Andrea K.
Steiner
Wegener Center for Climate and Global Change (WEGC) (WEGC) and Institute of Physics, University of Graz, Graz, Austria
Florian Ladstaedter, Wegener Center for Climate and Global Change (WEGC) and Institute of Physics, University of Graz, Graz, Austria
Hallgeir Wilhelmsen, Wegener Center for Climate and Global Change (WEGC) and FWF-DK Climate Change, University of Graz, Graz, Austria
Poster
Observations of the Earth’s surface temperature provide undeniable evidence of a changing climate. While surface temperature trends are in good agreement amongst different groups, upper-air climate trends show larger uncertainties. Particularly in the upper troposphere and in the stratosphere, differences across conventional upper-air data sets can be substantial. This is identified as a key issue in the recent world climate report, stating the need for data with better accuracy for monitoring and detecting atmospheric climate change.

Radio Occultation (RO) based on Global Navigation Satellite System (GNSS) signals provides high quality observations in the upper troposphere and lower stratosphere region for more than 15 years now. From a climate perspective this is still a short record, but RO has demonstrated potential for atmospheric climate monitoring due to its high vertical resolution, accuracy, and long-term stability. Error characteristics are well understood and advances are ongoing towards establishing RO as a reference record with integrated uncertainty estimation.

We investigate vertically resolved atmospheric change signals in the troposphere to lower stratosphere based on the WEGC OPSv5.6 RO record 2001 to 2016. Using a multiple linear regression analysis we separate the different contributions to atmospheric variability, including the seasonal cycle, the Quasi-Biennial Oscillation, El Niño–Southern Oscillation, volcanic eruptions, and solar variability. We show the relevance of these contributions in terms of explained variability and discuss uncertainties and challenges in the detection of vertically resolved short-term trends. Furthermore, we present a comparison of RO trend results to trends from conventional upper-air data sets.
OSTS session
Regional and Global CAL/VAL for Assembling a Climate Data Record
Meeting name
Joint COSMIC Tenth Data Users' Workshop and IROWG-6 Meeting
Download to PDF