

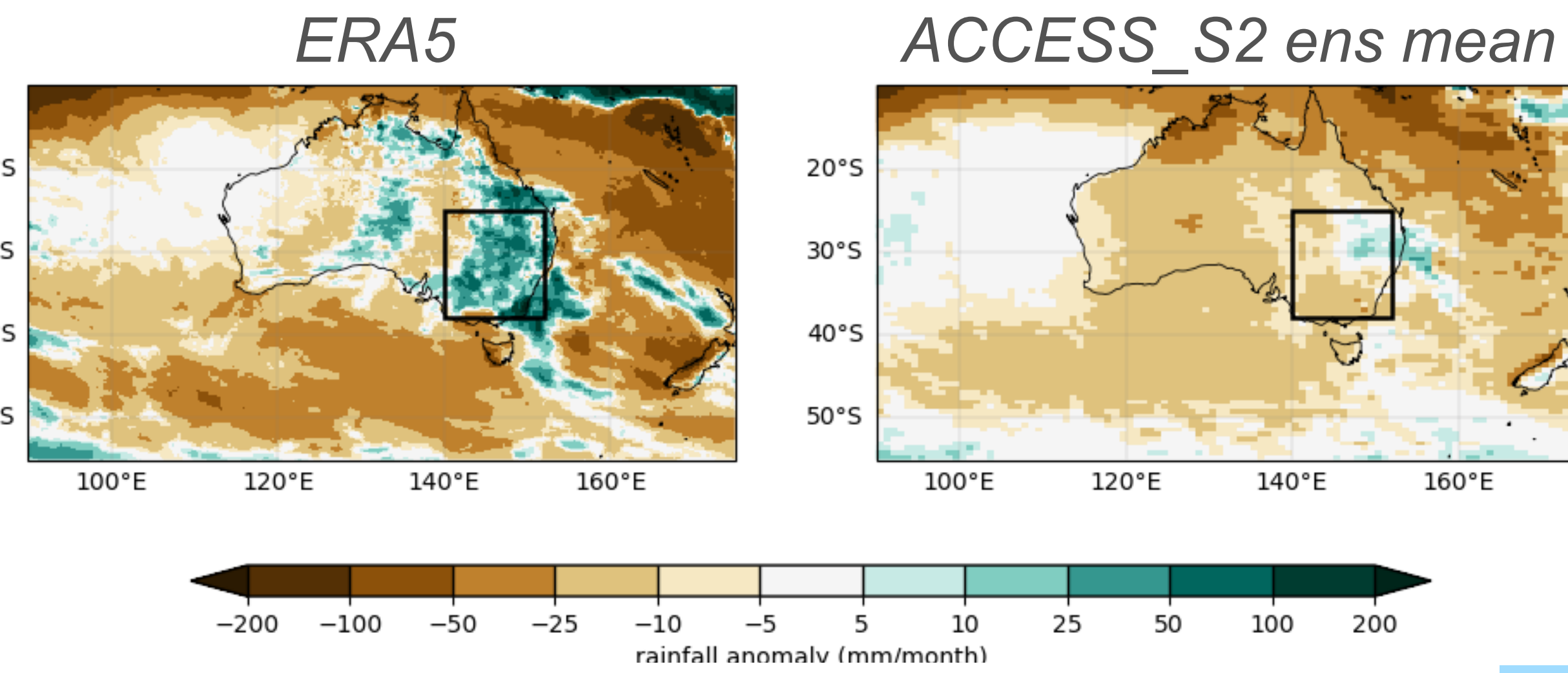
Breaking the El Niño Canonical Impact: Drivers and Forecast Skill of Australia's Wet November & December 2023

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The November Paradox:

