



## Modeling challenges in the alpine region of the Atacama Desert

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The primary goal of the Hungarian Atacama-expedition was to observe the climate and the climate change effects in the unhospitable environment of the highest regions of the Atacama Desert, at the Ojos del Salado. In 2016 the expedition group brought a micrometeorological station (with about 18 instruments) with themselves to provide atmospheric measurement as well beside the constantly working soil moisture and soil temperature ones. The meteorological station was placed at 5830 m altitude on rocky soil, where the nearby mountain peaks did not have a shading effect on it. Measured data was available at 5 minute interval.

This provides an exceptional opportunity to test numerical weather models in such extreme conditions. In about a 100 km<sup>2</sup> region the altitude varies between 3500-6800 m. The soil is extremely dry, fresh snow is rarely present and even at 6500 m height.

With the WRF model we conducted simulations to the region to assess the modeling capability of the model. Model runs are created with a 50-10-2 km nested setup using GFS as initial and boundary conditions for the 5 days of measurements. There was no significant weather phenomena during the period, only an occasional high level clouds were present.

In this study we will focus on the challenges of the modeling in this region, with special regard to initial condition and numerical problems. Sensitivity analysis of the parameterizations will also be included. Model results of both the 10 km and the 2 km simulations will be presented. Initial model results showed an underestimation of the measured surface temperatures by 10-15 °C but with rigorous testing the bias was decreased to a few degrees.