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# Flood Hydrology Program

Program Leader: Prof Russell Mein

**Project FL2: Spatial distribution of rainfall and storm movement**

## Introduction

Estimates of average rainfall based on rain-gauge data introduce significant error into hydrological models because they do not fully take into account the spatial and temporal variability of rainfall over different parts of the catchment. This project, based at the Bureau of Meteorology, involved the use of remote sensing (mainly radar) to reduce such error.

Researchers developed a space–time model of rainfall, which will improve the accuracy of flood modelling in a range of applications. For design-flood estimation for example, such a model should lead to more appropriate sizing of hydraulic structures such as causeways and drains. Through the project, the CRC also:

- established an off-line radar rainfall archive
- developed systems to derive quantitative rainfall estimates from radar
- used the radar data to calibrate the space–time rainfall model
- demonstrated the use of radar data in different hydrological applications through evaluating its use in real-time flood forecasting models and demonstrated the variability in estimated peak flow from rainfall spatial variability.

## Project's Intended Outcomes

- Improved design rainfall parameters (areal reduction factors, temporal patterns, depth duration-area data, etc) based on Australian data
- Strategies and tools for the optimum combination of remotely sensed (radar and/or satellite) data and ground-based rainfall observations
- Potentially high benefits from improved rainfall inputs to hydrological forecasting models for flood (flash) warning in major urban centres (Sydney, Melbourne, Brisbane, Adelaide)
- More efficient water allocation and management decision-making in the operation of regional water distribution and storage systems, translating into economic benefits to the community
- Improved guidelines for rainfall network design

## Key Project Achievements

- Developed an improved understanding of errors in flood modelling estimates from rainfall input errors in order to optimise the structure of future models.

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- Further developed the space–time rainfall model and presented findings at two international conferences.
- Produced space–time rainfall maps based on calibrated radar rainfall data from past storms in Sydney (NSW) and Katherine (Northern Territory) as case studies. The maps showed how spatial and temporal development of rainfall led to flooding, providing understanding not available through traditional techniques. This work also demonstrated the importance of radar electromagnetic calibration to rainfall estimation.
- Integrated rain-gauge and satellite data for use in predicting large-scale storm patterns.
- Developed capability to archive high-resolution radar data at the radar site (offline), improving the quality of archival data, which were previously stored centrally at a lower resolution. This provides a valuable resource for future research.
- Coordinated a national workshop on 'Scaling Issues in Hydrology' in June 1998 attended by Australian and overseas experts.

## Staff Involved:

**Project Leader**

Jim Elliott (Bureau of Meteorology)

**Senior Researchers**

Dr Beth Ebert (Bureau of Meteorology)

Tony Jones (Melbourne Water)

Dr Tom Keenan (Bureau of Meteorology)

Prof Tom McMahon (The University of Melbourne)

Prof Russell Mein (Monash University)

Lionel Siriwardena (Monash University)

Gary Weymouth (Bureau of Meteorology)

**Research Fellows**

Dr Alan Seed (Bureau of Meteorology)

**Senior Technical Officer**

Ken Glasson (Bureau of Meteorology)

**Participating Organisations**

Bureau of Meteorology

Goulburn-Murray Water

Melbourne Water

Monash University

Wimmera Mallee Water