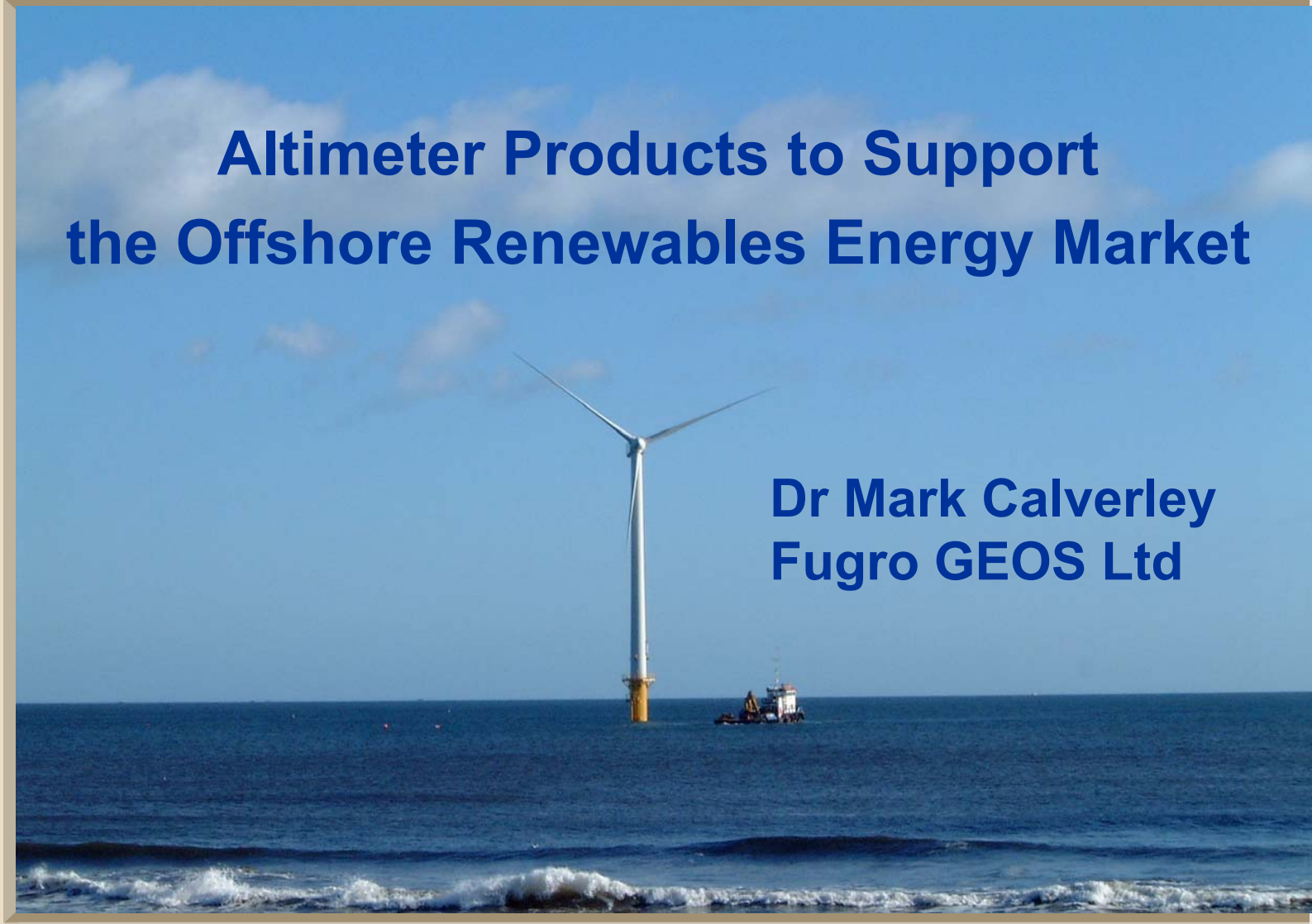
Altimeter Products to Support the Offshore Renewables Energy Market



Dr Mark Calverley
Fugro GEOS Ltd

Offshore Renewables Market

- Market presently focussed on shallow water and nearshore banks due to cost of integrating into distribution network
- Anticipated growth from 5GW to 50GW from 2010 to 2020
- Natural limitation on production due to instability of network if wind power exceeds approximately 14%