The Expectation: Hot and Dry

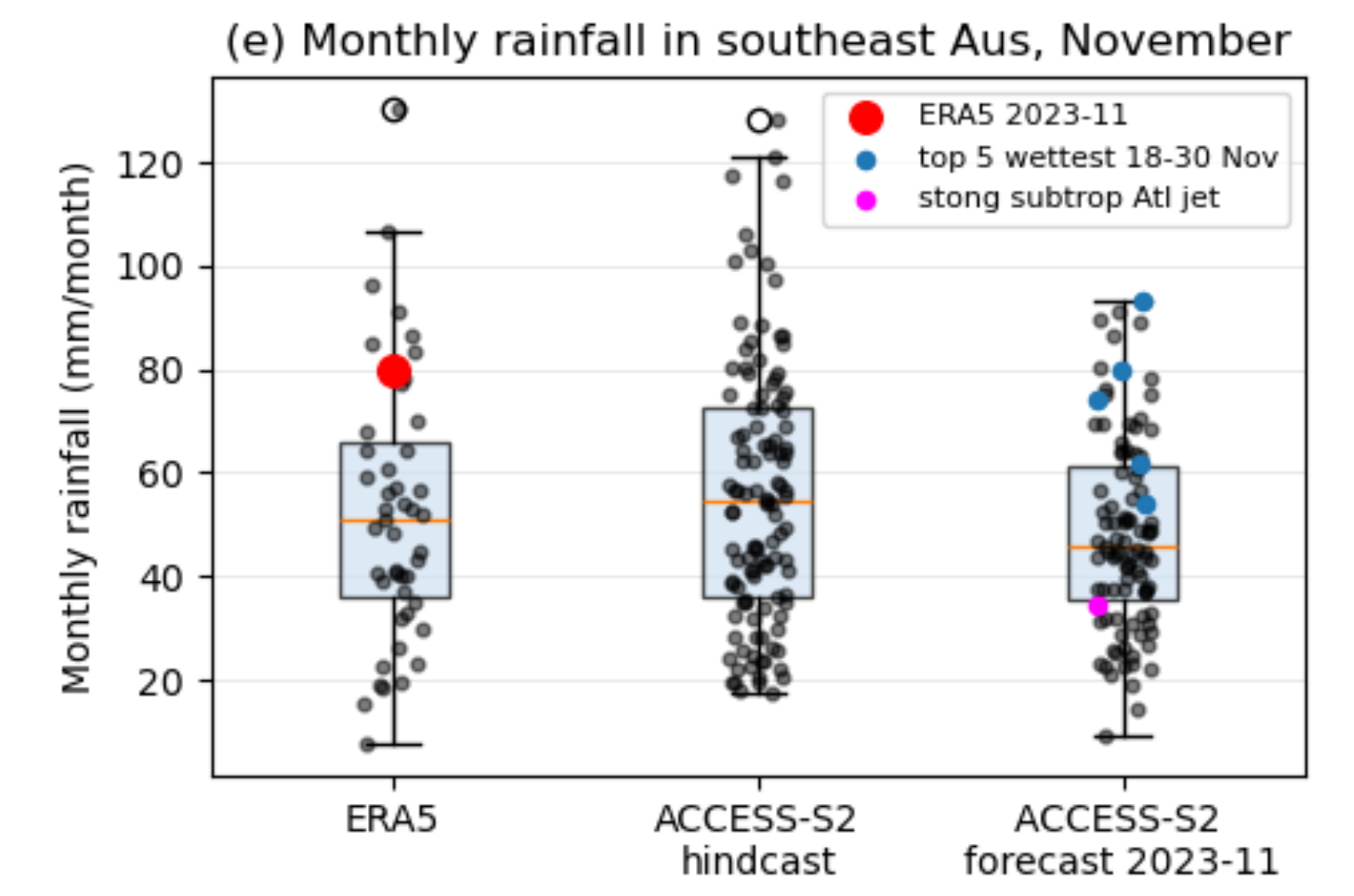
- November 2023 was dominated by a concurrent *strong El Niño* and an exceptionally intense *positive Indian Ocean Dipole* (IOD).
- Canonical pattern*: Suppressed rainfall in southeast Australia in late spring.
- ACCESS-S2 forecast for southeast Australia was close to the climatological mean, with a spread almost as large as the climatological spread



