

SEASCAPES

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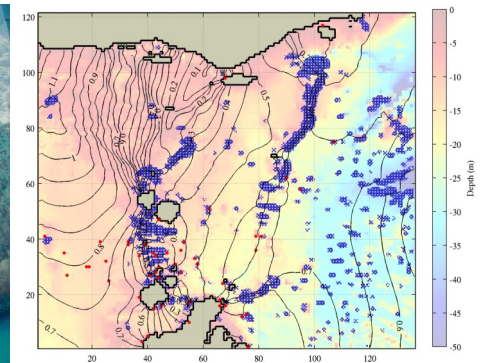
Spring 2009

Torres Strait Ocean Inundation Hazard Study

SEA is currently undertaking a detailed numerical and statistical ocean modelling study of the Torres Strait region on behalf of the Torres Strait Regional Authority (TSRA) Land and Sea Management Unit, which is based at Thursday Island (Waiben). TSRA is a Commonwealth statutory authority responsible for coordinating the delivery of policies and programs that benefit Torres Strait Islander and Aboriginal people living in the Torres Strait region.

Ocean inundation is a significant issue in Torres Strait impacting many Island communities. Early records suggest inundation has been a problem for many years with an event on Saibai in 1948 leading to the relocation of a portion of the population to the Northern Cape York Peninsula. More recently events in 2006 and 2009 impacted several island communities. Conversely, lower than predicted water levels can also be an issue for shipping activity and port activities. With potential sea level rise, inundation risk is likely to increase over time with flooding events expected to become more frequent and severe over time. Potential changes to the frequency and intensity of tropical cyclones and possibly other

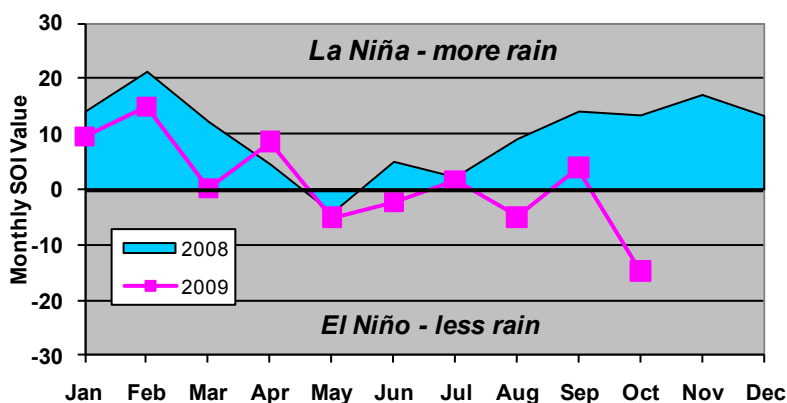
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Photos (L to R): Saibai in April 2009 (TSRA photo), Warraber (Sue Is), AMC numerically modelled amplitude of the M2 tide and depth.

El Niño threatens again ...

The ENSO state (El Niño Southern Oscillation) is now considered to be trending towards an El Niño condition for the coming summer, with ocean surface temperatures in the Central Pacific warming more each month. Recently, easterly trade winds have also weakened. The 30 day Southern Oscillation Index or SOI (10 times the normalised ratio of the mean surface pressure between Darwin and Tahiti) has also fallen to its lowest level since 2007 and the Coral Sea, which had been unusually warmer than expected for near-neutral conditions, has now cooled to normal levels. If this continues the coming tropical cyclone season may result in average to below average activity. *[Data and comments based on Bureau of Meteorology sources.]*



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.

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drivers of tidal anomalies may also result in increased inundation risk.

Due to the complex tides in the region, one of the many important issues in determining the threat to the isolated and sometimes low-lying island communities is the establishing of accurate tidal datums. As well as providing insight into the tidal behaviour, the numerical ocean modelling is assisting in quantifying the very significant effects of seasonal weather patterns that alter the mean

sea level in response to monsoon and strong trade wind events.

