

Abstract

In the Australian summer of 2010/11, Queensland experienced extensive flooding with the flooding occurring during a particularly strong La Niña event. The December Southern Oscillation Index (SOI) was +27.1 (National Climate Centre 2011), the highest December value on record and the highest monthly value since 1973, whilst other indicators of La Niña also indicate the strongest event since at least the mid-1970s, and one of the four strongest events of the last century (National Climate Centre 2011). The main purpose of this research is to investigate the 2010/11 floods and rainfall intensity and to contextualise it against the previous 40 years to understand whether this event can be understood in terms of large scale climate drivers. The coefficient of determination R^2 is used to determine the quality of the correlation. The R^2 value quantifies the amount of variance explained in the data and/or its relationship with another variable (i.e.: SOI and the percentage of Queensland rainfall stations recording rainfall deciles of 8 and above). An R^2 value of 0.4 or above is used to limit the results to correlations where the ENSO indices can account for at least 40% of the occurrences of Queensland high-quality rainfall stations recording rainfall deciles of 8 or above. The research looks at in situ data managed by the Bureau of Meteorology (created originally by Lavery et al. [1997]) to obtain results that show a positive correlation between NIÑO-4 (and SOI) values and very heavy rainfall indices at Queensland High Quality rainfall gauge stations during La Niña events. MATLAB is used create a matrix of the BOM dataset and to generate scripts for producing the correlations between intense Queensland rainfall and the SOI and NINO-4 index. The present study shows that the NINO-4 index and SOI are positively correlated (with varying levels of strength) with Queensland intense rainfall deciles for the periods of spring, summer and December. This study highlights the positive correlations between intense Queensland rainfall and the SOI and NINO-4 index. It also confirms the strong effects that the IPO inflicts on the correlations between SOI, NINO-4 and intense rainfall deciles in Queensland. This study asserts that while flooding of the summer 2010/11 magnitude has only occurred twice since 1970, on both occasions a negative IPO, highly positive SOI and strongly negative NINO-4 index coincided making it highly likely that these climatic conditions (producing a very wet spring followed by a very wet summer) are needed to produce flooding of that magnitude.