



Climate change of Southern Hemisphere cyclone activity and its possible mechanisms

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This study investigates Southern Hemisphere cyclone activity in simulations of the recent climate and the 21st century period according to the IPCC SRES A1B scenario. Therefore, reanalysis data and the data of a multi-model ensemble are analysed and potential mechanisms leading to the changed behaviour of cyclone track density are discussed.

Compared to reanalysis data, the overall spatial distribution patterns of cyclonic activity are well represented in most of the models although a partly large underestimation of the number of tracks is observed in individual models. Hence, we use a scaling approach to combine the cyclone statistics from different models into a multi-model ensemble.

In the future climate simulations, the total number of southern hemisphere cyclones is reduced and associated with a general poleward shift. In the ensemble mean perspective increasing track density is found south of about 55°S with significant positive changes up to 20% around 65°S.

An exemplary study of three AOGCM integrations analyses mechanisms leading to the robust shift of cyclone track density and reveals a relation to both tropical upper tropospheric warming and shifting meridional SST gradients in the Southern Ocean.