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High-resolution dynamic downscaling of CMIP5 output over the Tropical Andes

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Our project is targeted towards making robust predictions of future changes in climate over the tropical part of the South American Andes. This goal is challenging, since tropical lowlands, steep mountains, and snow covered subarctic surfaces meet over relatively short distances, leading to distinct climate regimes within the same domain and pronounced spatial gradients in virtually every climate quantity. We use an innovative approach to solve this problem, including several quadruple nested versions of WRF, a systematic validation strategy to find the version of WRF that best fits our study region, spatial resolutions at the kilometer scale, 20-year-long simulation periods, and bias-corrected output from various CMIP5 simulations that also include the multi-model mean of all CMIP5 models. We show that the simulated changes in climate are consistent with the results from the global climate models and also consistent with two different versions of WRF. We also discuss the expected changes in snow and ice, derived from off-line coupling the regional simulations to a carefully calibrated snow and ice model.