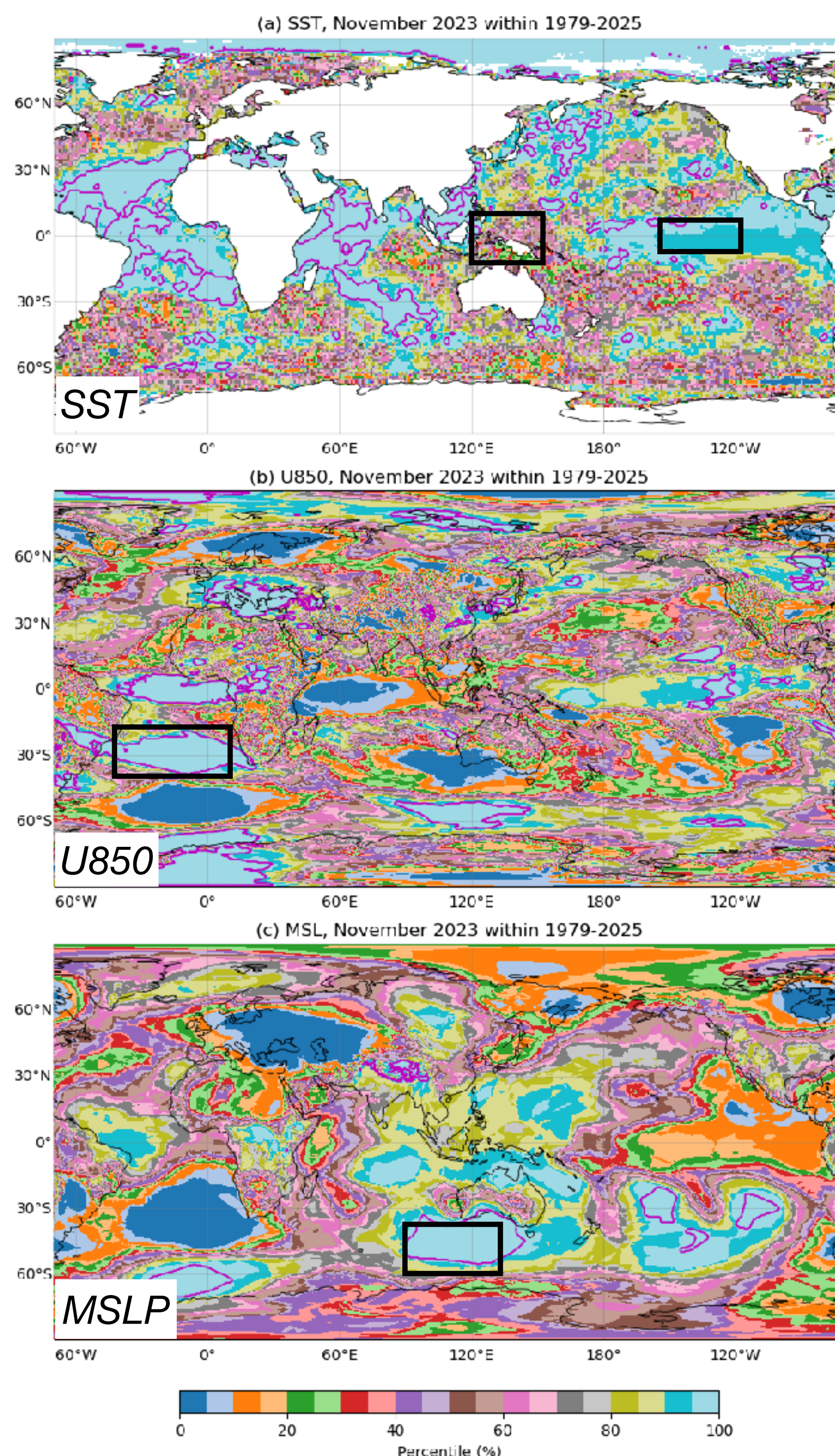
The Reality: Extreme rainfall

- Instead of a drought, eastern and southeastern Australia experienced unprecedented rainfall anomalies and major flooding events.

Despite a relatively neutral forecast, the expectations were heavily dominated by the strength of the tropical drivers, leading to strong criticism of the Bureau's seasonal forecast



