SEASCAPES

Volume 5, Issue 1 Autumn 2002

Groundbreaking 10^{-4} Waves Study continues for Woodside Energy Ltd

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 end-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.

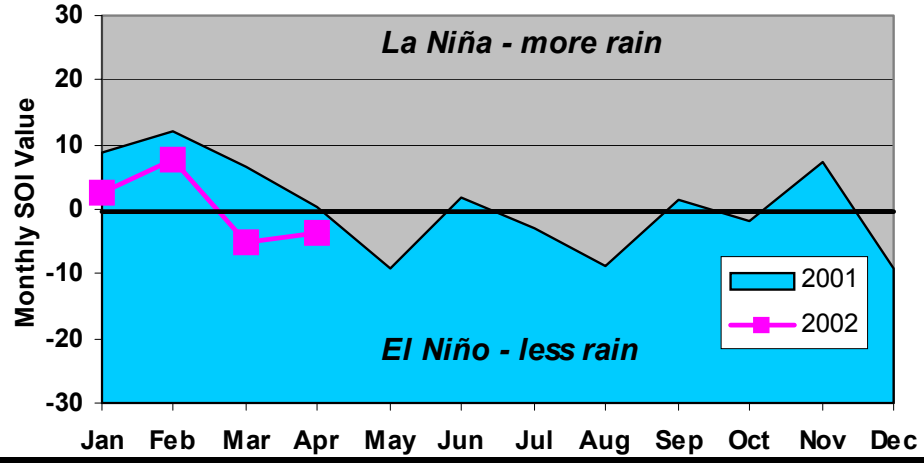
In order to be able to provide the necessary accuracy of estimates at these very low risk levels it is essential that very sophisticated risk models be developed and that their accuracy be demonstrated against measured extreme wind and wave data. Fortunately Woodside has invested wisely in long term 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 have been 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.

(Continued on page 2)

Near-Neutral SOI Forecast for 2002

With a slight warming in the central Pacific in recent months, the consensus of the available global climate model predictions is still for neutral ENSO conditions. Six of the eleven models favour a neutral prediction at August 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

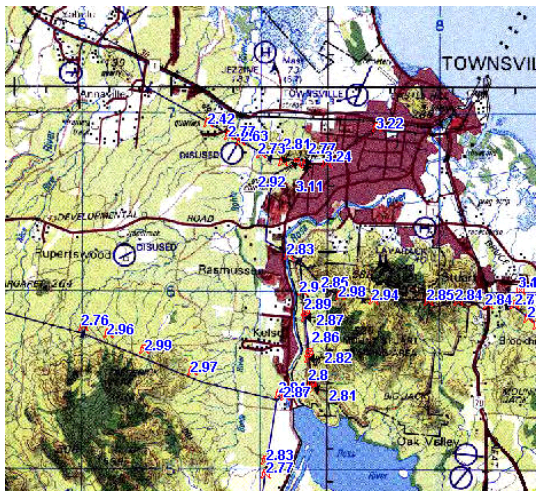
SEASCAPES features the developing risk assessment capabilities of Systems Engineering Australia Pty Ltd (SEA).

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. We do investigations, analysis, consulting, peer review and research.

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

Power Transmission Line Risk Study

Systems Engineering Australia has recently completed a sophisticated wind risk study adddressing tropical cyclone and severe thunderstorm wind loadings for Powerlink Queensland, the operator and owner of the extensive 10,000 km electricity power distribution system across Queensland. Powerlink has experienced a number of transmission line structural failures over a period of time, mainly thought to be caused by severe thunderstorms and/or tornadoes in SE Queensland. The present study re-examined these risks and also considered tropical cyclone impacts on the distribution network across the whole State. A feature of the study was the use of GIS mapping techniques to assemble model descriptions of over 28,000 towers from 146 lines. The risk model processed this data into 2,370 separate straight power line segments to accumulate the wind risk across the State. The results are now being used by Powerlink to consider their exposure to wind risk and to develop long-term mitigation strategies.



(Continued from page 1)

One of the major tasks being coordinated by SEA is a review of the tropical cyclone database archive for Woodside areas of interest, namely the North West Shelf of Western Australia and the Timor Sea region. The official database, which is readily available from the Bureau of Meteorology National Climate Centre, comprises contributions from each of the Regional Tropical Cyclone Forecasting Centres (Brisbane, Darwin and Perth). The historical review is being undertaken in association with the Bureau's Regional Offices and involves experienced meteorologists examining storms which have occurred since the mid-1960s, when satellite images became available. A number of changes to the data archive are likely to be recommended to the Bureau, and it is expected these will have a significant impact both on past and future risk studies.

As part of this coordinated effort, SEA has undertaken a review of the Dvorak satellite pattern recognition system which is used in Australia to arrive at estimates of cyclone intensity in the absence of any groundtruth data (the vast majority of occasions). The review has highlighted some past inconsistencies in analysis and proposes an extension and modification to the method to take advantage of emerging passive microwave satellite sensor systems. A vast amount of data has been sourced from around the world to support the review and its recommendations. Without access to aerial reconnaissance, Australia is dependent on the Dvorak technique for estimates of cyclone intensity. No systematic study of its overall effectiveness has been possible to date in Australia.

25th AMS Conference on Hurricanes and Tropical Meteorology

The 25th Conference on Hurricanes and Tropical Meteorology was held in San Diego, California from 28th April to 3rd May. Dr Bruce Harper of SEA attended to meet with international colleagues and to keep abreast of the latest technical developments. A feature of the conference was the increasing analysis of GPS dropwindsonde data from Atlantic hurricanes, which allows very accurate measurements of hurricane winds from aircraft level down to just above the sea surface.

Real risk management decision - making tools for your business.

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, Bermuda.*

For more information please contact:
Dr Bruce Harper
Systems Engineering Australia Pty Ltd
ABN 065 073 544 439
7 Mercury Court
Bridgeman Downs, Qld 4035, Australia

Tel/Fax:
(07) 3353-0288

Email:
seng@uq.net.au