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Resolution sensitivity of Atlantic tropical cyclone climatology in PRIMAVERA-HighResMIP AGCMs

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For the first time in the CMIP exercise, international modelling groups have come together under a coordinated protocol, HighResMIP, which is designed to investigate the role of global model resolution in the simulation of climate processes. The atmosphere-only protocol prescribes simulations of 65 years (1950-2014) using historic forcing, including simplified anthropogenic aerosol variability (with constant natural background aerosol). Six European groups within the H2020 PRIMAVERA project have completed these simulations with at least two different resolution models, the lower typical of CMIP-type models, while the higher aims towards 20km mesh size. All the models (and several reanalyses) have been analysed using the same feature tracking software (TRACK) with no tuning of algorithm for model or basin.
Several aspects of the North Atlantic tropical cyclone climatology and interannual variability have been examined. Initial results show a systematic improvement in the spatial distribution of tropical cyclone tracks at enhanced resolution, particularly on the eastern side of the Atlantic basin, together with an increase in the mean frequency of storms. However, correlation of the interannual storm frequency with observations shows less resolution dependence, at least when only single ensemble members are used. Similar analysis is also being conducted using Accumulated Cyclone Energy (ACE) index rather than simply storm frequency.
A set of 13 perturbed initial condition ensemble members has been produced for one model at one resolution (for the 1979-2014 period), which shows a large spread in interannual variability performance. This dataset will be used to assess the key drivers of this variability, and discover the causes of divergence in individual member performance.