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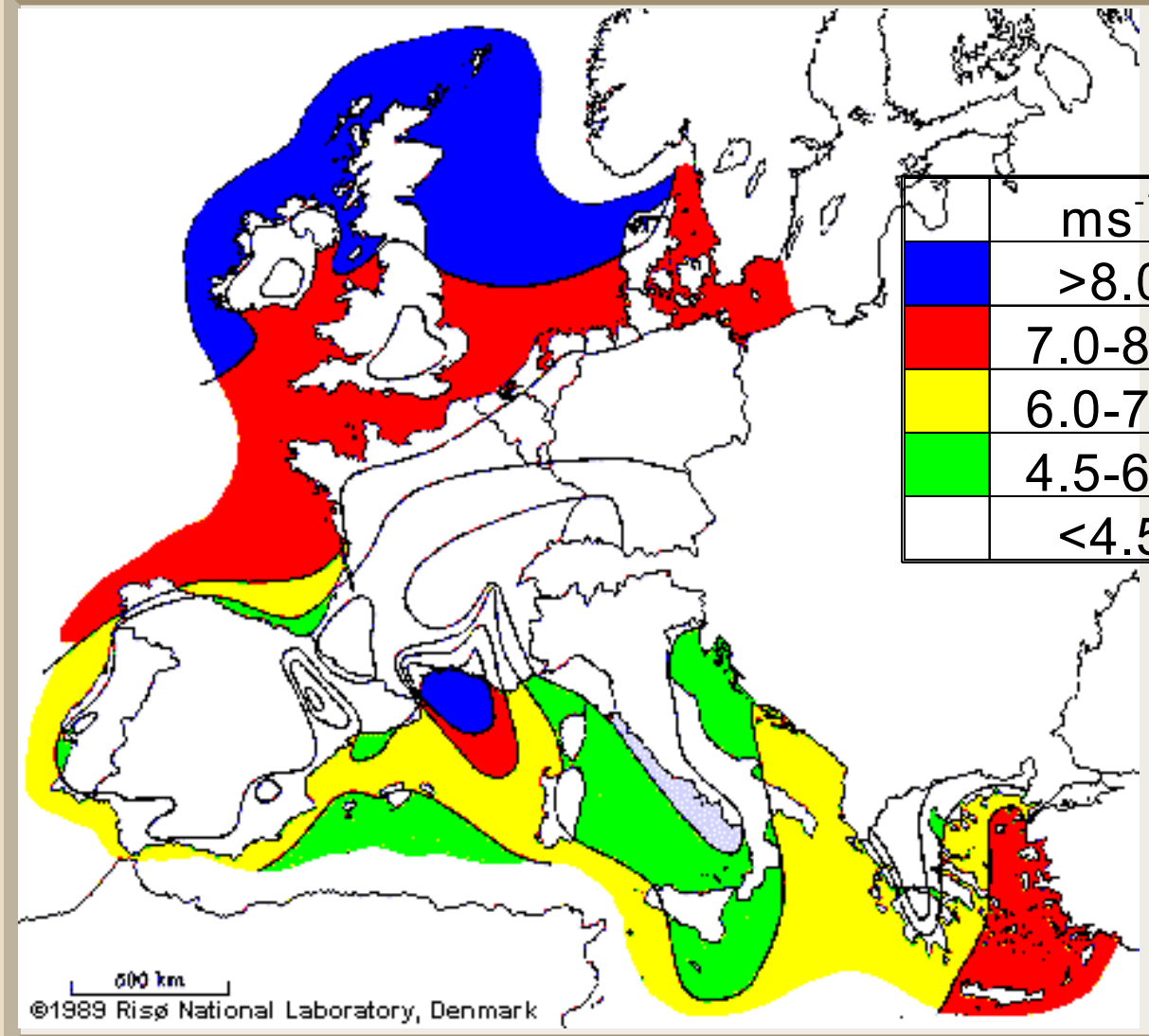
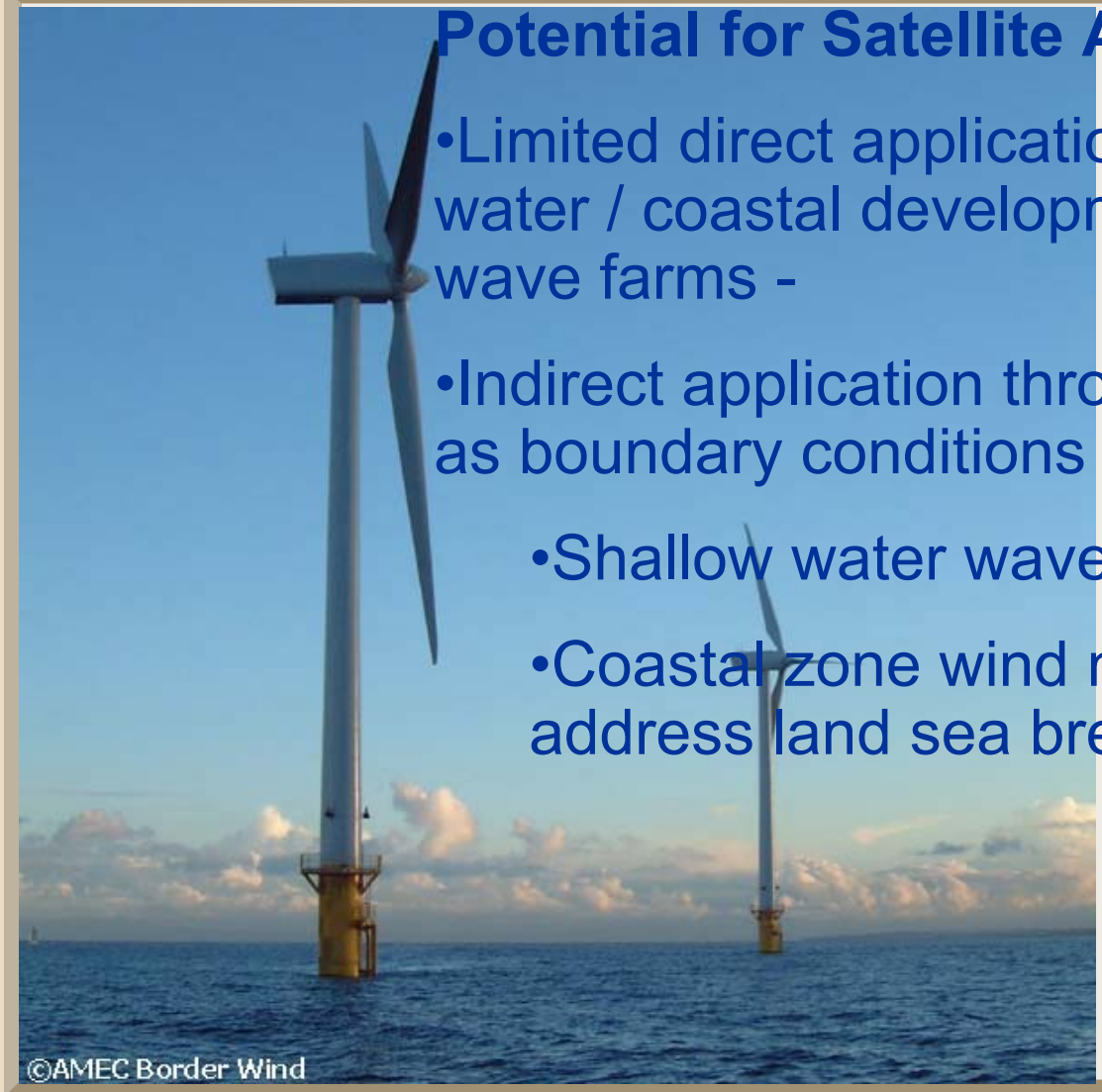


