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The Madden Julian Oscillation and its relationship with rainfall in Queensland.

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Abstract

The Madden Julian Oscillation is a large-scale atmospheric phenomenon that is generated above the tropical Indian Ocean. It is associated with large convective systems that propagate eastward across the Pacific Ocean. Since it is an atmospheric event limited to the equatorial domain, it was believed that it has little effect on non-tropical regions. However, recent research found correlations between the positioning of the active Madden Julian Oscillation phase along the Equator and rainfall events northeast Australia. The correlations were significant throughout Queensland. The phenomenon is subject to a study by climate scientists at four Australian institutions. It aims to develop a simple predictive tool of rainfall events that are linked with the active phase of the Madden Julian Oscillation and that is applicable throughout Queensland and possible beyond. The outcome of this research is to be linked with agricultural production systems model in order to help Queensland farmers to better time planting and harvesting, as well as scheduling of contractors whose operations might be delayed by rain.

Editorial

Learn to Understand and Forecast Australia's Climate – Study Climatology at the University of Southern Queensland

Australia is known as a continent of extreme weather and climate events. Wild thunderstorms, frequent cyclones, destructive floods, long-lasting droughts, devastating bushfires and violent hailstorms are phenomena familiar to many people living in the bush or the city. For almost two centuries we have accepted these events as unavoidable natural hazards. They have cost the nation billions of dollars and made headlines around the world. Almost month after month one part or another of the country is affected adversely by abnormal weather or climate anomalies.

The most vulnerable industry of the Australia economy is the rural sector. The 2002/2003 El Nino that came on top of prolonged drought conditions observed for many parts of the country, led to this event being the worst drought in the last century. Crop failures resulted in a loss of thousands of jobs in the rural sector and a reduction of economic growth by almost 1 %. Many rural producers will continue to suffer the adverse climatic impacts of this drought in the years to come. Another example of adverse climatic impacts upon the rural sector is the long lasting drought in South Western Australia that commenced in the 1970s. The below average rainfall since then has led to significant changes in agricultural production system.

However, longer lasting climatic changes impact on other sectors of the Australian economy as well. The global insurance industry is taking notice of global climate change and the increase frequency of storm related damages. The energy sector is requested to take into account the consequences of global carbon dioxide emissions due to the combustion of fossil fuels. And in doubt are freshwater supplies for several Australia cities. Being able to better forecast climate will assist many industry sectors to limit losses and adopted management strategies that account for adverse climatic impacts.

Climatology is the science that helps us to continuously improve our knowledge of the climate system in order to better understand climate variability and future climates in Australia and world-wide. It will also allow us to develop climate forecast systems that help to mitigate adverse climate impacts upon economy and society.

Climatology is a rapidly evolving science that explores the nature of the global climate system. Climatologists are trained to analyse observed distributions of climate elements such as air and sea surface temperature, winds, and ocean currents. These elements describe the state of the climate system. Subsequently, statistical methods are applied to data to identify spatial and temporal patterns. Physical models are developed and adopted to explore the exact dynamical nature of underlying mechanisms. Both approaches combined lead to the development of climate forecasting systems.

The University of Southern Queensland, Toowoomba, established several non-professional and professional degree programs in climatology. The first certificate-level to be offered by the Faculty of Sciences, **Certificate in Climate Studies**

(CertClimSt) was introduced in 2001. The **Bachelor of Science (Climatology)** (BSc. (Clim.)) was also introduced in that year. It represents the first program of its type in Australia and is unique in the world. Other programs established include a Bachelor of Science (Honours), Graduate Diploma, Masters and Ph.D. programs in Climatology.