

SEASCAPES

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SEA leads move for a review of the Australian Tropical Cyclone Database Archive

Systems Engineering Australia Pty Ltd is leading the move towards a review of the tropical cyclone database archive across Australia. The official database is maintained by the Bureau of Meteorology National Climate Centre and comprises contributions from each of the Regional Tropical Cyclone Forecasting Centres (Brisbane, Darwin and Perth).

The database spans the period from 1900 to the present, but has highly variable coverage and quality both in time and space due to the enormous changes in sensing technology (satellite, radars etc) and also the development of new analysis techniques. Typically, only data from the 1960s onwards has been considered

sufficiently reliable for statistical studies. Even over this period, however, there are biases evident in the dataset which are thought to be due to the gradual changes in worldwide application of the pattern recognition system used for intensity analysis (Dvorak technique). Without access to aerial reconnaissance, Australia is dependent on the Dvorak technique for the vast majority of all estimates of cyclone intensity.

The Dvorak technique derives initially from analyses of Atlantic hurricanes using both satellite and aerial reconnaissance. It has been extended for use in other parts of the world by the adoption of empirical wind and pressure relationships. No systematic study of its overall effec-

tiveness has been possible to date in Australia.

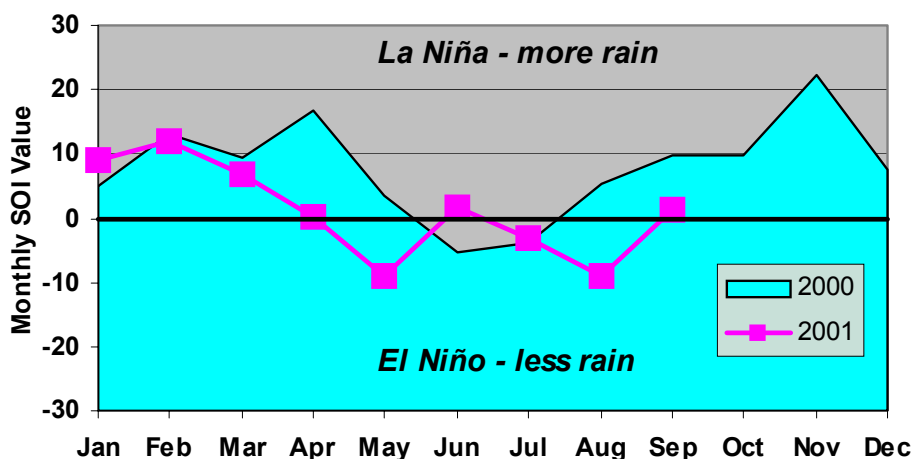
In order to overcome some of the more obvious deficiencies in the historical records, SEA is working to facilitate discussions between industry partners and the Bureau of Meteorology.

Discussions are addressing the most practical way to reanalyse the historical storms using the latest objective techniques. In doing so it is hoped that the apparent biases in the record can be lessened and thus allow more accurate risk assessment, especially in regard to the possible impacts of climate change. More industry partners are being

Near-Neutral SOI Forecast for 2002

With warming in the central Pacific and cooling in the east in recent months, the consensus of the available global climate model predictions is still for neutral ENSO conditions. Ten of the eleven models favour a neutral prediction at March 2002 (within one standard deviation of normal). These terms (warm and cold) refer to eastern equatorial Pacific Sea Surface Temperatures (SSTs). Generally, cold conditions correspond to positive values of the SOI and in eastern Australia usually to wet conditions.

[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.

Visit us on the web:
www.uq.net.au/seng
seng@uq.net.au



Woodside Energy Ltd

10⁻⁴ Waves Study

Systems Engineering Australia has been contracted by Woodside Energy Ltd to provide overall technical management for the so-called 10⁻⁴ Waves Study, which will involve developing technical specifications and coordination of numerical and statistical modelling between a number of Australian and overseas consultants. Scheduled completion of the project is mid-2002.

The 10⁻⁴ Waves Study refers to the requirement to develop environmental risk criteria (winds, waves and ultimately currents) which will be reliable to the 0.01% risk per annum (or 1 in 10,000 y return period). The risk criteria will be used to design new generations of offshore oil and gas production systems servicing Woodside's extensive identified reserves in North West Australia.

The 10⁻⁴ p.a. risk level has been adopted worldwide by the oil and gas industry as the new reference for ensuring the safety of offshore personnel, minimising financial risk, and also reducing environmental impacts due to leaks and spills resulting from structural system failures of fixed and floating production systems.

In order to be able to provide the necessary accuracy of estimates at these very low risk levels it is essential that very sophisticated risk models be developed and that their accuracy be demonstrated against measured extreme wind and wave data. Fortunately Woodside has invested wisely in long term ocean measurement programs since the late 1970s and now has one of the most extensive ocean datasets available anywhere in the world. This dataset will be used to facilitate many areas of research and development into aspects of tropical cyclone structure, wind and wave modelling and statistical risk modelling.

A number of Australian researchers are expected to be contracted to assist in the study, which also involves overseas consultants. Woodside's developments parallel those of a number of major international oil and gas producers with interests in the Gulf of Mexico and the North Sea.



Some of the SEA Clients Since 1996

Tropical Cyclone Risks:

- RACQ Insurance
- CGU Insurance
- Suncorp Metway Insurance
- Aon Group Australia Limited
- Powerlink Queensland
- Australian Geological Survey

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.
- Dept Transport and Regional Services
- GHD Pty Ltd
- Bureau of Meteorology
- Kvaerner E&C Australia

Multi-Hazard Studies:

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

Research:

- The Risk Prediction Initiative,

Coastal and Ocean Engineering Conference



The 15th Australasian Conference on Coastal and Ocean Engineering was held at the Gold Coast 25th to 28th September. Dr Bruce Harper of SEA presented two papers describing aspects of recent projects. "Cyclone Althea Revisited" re-examined the data and impacts of this historically significant severe cyclone which affected Townsville in 1971 and presented numerical modelling of the storm surge and wave setup processes. "Cocos (Keeling) Islands Storm Surge Risk Assessment" presented an overview of the simulation modelling methodology used to provide estimates of extreme water levels at this remote island site in the South Indian Ocean, an Australian external territory.

2001 Sunshine Seminar



The Australian and New Zealand Institute of Insurance and Finance held its highly successful Sunshine Seminar once again at the Sheraton Noosa from 26th to 28th August. Dr Bruce Harper of SEA was invited to speak on the subject of natural hazards risk assessment. His paper entitled "Unnatural Perils?" addressed the many issues surrounding the potential impact of enhanced-Greenhouse climate change on the frequency and intensity of tropical cyclones. The paper also outlined the present challenges in understanding the natural variability of climate systems, such as the impact of the El Niño cycle, which modulates the annual occurrence of cyclones.

Real risk management decision - making tools for your business.

For more information please contact:
Dr Bruce Harper
Systems Engineering Australia Pty Ltd
ACN 073 544 439
7 Mercury Court
Bridgeman Downs, Qld 4035, Australia

Tel/Fax:
(07) 3353-0288

Email:
seng@uq.net.au