	ms^{-1}	Wm^{-2}
	>8.0	>600
	7.0-8.0	350-600
	6.0-7.0	250-350
	4.5-6.0	100-250
	<4.5	<100

Wind resources over open sea (more than 10 km offshore) at 10m ASL



Potential for Satellite Altimeter Data

- Limited direct application in shallow water / coastal developments of wind or wave farms -
- Indirect application through use of data as boundary conditions for:-
  - Shallow water wave models
  - Coastal zone wind models to address land sea breeze problems

Jericho looked at direction application of satellite data for shallow water wave modelling

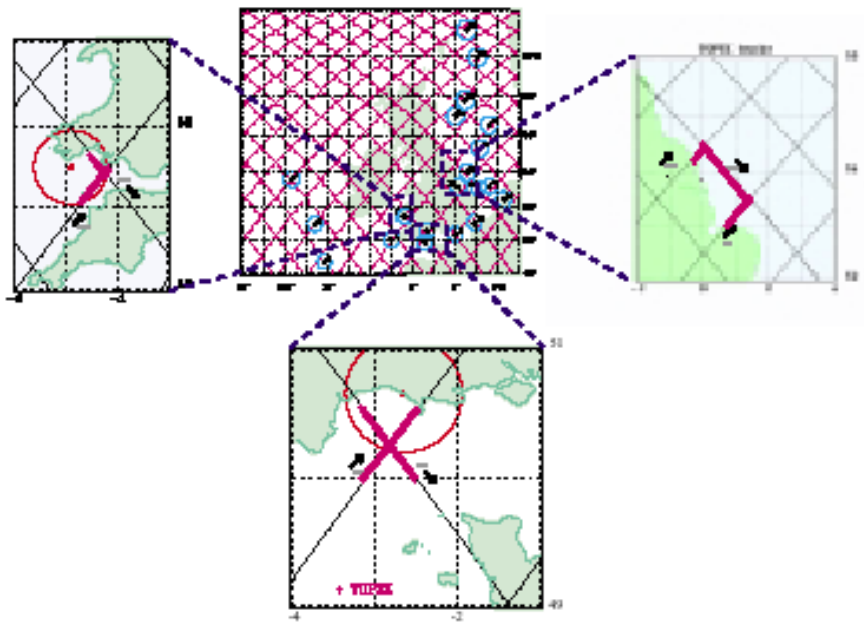


Figure 2. Locations of JERICHO *in situ* data, TOPEX satellite altimeter tracks, and the three JERICHO coastal sites at (right to left) Carmarthen Bay, Lyme Bay and Holderness

JERICHO showed

- satellite data can be used to monitor offshore wave climate up to 10-20km from the coast.
- Closer to the coast climatologies derived from the data can be used to drive coastal wave models.

