



5th Western Australian State

COASTAL CONFERENCE 2009

*Whose Coast Is It?
adapting for the future*

1A:
Coastal
Vulnerability:
11.45am–12.15pm
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Sirius Room

Inter-Annual Tidal Modulations Along the Western Australian Coast

PRESENTER:

Mr Matt Eliot

School of Environmental Systems Engineering, The University of Western Australia

CONTACT DETAILS:

Phone: +61 0408 414 225

Email: eliot@sese.uwa.edu.au

Postal Address: 35 Stirling Hwy, Crawley, 6009

CO-AUTHOR:

Prof Chari Pattiaratchi

School of Environmental Systems Engineering, The University of Western Australia

Abstract

Diurnal and semi-diurnal tides are modulated over a range of time scales, including systematic annual and inter-annual variations. Although identified for other regions, the effects of inter-annual tidal modulations have had limited attention on the Western Australian coast. Research described here identified that tidal modulations, combined with seasonal storm surges, are a significant factor in the frequency with which high water level thresholds are exceeded. Hence, tidal modulations provide a predictable contribution to the coastal management effort required on a year-to-year basis, and allow prediction of periods where coastal infrastructure is enhanced risk of flooding.

The two most significant inter-annual tidal modulations are the 18.6-year lunar nodical cycle and the 4.4-year sub-harmonic of the lunar perigean cycle. These cycles are obscured within conventional harmonic and extreme analysis, and their identification requires dedicated techniques. The relative contribution of the two principal cycles and their sub-harmonics varies along the Western Australian coast, related to the tidal form.

Diurnal locations are dominated by the lunar nodical cycle, with a clear 18.6-year signal in the Fremantle-Bunbury region. The cycle most recently peaked in 2007, with declining tidal peaks expected until 2017. Semi-diurnal locations are mainly affected by the lunar perigean sub-harmonic, causing a 4.4-year cycle along the Northwest Shelf. The last peak occurred in 2007, with the next peak due in 2011.