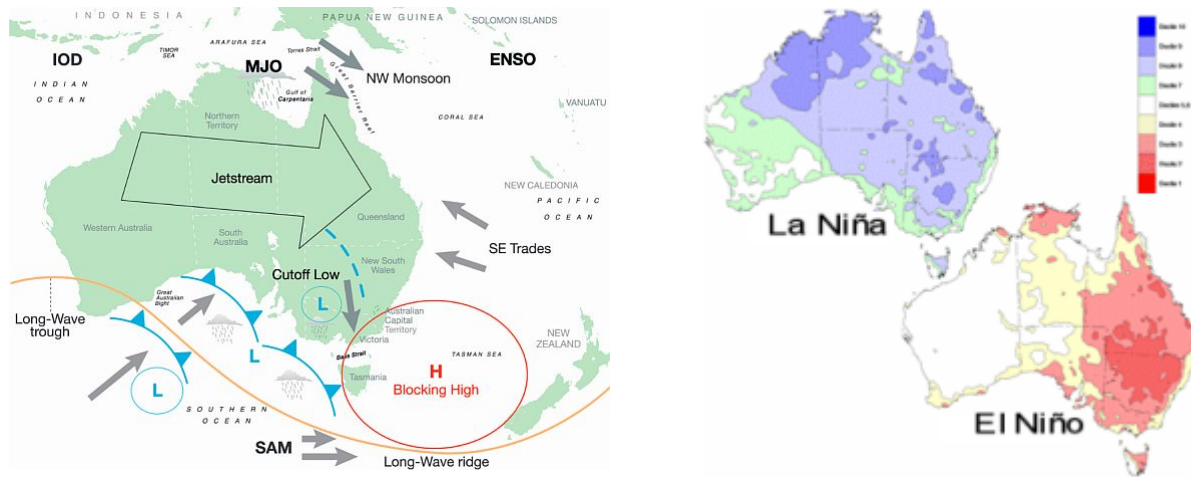


Master's thesis topic in “Large-scale Dynamics and Predictability” group IMK-TRO

18 December 2017

“The effect of the El Niño Southern Oscillation on Australian climate variability from a weather system perspective”



Sources: Risbey et al 2008, Bureau of Meteorology

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Description:

The year-to-year climate variability in Australia is strongly modulated by the El Niño-Southern Oscillation (ENSO), a natural cycle associated with periods of warming (El Niño) and cooling (La Niña) in the eastern tropical Pacific. Previous studies have shown that El Niño typically leads to reduced winter-to-spring rainfall in eastern Australia, a decreased snow depths in Australia's alpine regions, and warmer summer-time temperatures in southern Australia. However, it is still not fully understood how this year-to-year variability is related to processes on the synoptic time-scale.

In this Master's thesis, the effect of ENSO on Australian climate variability will be analysed using a novel data set of objectively identified weather systems. The goal of the first part of the work is to develop a conceptual picture on how different states of ENSO are related to the occurrence frequency of midlatitude weather systems around Australia such as midlatitude cyclones and anticyclones, fronts, warm conveyor belts, atmospheric blocking highs and cut-off lows. The results will then be used to attribute the observed variability in temperatures and precipitation to these weather systems. A focus will be on the El Niño events of 1982-1983 and 1997-1998 which were associated with very different rainfall responses in southeastern Australia.

We are looking for a highly motivated student with interest in tropical and midlatitude meteorology. Ideally, the student should be familiar in a Linux environment and have basic programming skills (e.g., Python, NCL, Fortran). Although the student will be primarily located at the Karlsruhe Institute of Technology, the student will also collaborate with partners at the School of Earth, Atmosphere and Environment at Monash University, Melbourne, Australia. Depending on the progress of the work, the student will have the opportunity of an extended research stay at Monash University.