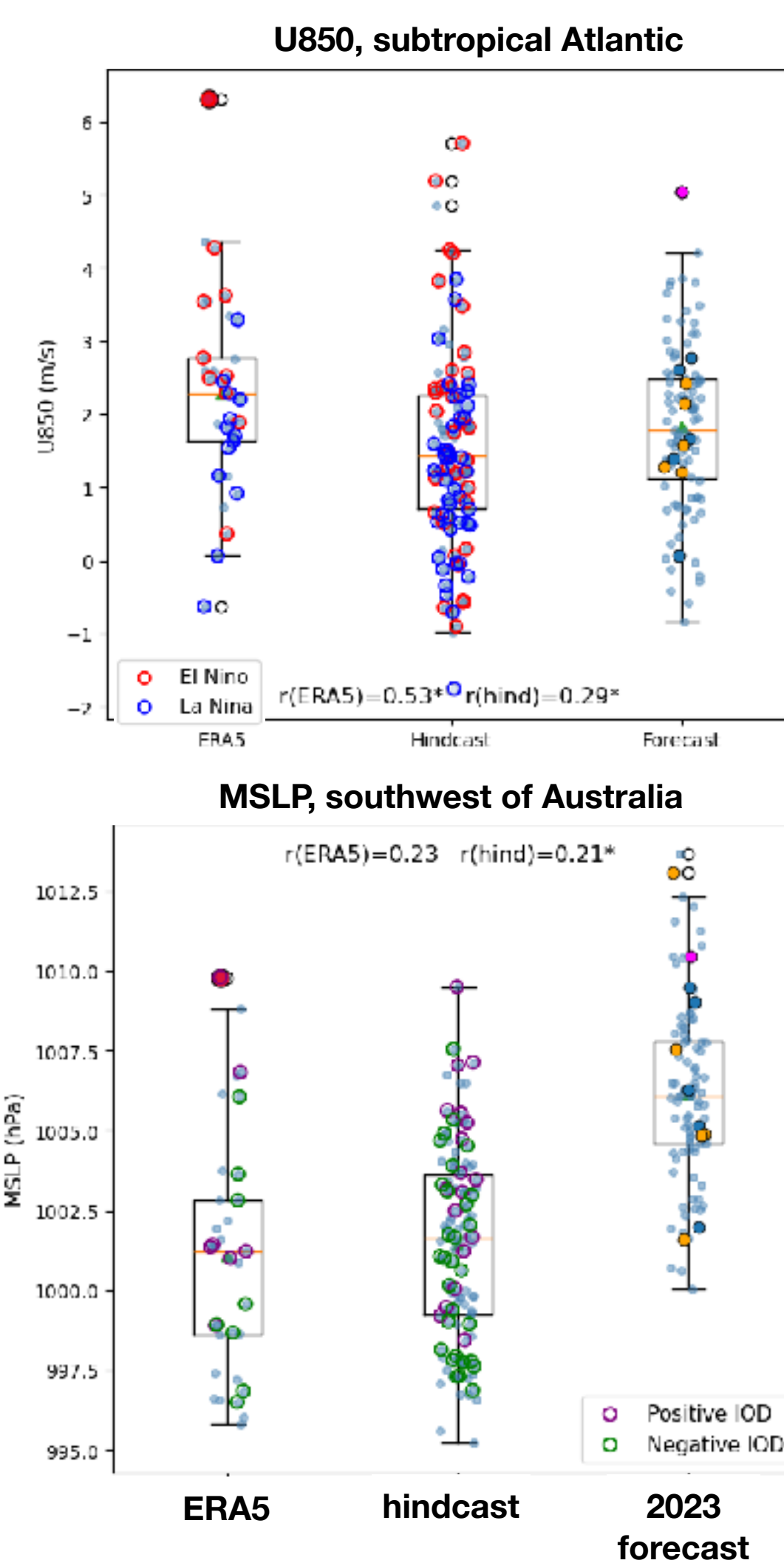
How anomalous was November 2023?



SST and upper-level divergence:

Was El Niño muted?

The strong warming in the tropical Indian and Atlantic Oceans was reported to mute the ENSO impact on the Northern Hemisphere. However, to the north of Australia, the anomalous convergence was consistent with the *El Niño* & *positive IOD*.

