Multiweek Prediction and Attribution of the Black Saturday Heatwave Event in Southeast Australia

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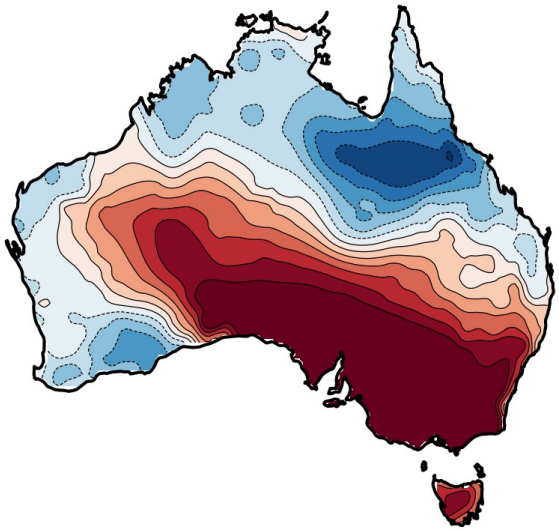
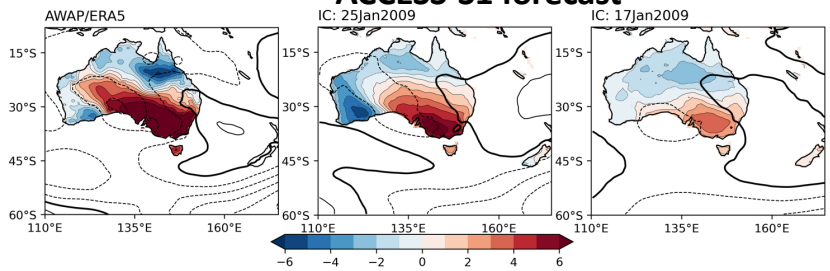
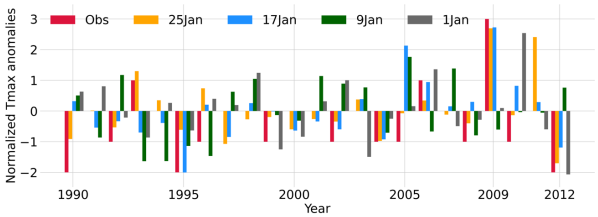


Black Saturday Heatwave event

- **Period**: 27 January – 8 February 2009
- **Affected region**: VIC, SA, TAS, NSW (SE Australia).
- **Temperature**: 12°-18°C above normal, with 49°C in north VIC, Melbourne (46.4°C), Adelaide (45.7°C).
- **Climate condition**: weak La Nina (Nino3.4: -0.8°C)
- **Casualty & loss**: 300+ people, livestock, and major economic loss due to wildfires.
- Leadbeater's possums lost about 45% of their natural habitat

ACCESS-S1 forecast

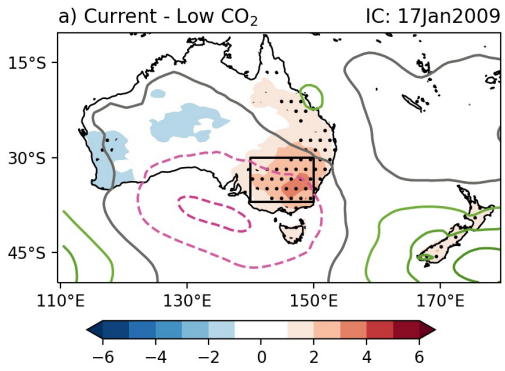


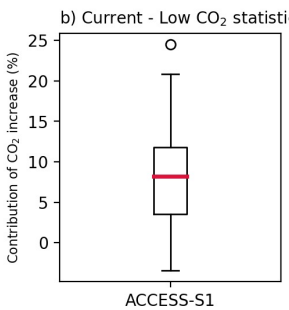


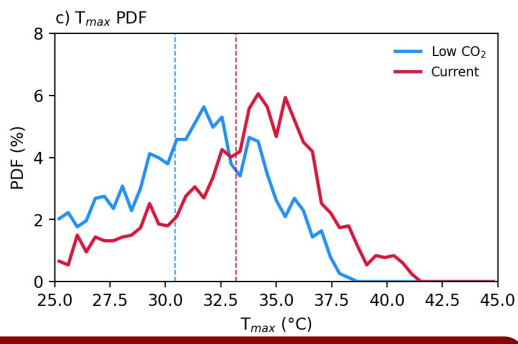
- Persistent High (Low) over Tasman Sea (southern Australia) → warmer T_{max} advection
- Observed pressure anomalies are weaker in the forecast.
- This leads to a weaker T_{max} forecast over SE Australia.
- Extreme T_{max} forecast is skillful up to 10 days lead time.

Climate Attribution Forecast Experiment

- Low CO_2 level: 297 ppm (~1905 CO_2 level)
- 17 Jan 2009 modified O-A initial conditions for the counterfactual world.
- Current forecast is up to 4°C warmer over SE Australia than the "Low CO_2" forecast, with an areal average difference of ~2.6°C.







Increased atmospheric GHG intensified the Black Saturday heatwave event.

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