

Tropical cyclone studies with a hierarchy of climate model resolutions from the UPSCALE project

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A traceable hierarchy of global atmosphere climate models at resolutions ranging from 130km up to 12km has been developed in order to investigate aspects of climate processes such as tropical cyclones. In particular, an ensemble of integrations for 1985-2011 at 130km, 60km and 25km resolution has been completed, in addition to the core CLIVAR HWG experiments. In terms of variability, the Atlantic tropical cyclone simulation improves with higher resolution (ensemble correlation of 0.75 over 1985-2011 at 25km) and numbers and standard deviation improve – with indications that African Easterly Waves (AEW) and remote teleconnections both play a part. Biases in the Gulf of Mexico, eastern and central Pacific seem to be due to excess vorticity initiating too many structures here.

Future climate timeslice integrations suggest a large reduction in Atlantic tropical cyclones, with stronger shear and weaker correlations with some remote forcings, with little change in AEWs.

Tropical cyclone intensity is weak at all resolutions, and some investigation of this looking at composite cyclone structure, together with some parameter sensitivity and updated dynamical core results, will also be shown.