

# **A comparison of quasi-millennial extratropical winter cyclone activity between the Northern and Southern Hemisphere**

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## **Abstract**

The winter extratropical cyclone activity on both hemispheres during the last one thousand years within a global climate simulation was analyzed by tracking cyclones, and then clustering them consecutively for each hundred years. There is very strong year-to-year variability for winter extratropical cyclone numbers of both hemispheres. Larger variations on centennial time scale can be seen for Southern Hemisphere (SH), more so than for its Northern Hemispherical (NH) counterparts. However, no obvious trend can be found on both hemispheres. The mean tracks of clusters over the Southern Indian Ocean and near New Zealand shift poleward from the 11<sup>th</sup> to the 20<sup>th</sup> century while the clusters in the central Southern Pacific shift equatorward. This is quite different from Northern Hemispheric cyclone positions which change only marginally. Compared to the NH mid-latitude cyclones, the SH cyclones have higher percentage of long lifespan (last over 10 days). Cyclones deepening fast (maximum deepening rates over 10 hPa/12h) over the oceans of the SH are fewer than the oceanic counterparts of the NH. Frequencies of cyclones over the North Pacific and North Atlantic are correlated to the Aleutian Low and the North Atlantic Oscillation (NAO) correspondingly. The winter storm activity in the Southern Hemisphere is closely related to the Antarctic Oscillation (AAO). The cyclone frequency over the Indian Ocean and South Pacific Ocean can be associated with the Indian Ocean Dipole (IOD) and El Nino-Southern Oscillation (ENSO) respectively.