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A climatology of poleward moisture transport by southern hemisphere extra-tropical cyclones

Victoria Sinclair (1) and Helen Dacre (2)

(1) University of Helsinki, Division of Atmospheric Sciences, Department of Physics, Helsinki, Finland (Victoria.Sinclair@helsinki.fi), (2) Department of Meteorology, University of Reading, Reading, UK

Extra-tropical cyclones constitute a significant component of the climate system and play a large role in transporting heat and moisture from the tropics to the mid-latitudes and polar regions. The amount of moisture transported polewards by extra-tropical cyclones exerts a strong control on how much precipitation occurs in the mid-latitudes and polar regions. In this study, 35 years of ERA-Interim data is analyzed to quantify how much moisture is transported polewards by extra-tropical cyclones in the current climate. We focus on the southern hemisphere as poleward moisture transport can affect the surface mass balance of the Antarctic ice sheet and consequently global sea levels. To calculate the moisture transported by extra-tropical cyclones, a novel method is employed in which first all cyclones in the dataset are identified using an objective feature tracking algorithm. Next a mask is centred around each cyclone and the moisture transport occurring within that mask is calculated and attributed to that cyclone. The advantage of this method over the more-traditional transient eddy approach is that moisture transported by subsets of cyclones can be determined. In this presentation we will show that cyclones are responsible for almost 80% of the total poleward transport in all seasons. In SH summer the maximum region of poleward moisture transport occurs downstream of South America whereas in SH winter the regions of maximum poleward moisture transport occur south of Australia and in the southern Pacific Ocean. Results will also be shown that demonstrate that the strongest 10% of cyclones, in terms of relative vorticity, are responsible for 23% of the cyclone-related poleward moisture transport. This finding suggests that if the number of strong cyclones increases in the future, the total poleward moisture transport may also increase.