

Project “Nested high-resolution UA-ICON simulations for sounding rockets comparison at ALOMAR”

The aim of this project is to use UA-ICON simulations to support the joint NASA and Leibniz Institute of Atmospheric Physics (IAP) “Vorticity Experiment” (VortEx) measurement campaign that took place in March 2023 in Andøya, Norway. This campaign consisted of sounding rocket launches by NASA that was supplemented with ground-based lidar and radar observations by IAP and was designed to obtain comprehensive measurements of winds, temperatures, gravity waves (GWs) and turbulence in the mesosphere and lower thermosphere, which are crucial for a better description of subgrid processes and eddy diffusion in global atmospheric models. In the planned work, we aim to carry out high-resolution nested simulations over Andøya with UA-ICON for comparison and interpretation of the observational data collected from the VortEx mission. We aim to carry out UA-ICON simulations with 250 levels and a model top at 150 km in a global horizontal resolution of R2B7 (~20 km) with subsequent nests applied at R2B8 (~10 km), R2B9 (~5 km), R2B10 (~2.5 km) and R2B11 (~1.5 km) horizontal resolution. The proposed simulations shall continue the development resulting from the DFG funded MS-GWaves project in assessing how well the UA-ICON simulations agree with the observations. The comparison between the data from VortEx campaign and high-resolution nested UA-ICON simulations will shed light on the treatment of GWs at high-resolution upper-atmosphere setups, which will further support development and application of the UA-ICON model.