**id:**152
**firstauthor_firstname:**Maximilian
**firstauthor_lastname:**Maahn
**firstauthor_email:**mmaahn@meteo.uni-koeln.de
**firstauthor_affiliation:**University of Cologne
**firstauthor_country:**DE
**coauthor_names:**Löhnert, Ulrich (University of Cologne, Germany)
Pavlos, Kollias (McGill University, Montreal, Canada)
**presenting_name:**
**presenting_email:**
**abstract_title:**Using higher radar moments to study ice clouds
**abstract_classification:**Millimeter-wave cloud radars

**abstract_text:**There are still gaps in the understanding of microphysical properties and processes of ice clouds.
In-situ observations with aircraft are costly and cannot provide any long term observations which are
needed for a deeper understanding of the processes. Ground based remote sensing observations have the
potential to fill this gap, but uncertainties of current retrievals of cloud properties are high,
because only a fraction of the required degrees of freedom can be measured. For cloud radars, usually
only reflectivity and Doppler velocity are used for retrievals, few studies use spectral width as
well. The measured Doppler spectrum, however, contains more information than that. To exploit this
additional information, the presented study uses additional, higher moments of the Doppler spectrum
such as skewness and kurtosis together with the slope of the peaks. First, these higher moments are
used to test various parametrisations of size distribution, area, mass and shape of ice particles.
For this, ISDAC in-situ aircraft observations of ice clouds are modelled with the Pamtra forward
operator using the various parametrisations. The higher moments of the modelled Doppler spectra are
statistically compared with the observations of the MMCR radar of the NSA ARM site in Barrow to
ensure that the simulated radar measurements correspond to reality. Eventually, the information
content of the higher moments is evaluated and their potential for retrieving ice cloud properties is
estimated.

**presentation:**oral
**student:**student
**ws_opensource:**
**ws_dualpol:**
**ws_spectra:**interest