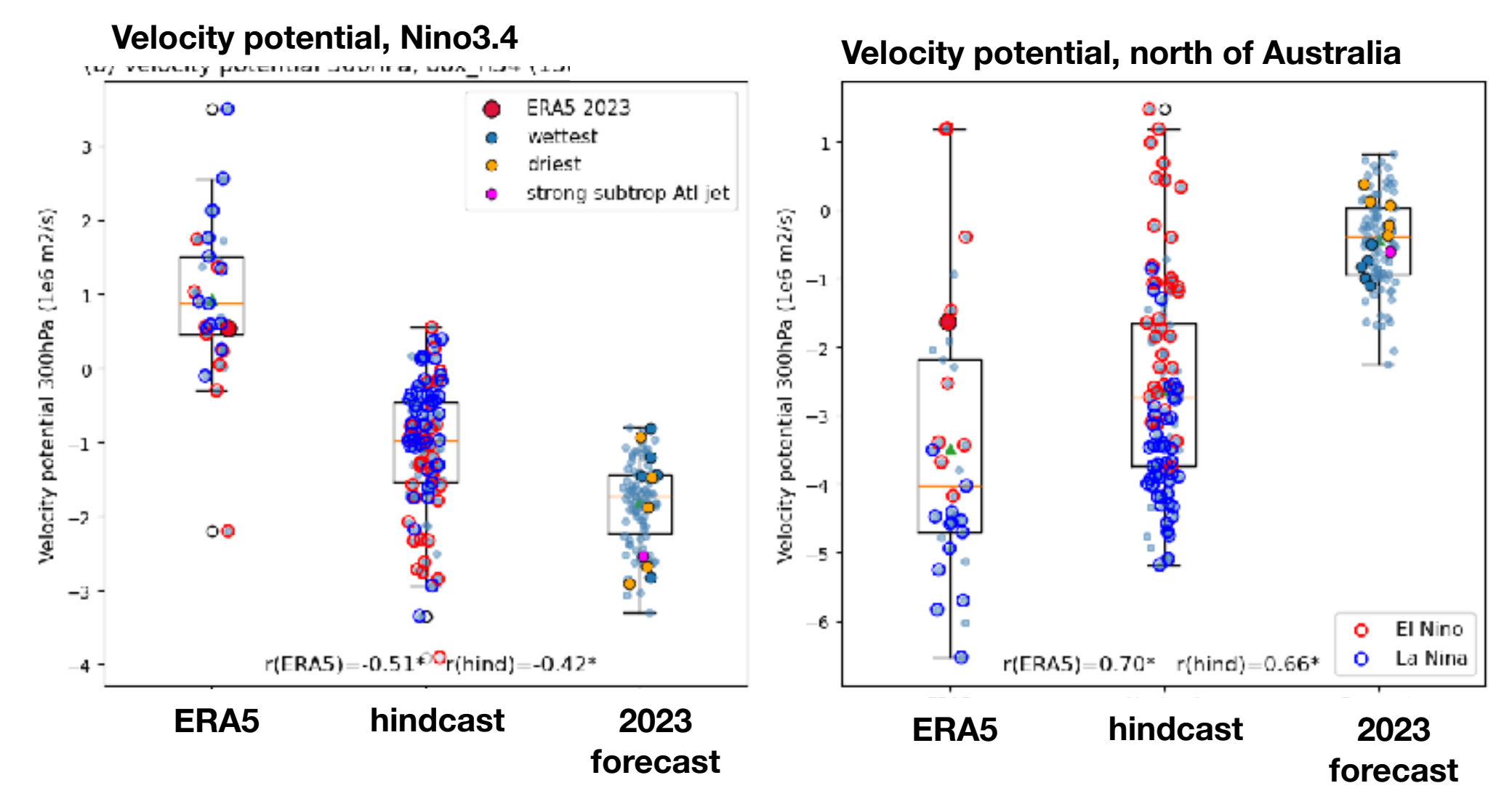


U850 & U300

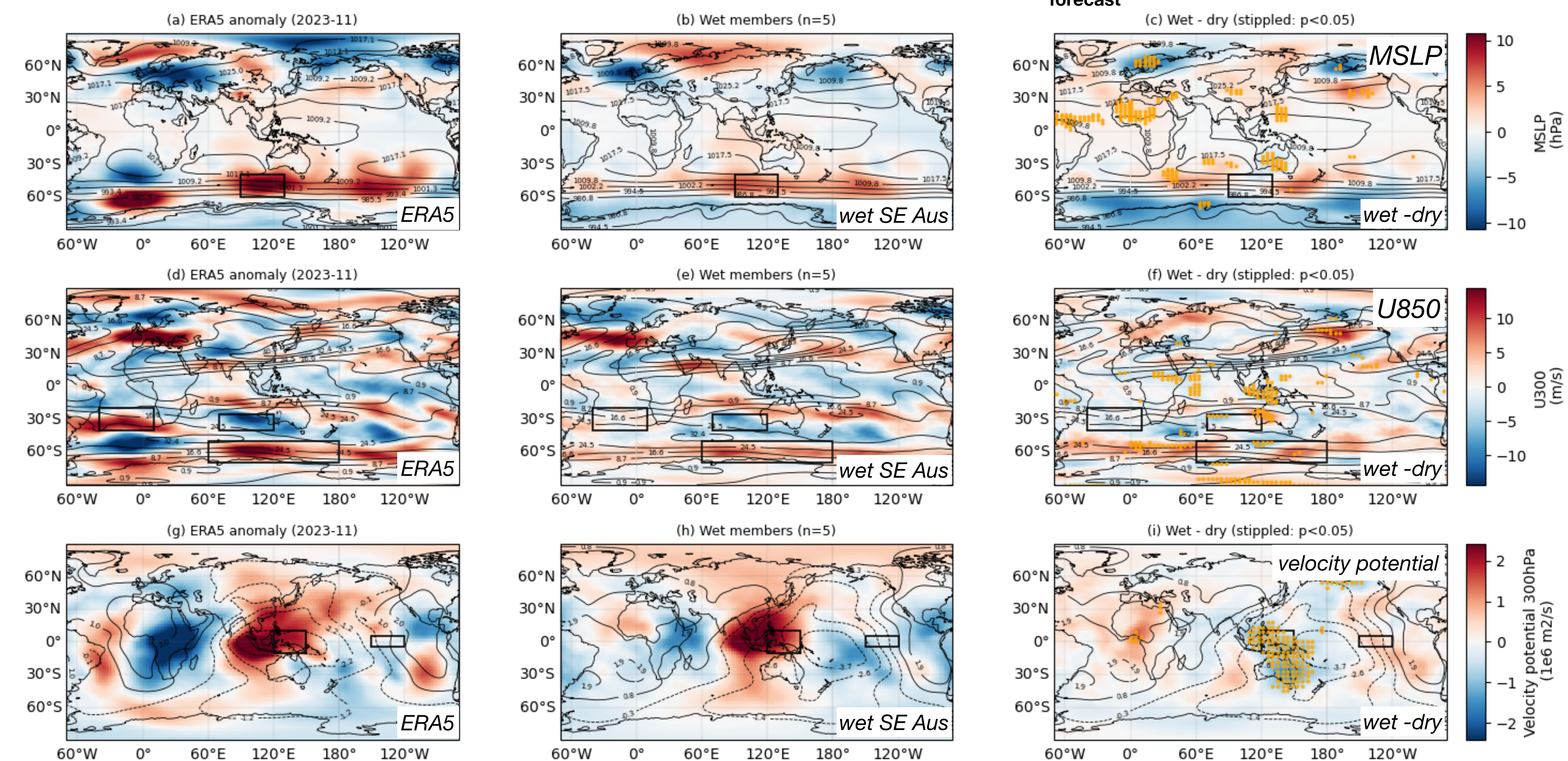
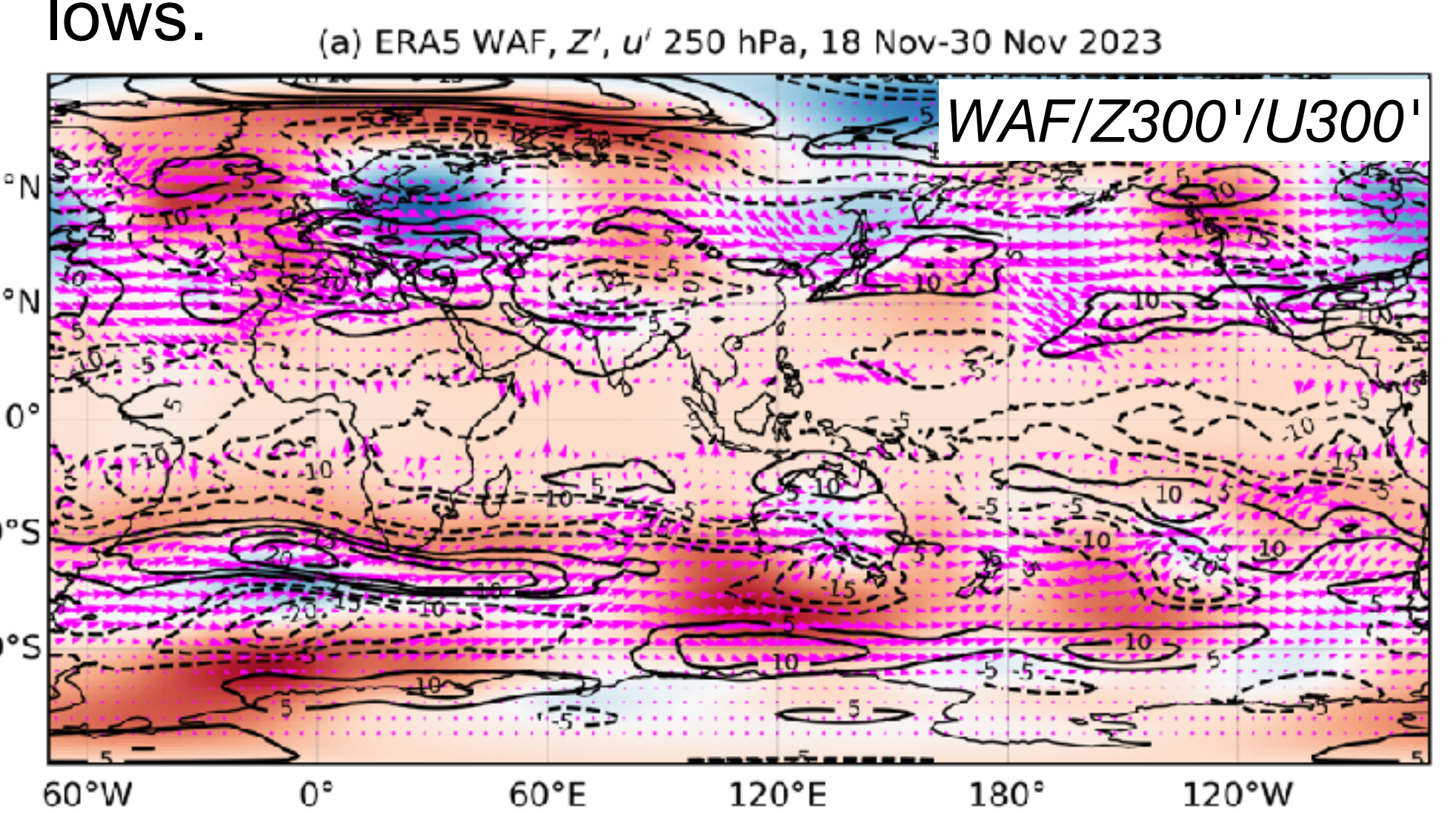
The strongest Atlantic subtropical jet on record. The spread in ensemble members suggested that jet intensification was primarily driven by upper-level dynamics rather than SST gradients.

