research Abstracts
Vol. 13, EGU2011-3733, 2011
EGU General Assembly 2011

Global constraints on radiative properties of ice clouds using MODIS and POLDER measurements

Bastiaan van Diedenhoven (1,2), Brian Cairns (2), Ann Fridlind (2), and Andrew Ackerman (2)

(1) Columbia University, Center for Climate Systems Research, New York, United States (bvandiedenhoven@giss.nasa.gov), (2) NASA Goddard Institute for Space Studies, New York, United States

It has long been known that global climate model projections are sensitive to the simulated properties of ice clouds, such as those of widespread cirrus. The fundamental radiative properties of ice clouds can be represented in terms of their optical thickness, effective ice crystal size, and the asymmetry parameter of the scattering phase function. Satellite measurements such as those from MODIS are currently used to retrieve cloud optical thickness and effective radius, but cannot effectively constrain the asymmetry parameter. Moreover, MODIS cloud products intended to constrain climate model simulations are sensitive to the asymmetry parameters of the ice crystal habits assumed in the retrievals. To date, no global estimates of the asymmetry parameter of ice clouds exist. While ice crystal habits are highly variable, it has been shown that observed variations in the asymmetry parameter of ice clouds can be represented in terms of the aspect ratio and surface roughness of simple hexagonal ice particles. Multidirectional polarization measurements such as those made by the POLDER instrument contain significant information about ice crystal aspect ratios and surface roughness and consequently asymmetry parameter. Here we outline a new study that combines MODIS-Aqua and POLDER observations in order to obtain a global climatology of ice cloud asymmetry parameters that can be stratified by cloud optical thickness, cloud top temperature and particle size. We show some preliminary modeling and retrieval results, and discuss potential error sources.