Geophysical Research Abstracts
Vol. 18, EGU2016-12903, 2016
EGU General Assembly 2016

Validation of satellite data with IASOA observatories and shipboard measurements in Arctic Ocean

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The paper shows the possibility of using surface observation data at high latitudes for the validation of different satellite products. We use data from International Arctic Systems for Observing the Atmosphere (IASOA) observatories and data from Nansen and Amundsen basins observation system (NABOS) project. The NABOS field experiment was carried out in the central part of the Arctic and in the eastern Arctic seas during summer and fall period of 2004-2009, 2013 and 2015.
Newly improved satellite products and surface observations provide an opportunity to revisit remote-sensing capabilities for estimating shortwave and longwave radiative fluxes, as well as turbulent fluxes at high latitudes. Estimates of SW fluxes from the MODIS and LW fluxes from the NOAA satellites are evaluated against land observations from IASOA observatories, and unique shipboard measurements. Results show that the satellite products are in better agreement with observations than those from numerical models. Therefore, the large scale satellite based estimates should be useful for model evaluation and for providing information in formulating energy budgets at high latitudes.
Visible and near-infrared albedos over snow and ice surfaces are retrieved from AVHRR. Comparison with surface measurements of albedo in arctic observatories and Arctic ocean shows very good agreement.
Meteorological and micrometeorological observations were used to validate the surface temperature and surface heat fluxes in the satellite data. Compared data arrays are independent and sufficiently detailed to perform trustworthy evaluations. The spatial and temporal patterns of the resulting flux fields are investigated and compared with those derived from satellite observations such as HOAPS, from blended data such as AOFLUX (in the open water cases). A computation of the sensible heat flux at the surface is formulated on the basis of spatial variations of the surface temperature estimated from satellite data. Based on the comparison of field experiments data, satellite-derived the causes of underestimation of the values of turbulent heat fluxes in the Arctic modern reanalysis are investigated.
The IASI and AIRS satellite methane data were validated with in situ measurements (Tiksi, Ny-Ålesund, Pallas, Sodankylä). The study was supported by RSF grant # 14-37-00053.