

A new Python module to convert WRF regional climate projections into CORDEX-compliant datasets

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Abstract: Regional climate modelling (RCM) helps better resolve the drivers of regional climate e.g., complex topography, convective processes, and produce climate projections at high resolution. RCM simulations are fundamental components for climate services on national and regional scales. NARClIM (NSW and Australian Regional Climate Modelling) is designed to produce an ensemble of regional climate projections for southeast Australia. The first two generations of NARClIM (1.0 and 1.5) were delivered in 2014 and 2020, which have been widely used in scientific research, climate changes impacts assessment and long-term planning. The third generation of NARClIM (2.0) is in production.

CORDEX (Coordinated Regional Climate Downscaling Experiment) initiative aims to advance and coordinate the science and application of regional climate dynamical downscaling through global partnership. CORDEX-Australasia coordinates regional climate modelling over the Australia and southern Pacific. Both NARClIM1.5, and now NARClIM2.0, contribute to CORDEX.

CORDEX provide guidelines for modelling groups to produce a wide range of required end-user climatic data sets at specific time scales. These data must meet specific requirements such as CF compliance (Climate and Forecast conventions). The WRF (Weather Research and Forecasting) is a popular RCM for simulating regional climate projections and is in widespread used by modelling groups around the world, including for NARClIM2.0. WRF produces outputs that are not CF compliant, nor does it produce all the required CORDEX end-user data sets. Here we present a Python solution to convert WRF outputs into CORDEX compliant datasets. This module is sufficiently general that the outputs could be used for other CF compliant projects other than CORDEX with simple changes to module configuration.

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