**An emergent constraint on future shifts in the Southern Hemisphere westerly winds and storm track**

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The Southern Hemisphere westerly winds and associated storm track are an important component of the climate system. The westerly winds drive upwelling in the Southern Ocean and thus play a key role in the exchange of carbon between the deep ocean and atmosphere. The position of the storm track determines precipitation patterns across the mid-latitudes. These winds are also a primary driver of ocean circulation under the floating Antarctic ice sheet, which has a major impact on the ice discharge toward the ocean. The westerly winds and storm track are expected to shift poleward under anthropogenic global warming, with far reaching implications for global climate, the carbon cycle, and the Antarctic ice sheet contribution to sea level rise. However, the magnitude of the predicted poleward shift in the winds varies greatly between differing climate models. This stage aims to use ‘emergent constraints’ (Eyring et al, 2019) to reduce the uncertainty in the predicted future shift in the position of the westerly winds and storm. The stage will combine newly identified emergent relationships from a large ensemble of climate models (Gray et al 2021) with historical sea surface temperature data to constrain the future shift in the westerly winds and storm track. The stagiaire will analyse output from an ensemble of IPCC class climate models (CMIP5/ CMIP6) as well as historical climate data. The findings of the stage will have implications for our understanding of future climate change.

Eyring, V., et al, 2019, Taking climate model evaluation to the next level, https://doi.org/10.1038/s41558-018-0355-y

Gray, W.R., de Lavergne, C., Wills. R.C., Menviel, L., Spence, P., Holzer, M., Kageyama, Michel, E., 2021, Poleward shift in the Southern Hemisphere westerlies synchronous with the deglacial rise in CO2. EarthArXiv, <https://doi.org/10.31223/X5P02C>