The study will provide statistical estimates of ocean levels at each of 20 island sites based on the combined impacts of the tide, broadscale ocean patterns (typically ENSO-related) and tropical cyclone storm surge, waves and breaking wave setup. Potential climate change influences will be included and detailed community hazard maps will be prepared to assist in

long term planning and emergency management.

SEA is being assisted in this complex study by UTAS-AMC Australian Maritime College (modelling), GHD Pty Ltd in Brisbane (modelling and mapping) and Gassman Development Perspectives (surveying issues). Mr Jeff Callaghan (BoM-retired) is also assisting in quantifying the specific regional threat from tropical cyclones. TSRA representative is Mr David Hanslow.

WMO Wind Averaging Recommendations

Since 2003, SEA has been the lead researcher in a World Meteorological Organisation (WMO) sponsored project to review the way in which forecasters convert between different descriptions of the extreme wind speeds in tropical cyclones. The issue arose from a recommendation at the 4th International Workshop on Tropical Cyclones in 1998 and a Working Group was formed at the 4th Tropical Cyclone Regional Specialised Meteorological Centre's (RSMC) Technical Coordination Meeting in Nadi (Fiji), November 2002, to coordinate the present study. The project has included a comprehensive review of the science of near-surface wind turbulence, a wide range of international studies, data and models, and has involved several rounds of technical and agency review. It is expected that the recommendations will be incorporated into an update of the *WMO Global Guide for Tropical Cyclone Forecasting* scheduled for 2010.

SEA's Dr Bruce Harper was assisted in the study by Dr Jeff Kepert from the Bureau of Meteorology Centre for Australian Weather and Climate Research and Dr John Ginger from the James Cook University Cyclone Testing Station.

Conferences and Workshops

SEA's Dr Bruce Harper was invited to deliver a keynote address at the World Meteorological Organization 2nd International Workshop on Tropical Cyclone Landfall Processes held in Shanghai, China, 19th to 23rd October (IWTCLP-II). The topic "Forecasting Surface Impacts of Winds, Waves and Storm Surge" was designed to provide an overview of the state of the science and to highlight future research needs. The IWTCLP is an initiative of the Tropical Meteorology Research Programme (TMRP), part of the World Weather Research Programme, and the local hosts were the Shanghai Typhoon Institute and the China Meteorological Administration. Dr Harper was also invited to become a member of the TMRP Expert Panel on Tropical Cyclone Landfall Processes, which is tasked to assess progress in this topic and develop a plan for encouraging research and facilitating transition of research to operations.

In September, Dr Harper was invited to address the 16th Annual Sunshine Seminar, Noosa, organized by the Australian and New Zealand Institute of Insurance and Finance with the topic "Cyclone Hamish in Hervey Bay: A Katrina-like Scenario".

In August, Dr Harper addressed the topic of "Australian Design Guidelines" in the Seminar on Practical Adaptation to Climate Change on NSW Coasts, organised by the Engineers Australia NSW Maritime Panel and PIANC Australia, in Sydney.

Some of the SEA Clients:

Coastal and Ocean Hazards:

- Woodside Energy Ltd, WA
- EPA, QLD
- Dept Env and Climate Change, NSW
- Alcan
- GHD Pty Ltd
- Bureau of Meteorology
- Kvaerner E&C Australia
- McConnell Dowell

Multi-Hazard Studies:

- Dept Emergency Services, QLD
- Bureau of Meteorology / GA

Tropical Cyclone Risks:

- Willis Re
- RACQ Insurance
- CGU Insurance
- Suncorp Metway Insurance
- Powerlink Queensland
- Geoscience Australia
- CSIRO Atmospheric Research
- Risk Management Solutions

Severe Thunderstorm Risks:

- Suncorp Metway Insurance
- Macquarie University, NHRC
- Powerlink Queensland

Research:

- Risk Prediction Initiative, Bermuda.
- James Cook University CTS
- Willis Research Network

Guidelines:

- World Meteorological Organisation
- Engineers Australia

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