Low-frequency variability in the North Atlantic circulation and coupling with decadal SST variability

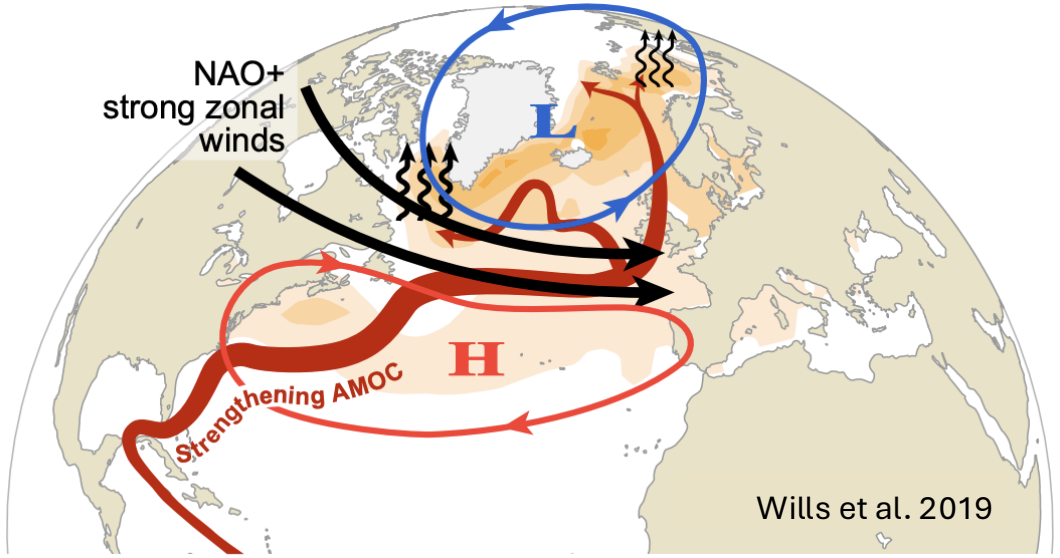
Background:

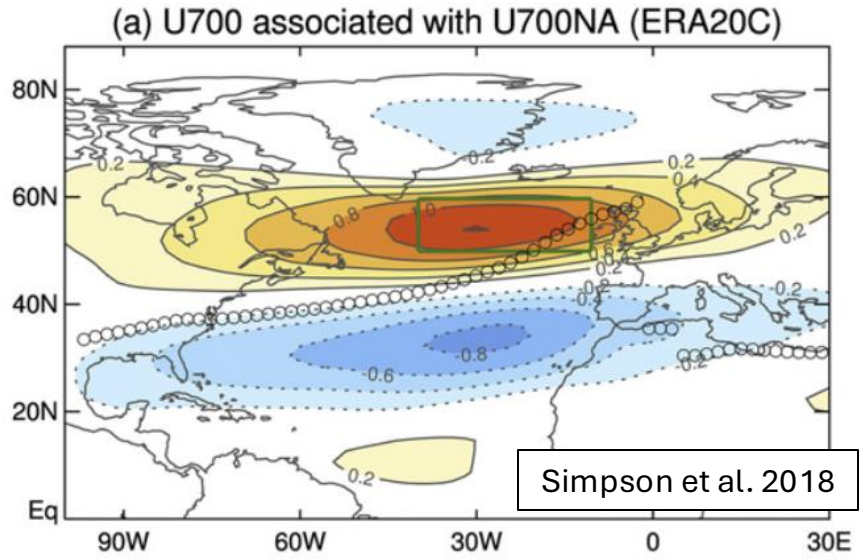
- Observations show much stronger decadal variability in the jet stream than climate models
- The weak decadal circulation variability in models is hypothesized to result from too weak coupling with sea surface temperature) (SSTs), a problem which might be alleviated in high-resolution models

Research questions:

- What are the patterns of decadal atmospheric circulation variability in observations? What are their mechanisms?
- How do the decadal variability patterns and mechanisms differ across observations and high- and low-resolution models?

Approach: Statistical pattern-recognition methods (low-frequency component analysis, maximum covariance analysis) applied to reanalysis and climate model data (Python); lead-lag analysis to give insight into mechanisms and causality (Python)





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Mechanisms of decadal variability in the South Pacific

Background:

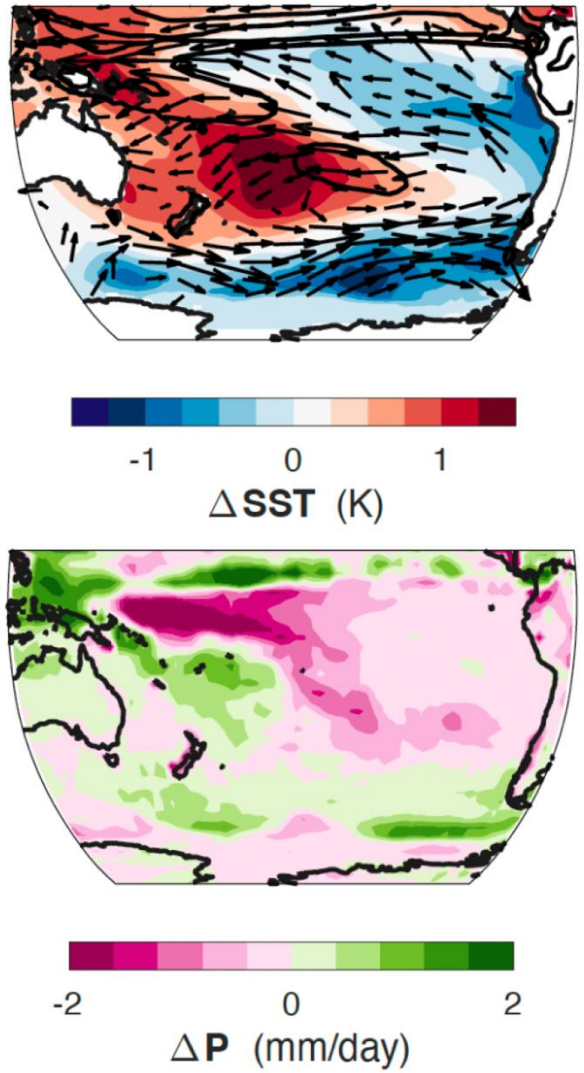
- Decadal sea-surface temperature (SST) variability in the South Pacific is relatively understudied compared to decadal variability in the Northern Hemisphere
- This region is increasingly recognized as playing an important role in trends over the last half century

Research questions:

- What are the mechanisms of South Pacific decadal variability (SPDV) and in particular the role of atmospheric and oceanic processes?
- Are climate models able to represent the observed pattern and mechanisms of SPDV?

Approach: Statistical pattern-recognition methods (low-frequency component analysis) applied to reanalysis and climate model data (Python); lead-lag analysis to give insight into mechanisms and causality (Python)

Austral Winter/Spring Changes (1980-2022)



DiNezio et al., in prep.

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