Developing an integrated predictive capability for extreme rainfall and inundation

Natural **Hazards Research** Australia

RESEARCH TEAM

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Project duration: 36 months

SUPPORTING ORGANISATIONS

Tasmanian State Emergency Service
Victorian State Emergency Service
AFAC Flood and Severe Weather Intelligence
Services Technical Group

Background

Recent events in Australia, including many flood rescues reported across multiple Australian states, demonstrate that flash flooding remains a significant risk to public safety. Flash flooding, which is flooding that typically occurs over small spatial scales within 6 hours of the onset of rainfall, is generally difficult to predict, largely because of uncertainties in forecasting the intensity and spatio-temporal distribution of heavy rainfall and the landscape response. This means that accurate forecasts of the timing and location of flash flooding impacts are often not possible with certainty ahead of an event. In such circumstances, probabilistic approaches to forecasting the likely occurrence and severity of heavy rain and flash flooding are particularly valuable. This project will build on previous work to develop tools for probabilistic forecasts of these phenomena, including better ways of communicating the uncertainty associated with predictions of such severe weather.

Project description

This project will investigate the detailed meteorology of several high-impact heavy rainfall and flash flooding events that have occurred in recent years. It will develop approaches to combine probabilistic weather model data and short-term radar-based forecasts with newly developed techniques to predict likelihood and severity of flash flooding, tested on the case studies investigated earlier. The outputs of each of these components, and of the combined prototype forecast tool, will be informed by previous research conducted within the Centre to better communicate the uncertainty that is inherent in forecasts of these types of weather event. A key part of the project will be engagement with emergency management personnel, including at the Bureau of Meteorology and State Emergency Services, to ensure that project outputs are relevant and useful to them.

Intended outcomes

There has been limited investigation of the detailed meteorology of heavy rainfall events in Australia. The project will extend the number of such investigations, allowing operational meteorologists to identify similar features in future developing weather systems.

The project will develop a prototype forecast tool for heavy rainfall and flash flooding, providing probabilistic guidance. This will allow emergency managers and meteorologists to better understand and quantify the uncertainties in developing severe weather events. In particular, the outputs of the tool will be informed by previous Centre research to enhance understanding and communication of the uncertainty associated with severe weather events. It is anticipated that this will ensure the usefulness and utilisation of the project outputs.

As a result of this project, better links are expected between the research team and operational staff at both the Bureau of Meteorology and Emergency Management agencies, further improving the uptake of of emergency management research.

Translation and implementation potential

Improved understanding of severe weather events will be of immediate use to operational meteorologists and emergency managers. Outputs of the detailed case study analysis will be communicated in a variety of forums during the course of the project and thus available relatively soon after the completion of the analysis.

Techniques to better visualise and communicate probabilistic information in general can be implemented on Bureau operational meteorological displays with little difficulty, when available. They are then are available for use by operational staff, including for emergency management briefing.

The project team anticipates that the prototype integrated probabilistic heavy rainfall and flash flood tool will be developed on Bureau systems. As such, it will be available immediately for testing and demonstration to operational meteorologists, and thus indirectly to emergency managers.

Further information

For full project details head to: https://www.naturalhazards.com.au/research/research-projects/developing-integrated-predictive-capability-extreme-rainfall-and

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