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Dynamical downscalling of New Caledonia Climate: present-day and projections for the Late Twenty-First Century.

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We use a regional dynamical downscaling approach (WRF) at 4km to simulate the climate in New Caledonia, South Pacific, a mountainous island in the present and in the future for the late Twenty-First Century. For the future climate, we use a pseudo-warming method to force the nested models boundaries and downscale the CMIP5 climate models at the 2100 horizon under RCP8.5 as these models are too coarse resolution to represent the proper island orography and thus its climate. The regional model is capable of simulating the main climatic characteristics (spatial distribution of precipitation, weather regime, seasonal cycle) of New Caledonia. Our projections shown a decrease of precipitation about 20% in average on the New Caledonia with strong contrasts between the east (-10%) and the west (-30%) coast in the future climate. This precipitation reduction is mainly concentrated during the austral summer (∼75%), and weather regime analyses highlights the importance of the trade wind regime modification in this future reduction. We also explore the evolution of climate extremes through the calculation of about sixty indices of high interest for various socio-economic sectors in New Caledonia using the dedicated ClimPACT2 package. For instance, we show an alarming increase of number (multiplied by 2) and duration (multiplied by 6) of heat waves in the future climate of New Caledonia.