MSLP

The high MSLP to the southwest of Australia was a result of the *pIOD* wavetrain amplified by WAF divergence



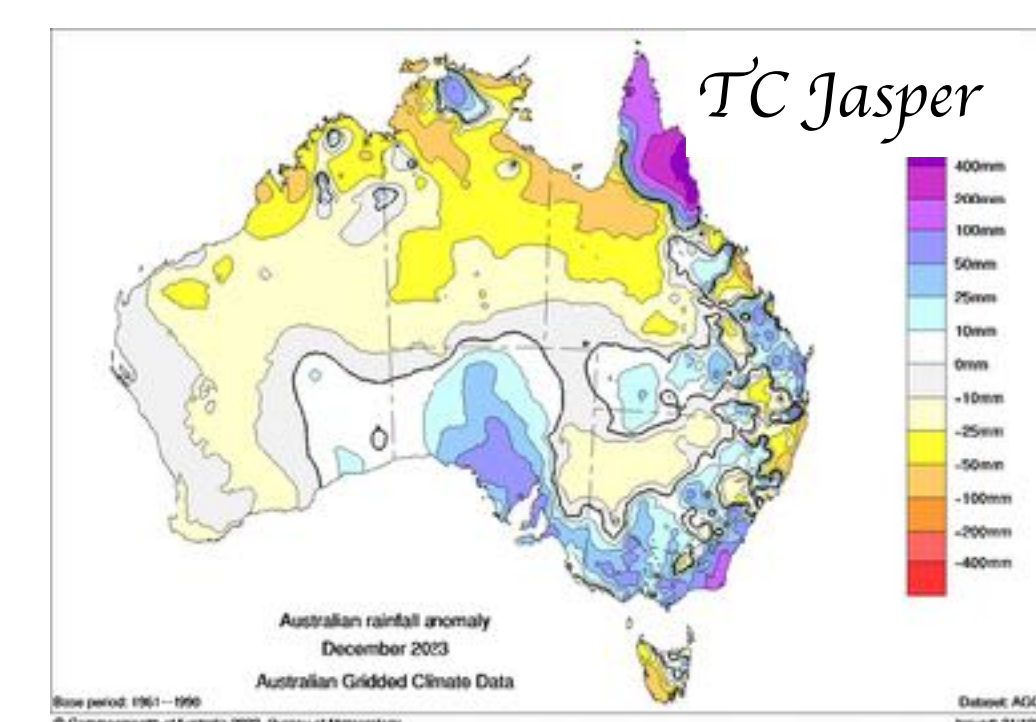
The extreme precipitation was heavily dictated by extratropical internal variability. The phase-locked interaction between the tropically forced *IOD* wave train and the strong Atlantic jet upstream promoted strong WAF convergence over southern Australia, anchoring rain-bearing cut-off lows.



