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Characterising Dansgaard-Oeschger cycles: from MIS3 to today

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One of the main contributors to palaeoclimate variability on millennial timescales is understood to be Dansgaard-Oeschger (D-O) cycles. Our awareness of these phenomena arises primarily from quasi-periodic, abrupt transitions of large magnitude detected in $\delta^{18}O$ records from Greenland ice cores (e.g. Dansgaard et al, 1982; Johnsen et al, 1992), although there is evidence of similar variability in other archives and regions. D-O cycles have plenty to capture the imagination:

- the strength and rapidity of climate changes over Greenland,
- their regularity throughout MIS3 (~60 to 30 thousand years before present) and occurrence during the last deglaciation contrasting with their relative absence during the Last Glacial Maximum and Holocene,
- their opposed characteristics in Greenland and Antarctica,
- and that different models require different boundary conditions to reproduce this phenomena, if they can reproduce it at all.

This talk characterises D-Olike cycles in two different models: Planet Simulator (PlaSim, an Earth System Model with simplified atmospheric physics, thermodynamic sea ice, and simplified ocean dynamics), and COSMOS (a CMIP3-era ESM). We identify four phases to D-O cycles and commonalities and differences in their representations in these models. Finally, we examine which phases of this type of variability continue to contribute to climate variability today and what that looks like.