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## Relationships between clouds and circulation in reanalyses and climate models

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Cloud feedbacks remain the dominant source of uncertainty in climate model predictions of the surface warming response to increasing carbon dioxide. One cause of this uncertainty is the intimate coupling between clouds and circulation: cloud responses to circulation changes are poorly understood, the circulation changes are themselves uncertain, and the potential for changes in cloud to further influence circulation contributes further uncertainty.

Motivated by the need to better understand the coupling between clouds and circulation, this presentation describes the relationship between cloud radiative effects and circulation regime (based on vertical velocity at 500 hPa) over the tropical Pacific Ocean. Based on a combination of vertical velocity from state-of-the-art reanalyses with satellite radiation measurements, we examine how the relationship between cloud and circulation changes with spatial and temporal scale, season, and ENSO index. We then examine whether these relationships are reproduced in a range of models, ranging from high resolution idealised cloud resolving simulations to the latest CMIP6 climate simulations.