Geophysical Research Abstracts
Vol. 20, EGU2018-14108, 2018
EGU General Assembly 2018

Cloud top properties over the Antarctic Peninsula: Evaluation of MODIS and CALIOP data with radiosonde profiles and Micro Pulse Lidar data

Marta Caballero (1), Penny Rowe (2), Tobias Sauter (1), Edgardo Sepulveda (2), Thomas Mölg (1), Raul Cordero (2), and Matthias Braun (1)

(1) Friedrich-Alexander-University (FAU), Institute of Geography, Erlangen, Germany (marta.caballero@fau.de), (2) Departamento de Física, Universidad de Santiago de Chile. Avenida Ecuador 3493, Estación Central, Santiago, Chile

Clouds play a key role in the polar energy balance and climate system. Clouds contribute with their albedo to the radiation balance, have impact on the greenhouse effect and alter the thermodynamic structure of the atmosphere by their properties (height and microphysical properties such as shape, size, concentration and phase). In the Antarctic Peninsula, rising surface air and ocean temperatures have been observed as well as changes in the glacier system, such as disintegration of ice shelves. Nevertheless, clouds remain challenging to represent well in mesoscale and global climate models, specifically in polar regions. In particular over the large ice sheets, ground-based cloud monitoring is still difficult because of the remoteness and the hard access due to weather conditions. Cloud monitoring from satellite is essential in the remote Antarctic region, but retrievals from infrared instruments are challenging due to the similarity of temperature between the ice surface and clouds. Lidar instruments also provide essential profiling of Antarctic clouds, but lack the large footprints of infrared measurements that allow twice daily global coverage. Since ground-based measurements are sparse and irregular, the evaluation of the satellite-derived cloud properties is crucial in order to validate global and mesoscale climate models. Here we present results from an austral summer campaign (November 2017 through February 2018) at Escudero station (62° 12′ 57″ S, 58° 57′ 35″ W, King George Island) and at O'Higgins station (63°19′ S, 57°51′ W, Antarctic Peninsula), the last one during the first weeks of December. Radiosonde vertical profiles were collected 4-5 times per week, at 12 UTC at each station. Some soundings were coordinated with the NASA A-Train constellation satellite overpass. Cloud height and thermodynamic phase were also measured using a mini Micro Pulse Lidar (mini MPL) at Escudero station. Cloud-top properties measured by the MODIS and CALIPSO-CALIOP satellite sensors on the A-train are compared to estimates from radiosonde and mini MPL data. We find that MODIS and CALIOP generally agree with radiosonde and mini MPL cloud height. However, during a coordinated radiosonde launching with the A-Train overpass, CALIOP did not detect mid-to-low clouds over the ocean, that were observed by MODIS.