# The role of sea-surface temperatures in a June 2016 east coast heavy rain event: insights from AUS2200 simulations

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In early June 2016 an east coast low complex brought extensive heavy rainfall that produced flooding in areas of Queensland, New South Wales, Victoria, and Tasmania. In the lead-up to this event, sea-surface temperatures (SSTs) in the Coral and Tasman Seas were the warmest on record. Our aim is to determine how the high SST, and its distribution, influenced the rainfall and the storm-system's evolution. To do this, three AUS2200 sensitivity to SST simulations, for the period 0000 UTC 3 June to 0000 UTC, 8 June 2016, have been run using ERA5 skin-temperature data over water. The three simulations are run with 1)1980-2019, 3 June average ERA5 skin temperature (Climatology), 2) constant 3 June 2016 ERA5 skin temperature (Fixed), and 3) daily evolving ERA5 skin temperature (Evolving). The Fixed and Evolving simulations, that include the observed warmer SSTs, produce greater rainfall than the Climatology simulation over much of the ocean area and most of the east-coastal mountains. The Fixed and Evolving simulations also produce a deeper east coast cyclone that intensifies over a prominent warm eddy. These cases also keep the low pressure further to the north, off the New South Wales coast, for longer than the Climatology run. Towards the latter stage of the simulation period, a complicated multi-centred low-pressure system around Tasmania, seen in observations, correlates better with the Fixed and Evolving simulations than the Climatology simulation. The potential mechanisms responsible for these differences will be discussed. Additional simulation results will be presented to investigate the relative roles of the warm eddy and the broad-scale warmer SST.