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High Resolution WRF Regional Climate Modeling for the Andes-Amazon Transition Region: Model Validation Early Results

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The western Amazon and eastern flank of the Andes form what is known as the Amazon-Andes transition region. This region is characterized by the presence of the rainiest area in the Amazon basin with an average precipitation ranging from 6000 to 7000 mm per year. This rainy zone is the result of interactions between large-scale circulation and local features. However, the physical mechanisms controlling this rainfall patterns in the transition region are poorly understood. On the other hand, high precipitation values in the area, along with erosion, sediment transport and the geological mountain uplift help to explain this region as one of the most species-rich terrestrial ecosystems. Nevertheless, accelerated deforestation rates reported both in tropical Andes and central-southern Amazon threat the biodiversity hotspots and can induce alterations in land surface energy and water balances. In this context, the use of regional climate models can shed light on the possible consequences of deforestation on rainfall in the transition region.

The early results presented here are the first step in a work that seeks to gain a better understanding in the mechanisms involved in precipitation generation over the Amazon-Andes transition region, as well as the assessment of deforestation impacts on spatial and temporal rainfall variability during austral summer. The Weather Research and Forecasting (WRF) regional climate model is used with three nested domains. High resolution simulations (1km horizontal grid size) are performed over the key regions of Cuzco and Bolivian slopes. As a perspective, deforestation scenarios following the land use change trajectory observed during the last decade will be used in future works. The results of this work can help to dimension the consequences of deforestation on key ecosystems such as Andean hotspots.