Improving prediction of the northern Australian wet season

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Location: Toowoomba, Melbourne, Brisbane and Brazil

Principal investigator

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The need

Variability of the northern wet season poses a significant risk for many climate-sensitive industries. Industries such as grazing, grain, sugar and horticulture are severely affected by the vagaries of climate.

Grazing is critically important for Australia's economy as pastures in their various forms occupy over 50% of the continent. In Queensland alone, grazing of native pastures is the major land use (85% of state) and contributes > $2.5 billion in gross agriculture value (> 40% of total agriculture). The statistics are similar for Western Australia and the Northern Territory.

However, climate variability and, in particular, failures of the northern wet season, have often led to substantial hardship and resulted in several major degradation events. There is also increasing pressure on northern grazing areas due to ongoing drought conditions in the more southern areas.

This project aims to better predict the onset, duration and termination of the northern Australian wet season to support better decision making in Australia's northern agricultural industries.

How this project fits with MCV objectives

This project addresses a commitment made by MCV to one of its partners, Meat & Livestock Australia, to invest in research to enhance predictions of the northern Australian wet season.

Project objectives

1. Reduce climate-related risk to agricultural industries (using the grazing industry as a case study) by providing improved quantification and predictions of the northern Australian wet season

2. Create new technologies for better decision making in climate-sensitive systems of northern Australia

Methods

> Using the grazing industry as a case study, effectively connect existing components of climate science in a framework suitable for decision making

> Investigate new climate research avenues that might lead to significant advances in our ability to predict climate variability

Desired outcomes

› At leads of 2 or more months, probabilistic predictions of the entire wet season rainfall (defined as Dec-Mar or Oct-Apr, or in whatever way deemed to be most relevant). For example, at the beginning of August, probabilistic prediction of the October to April rainfall could be produced based on knowledge of the state of the El Niño-Southern Oscillation (ENSO). These forecasts could then be updated monthly until the beginning of the wet season.

› At leads of 2 months or less, probabilistic predictions of shorter-averaged periods within the wet season. These shorter-averaged periods will have lengths from 1 week to 2 months. Some of these forecasts could be updated daily. The forecasts at longer leads will primarily use information coming from ENSO. Shorter lead forecasts will use information that is updated daily (eg forecasts based on the passage of the Madden-Julian oscillation). These systems will need to provide forecasts such as the probability of exceeding predetermined thresholds (eg 50 or 200 mm of rain in the coming week and subsequent week, the coming month or the following month).

› Predictions of 'onset date' of the wet season will be of particular importance in order to assess early pasture growth. Predictions will be tailored to provide estimates of dates when the accumulation of predefined threshold of rainfall (eg 100 mm) will be surpassed. These predictions will be provided at a range of lead times. Similarly, investigations will be made into forecasting the duration and end of the wet season. All predictions will be provided in probabilistic format and contain quantification of the associated uncertainties.

Achievements to date

› On 24-25 October 2005, BMRC and DPI&F scientists met face-to-face to form a scientific plan, culminating in the submission of the full proposal to MCV in November 2005.

› Over 23-25 January 2006, the first meetings with representatives of the project stakeholders (principally the grazing industry) were held in Darwin, leading to the development of a project steering committee and terms of reference. A preliminary systems analysis determining the leverage points for climate information and forecasts was conducted with grazing industry experts and representatives.

› Lead agreement between MCV and DPI&F signed on 10 February 2006.

What is left to do?

The project is still in its infancy but draws on many aspects of climate science to integrate our knowledge of different climate phenomena, such as the MJO and ENSO, into a framework for decision making in rural industries.

Although the project will concentrate on using this climate information for decision making in the northern grazing systems, we intend to provide the information in a form suitable for other rural industries and, indeed, other sectors of the economy.