

SEASCAPES

Volume 6, Issue 1

Autumn 2003

Advanced Modelling of Cyclone Damage

A six year collaborative effort between Systems Engineering Australia Pty Ltd (SEA) and the James Cook University Cyclone Testing Station (CTS) in Townsville is nearing completion. The project outcomes are expected to lead to much more sophisticated and accurate building damage algorithms for application to the difficult problem of estimating insurance losses due to extreme winds.

The project "Climate Change and Tropical Cyclone Impact on Coastal Communities' Vulnerability" was first instigated as a part of the Bureau of Meteorology sponsored TCCIP (Tropical Cyclone Coastal Impacts Program) in 1997 by the former Director of the CTS, Greg Reardon. SEA at that time provided access to its tropical cyclone module from the

MIRAM insurance loss model to permit CTS to concentrate on their detailed analysis of domestic building strengths.

In 1999, the project received additional support from the Queensland Government Greenhouse Special Treasury Initiatives fund, administered via the Department of Natural Resources and Mines and the Department of Emergency Services.

The aim of the study is to deliver a software package that will be capable of accurately estimating the nature and degree of wind-induced damage to different types of housing construction during a tropical cyclone. This will permit Government to assess the true vulnerability of many Queensland coastal communities.

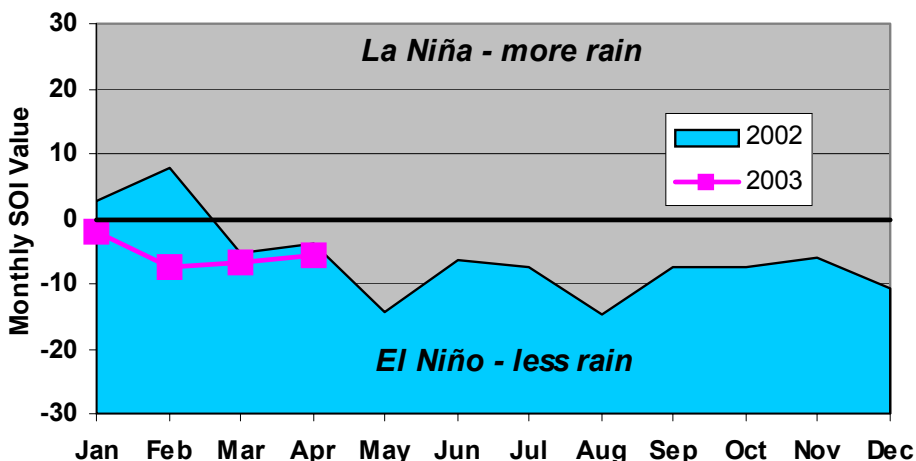


The CTS has built-up an impressive database of house construction joint and roof cladding strengths over many years through specific testing programs, augmented with full scale demolition tests. Under the guidance of incoming CTS Director David Henderson, the resulting database has now been combined with results from extensive housing surveys carried out in

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Potentially Neutral Season Ahead

The early indicators for 2003/04 are for a near-neutral ($-10 < SOI < 10$) climate season, following last year's mild El Niño event. Ocean temperatures in the mid-Pacific have slowly cooled over recent months and are now slightly below normal. The clear majority of numerical climate models predict neutral conditions as far as 8 months in advance. Based on past experience, neutral seasons have resulted in much higher numbers of tropical cyclones in the South-Western Pacific basin near Queensland when compared with EL Niño seasons.



SEASCAPES

SEASCAPES features the developing risk assessment capabilities of Systems Engineering Australia Pty Ltd (SEA).

Our services include coastal, ocean and offshore engineering, statistical analysis of tropical cyclone data, quantitative estimation of insurance losses, cyclone wind, wave and storm surge modelling, flood risk assessment and severe thunderstorm downbursts, hail and tornadoes. We do investigations, analysis, consulting, peer review and research.

Visit us on the web:
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Whitsunday Shire Storm Surge Study

Systems Engineering Australia Pty Ltd is providing technical support for GHD Pty Ltd in a study of the storm surge risk in the Whitsunday region of the Queensland coast.

The study is being commissioned by Whitsunday Shire Council and is designed to provide quantitative storm tide risks for the coastal region east of Proserpine. The principal towns in the area include Airlie Beach, Cannonvale and the nearby Shute Harbour, which is the principal tourist port for the region. Numerous island resorts, such as Hamilton, South Molle, Daydream, Hayman, Lindeman and Long Island are also included in the work scope.

The work is being performed jointly by GHD and SEA, whereby numerical hydrodynamic modelling will be done using GHD's Delft3d ocean modelling system while SEA will undertake spectral wave modelling to estimate wave setup components. SEA is also responsible for the climatological as-

essment of the region, the tropical cyclone wind fields and the development of parametric models of surge and wave setup leading to the probabilistic analysis.

The Whitsunday region is a complex archipelago with many large islands separated by relatively small passages and subject to very large tidal ranges. This results in high currents through some of these passages, which will be significantly enhanced during tropical cyclone conditions.

The principal outcome of the study will be a series of maps indicating potential levels of inundation that would be associated with a given probability of exceedance, for example, the 100 year and 1000 year return period events.

GHD will also be undertaking a study of the vulnerability of shire infra-structure and highlighting aspects of the storm tide threat that



Some of the SEA Clients Since 1996

Tropical Cyclone Risks:

- RACQ Insurance
- CGU Insurance
- Suncorp Metway Insurance
- Aon Group Australia Limited
- Powerlink Queensland
- Geoscience Australia

Severe Thunderstorm Risks:

- Suncorp Metway Insurance
- Macquarie University, Natural Hazards Research Centre
- Powerlink Queensland

Flood Risks:

- RACQ Insurance, Qld.

Coastal and Ocean Hazards:

- Woodside Offshore Petroleum, WA.
- Dept Natural Resources, Vic.
- Environmental Protection Agency, Qld.
- Commonwealth Dept of Transport and Regional Services
- GHD Pty Ltd
- Bureau of Meteorology
- Kvaerner E&C Australia

Multi-Hazard Studies:

- Dept Emergency Services, Qld.
- Bureau of Meteorology / GA

Research:

- The Risk Prediction Initiative, Bermuda.
- James Cook University CTS

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Townsville by the CTS and companion surveys done by AGSO in Cairns and Mackay over the past five years. SEA's role has been to supply the tropical cyclone module and, more recently, to assist in the detailed operational design of the final failure risk module and the creation of a new user-friendly software package. The new package will be made available to the sponsoring Government clients as a tool for estimating the potential community impacts due to specific cyclone scenarios. SEA plans to implement aspects of the building research into its next generation insurance loss estimating model (SEAcats), due for release by 2004, timed to coincide with a planned review of the tropical cyclone database for the Queensland East Coast and Gulf of Carpentaria regions. A tailored version of the new model is also planned for use in-house by

Cairns Hosts the IWTC-V 2002

Dr Bruce Harper of SEA was again invited by the UN World Meteorological Organisation (WMO) to attend the International Workshop on Tropical Cyclones (IWTC). The fifth in the 20 year long series was held in Cairns, North Queensland, over a two week period last December. This specialist conference seeks to enable the efficient exchange of research and operational experience on tropical cyclones from around the globe. Dr Harper was afforded an opportunity to share some of the results of recent investigations by SEA, funded by Woodside Energy Ltd, on the subject of estimating cyclone intensity in the Australian region.



Real risk management decision - making tools for your business.

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