EGU2020-16472
https://doi.org/10.5194/egusphere-egu2020-16472
EGU General Assembly 2020

Comparison of cirrus clouds in naturally and anthropogenically influenced regions of the atmosphere

Maximilian Dollner[1], Josef Gasteiger[1], Charles A. Brock[2], Manuel Schöberl[1], Christina Williamson[2,3], Agnieszka Kupc[1,2], Anne Philipp[1,4], Petra Seibert[4,5], Karl Froyd[2,3], Gregory P. Schill[2,3], Daniel M. Murphy[2], Glenn Diskin[6], T. Paul Bui[7], and Bernadett Weinzierl[1]

[1]Aerosol Physics and Environmental Physics, Faculty of Physics, University of Vienna, Vienna, Austria
[2]NOAA Earth System Research Laboratory, Boulder, CO, USA
[3]Cooperative Institute for Research in Environmental Sciences, University of Colorado, Boulder, CO, USA
[4]Department of Meteorology and Geophysics, University of Vienna, Vienna, Austria
[5]Institute of Meteorology, University of Natural Resources and Life Sciences, Vienna, Austria
[6]NASA Langley Research Center, Hampton, VA, USA
[7]NASA Ames Research Center, Mountain View, CA, USA

Cirrus clouds are an important contributor to the uncertainty of future climate prediction, especially due to the weak understanding of anthropogenic impacts on cirrus clouds.

We investigate aerosol and cloud microphysical properties of the remote atmosphere over the Pacific and Atlantic Oceans from about 80°N to 86°S and the region in the Mediterranean using airborne aerosol and cloud measurements of the entire atmospheric column up to approx. 13 km from the ATom (Atmospheric Tomography; 2016-2018) and the A-LIFE (Absorbing aerosol layers in a changing climate: aging, lifetime and dynamics; 2017) field experiments, respectively. Aerosol microphysical properties are retrieved from in-situ measurements of aerosol particle size distributions between 0.003 and 50 µm, single particle mass spectrometry as well as simulations with the Lagrangian transport and dispersion model FLEXPART. The microphysical properties of cirrus clouds are obtained from size distribution measurements covering the range between 3 and 930 µm.

In this study we show microphysical properties of aerosols and cirrus clouds in regions with high mineral dust concentrations as well as pristine and anthropogenic influenced regions in order to advance the knowledge of the natural and anthropogenic impact on cirrus clouds. We present comparisons of ice crystal number concentrations, aerosol and cloud particle size distributions, and meteorological conditions of cirrus clouds in the above-mentioned regions of the atmosphere.