



## **Sensitivity of Southern Hemisphere circulation to LGM and 4xCO<sub>2</sub> climates**

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The effect of Last Glacial Maximum (LGM) versus high CO<sub>2</sub> world boundary condition on the atmospheric circulation is evaluated, in particular in the Southern Hemisphere. PMIP2 and PMIP3 experiments, as well as the “abrupt 4xCO<sub>2</sub>” simulations from CMIP5, were analysed.

Robust findings include poleward expansion of the Mean Meridional Circulation (MMC) and intensified and poleward-shifted Southern Westerly Winds in the 4xCO<sub>2</sub> simulations, which is consistent with recent observations and 21st century climate change projections. For the LGM, stronger and southward shifted northern hemisphere MMC, and weakened southern Hadley cell was found. However, diverse model sea-ice response to LGM boundary conditions introduce non-linear atmospheric circulation response, including the Southern Westerly Winds and the Ferrel Cell, through a strong coupling between sea-ice extent, surface temperature gradients and the Southern Westerly Winds.