Comparison of wet and dry SE Australia members reveals that wet conditions were achieved through a SAM-like polar jet intensification, while members with the strong *pIOD* wavetrain produced a dry forecast, consistent with the expectations. The main factor, however, was a weaker subsidence over the eastern Maritime Continent in wet members.

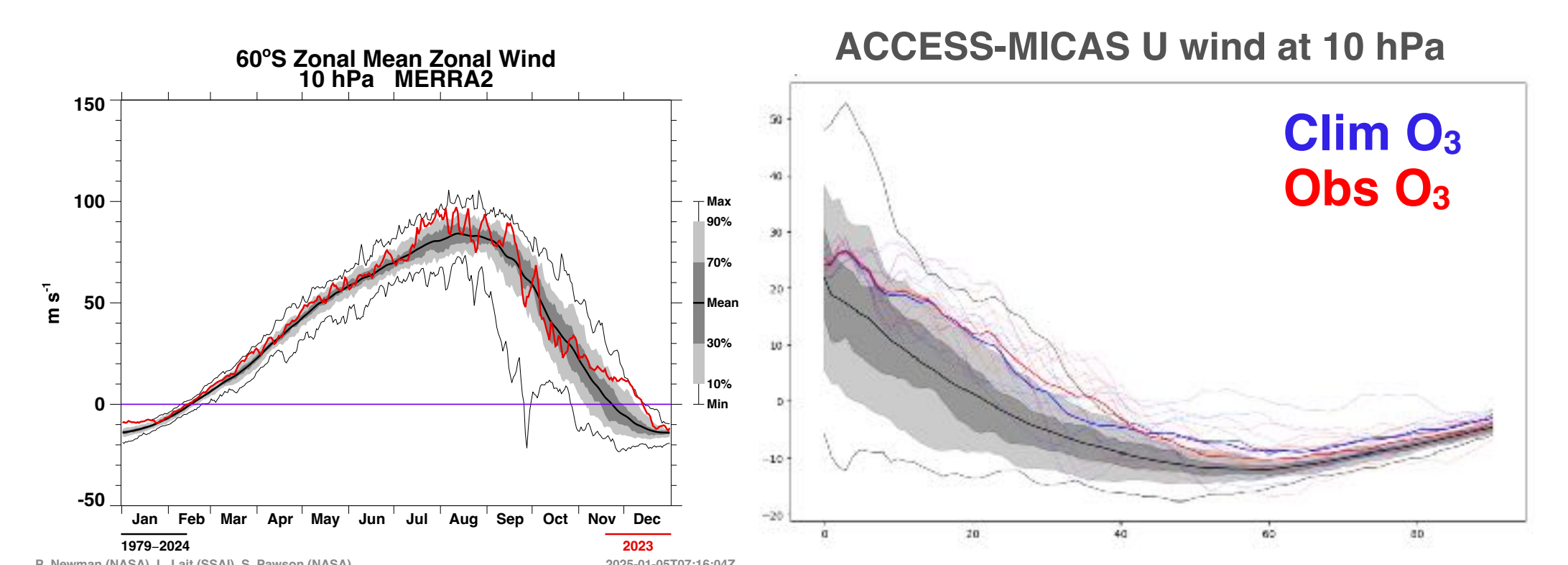
These findings demonstrate that the low predictability of the event stemmed from internal atmospheric variability rather than systematic deficiencies in model physics.

December 2023



The Late breakdown of a strong polar vortex led to

- a positive SAM ->
- formation of a cut-off low that promoted rainfall



Predictability in December:

Realistic ozone anomalies in the ACCESS-S2 initial conditions improve the prediction of the polar vortex, which improves the skill of SAM prediction.