Southampton Oceanography Centre | CENTRE FOR COASTAL & MARINE SCIENCES | Satellite Observing Systems | Halcrow | ENVIRONMENT AGENCY

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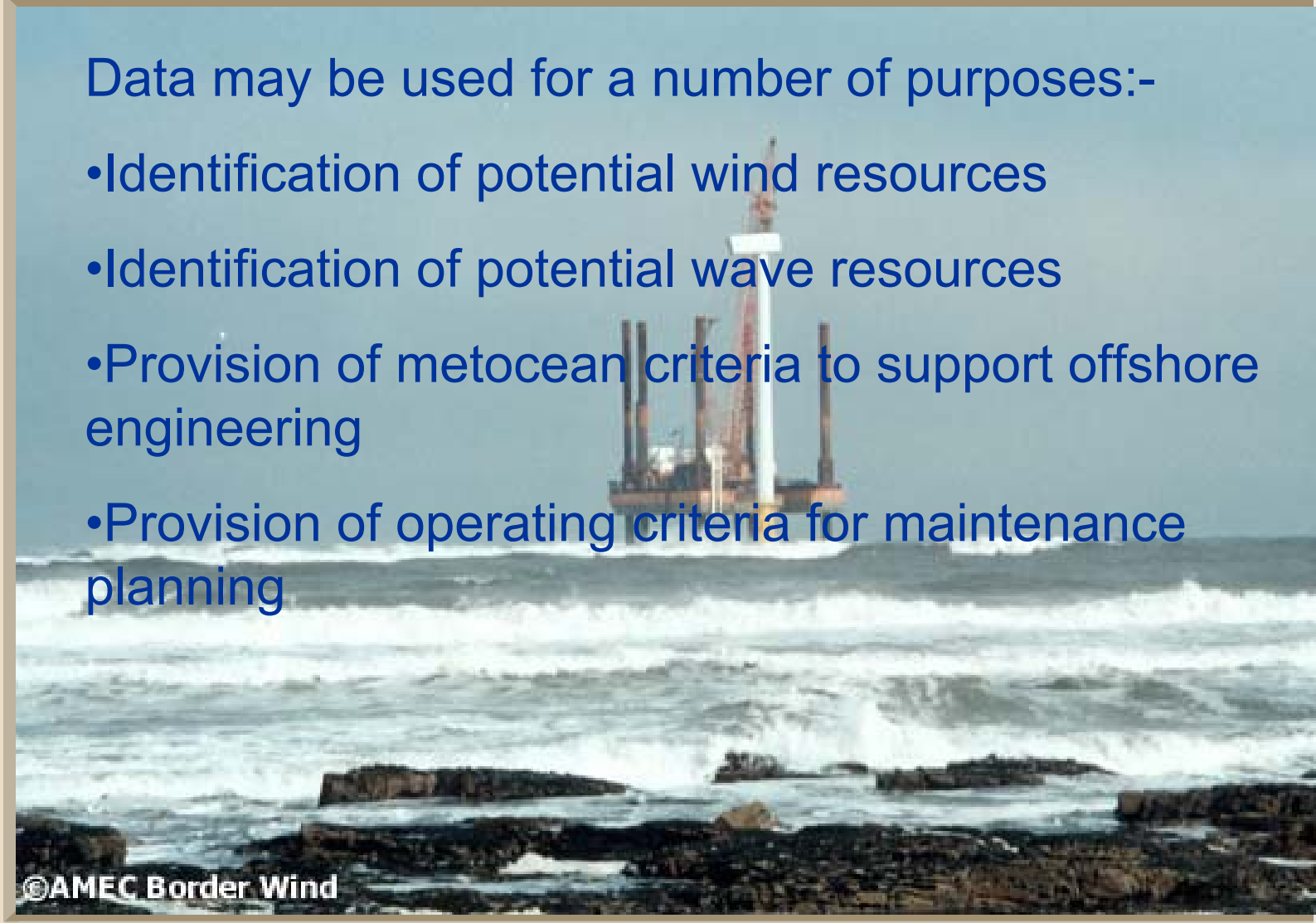
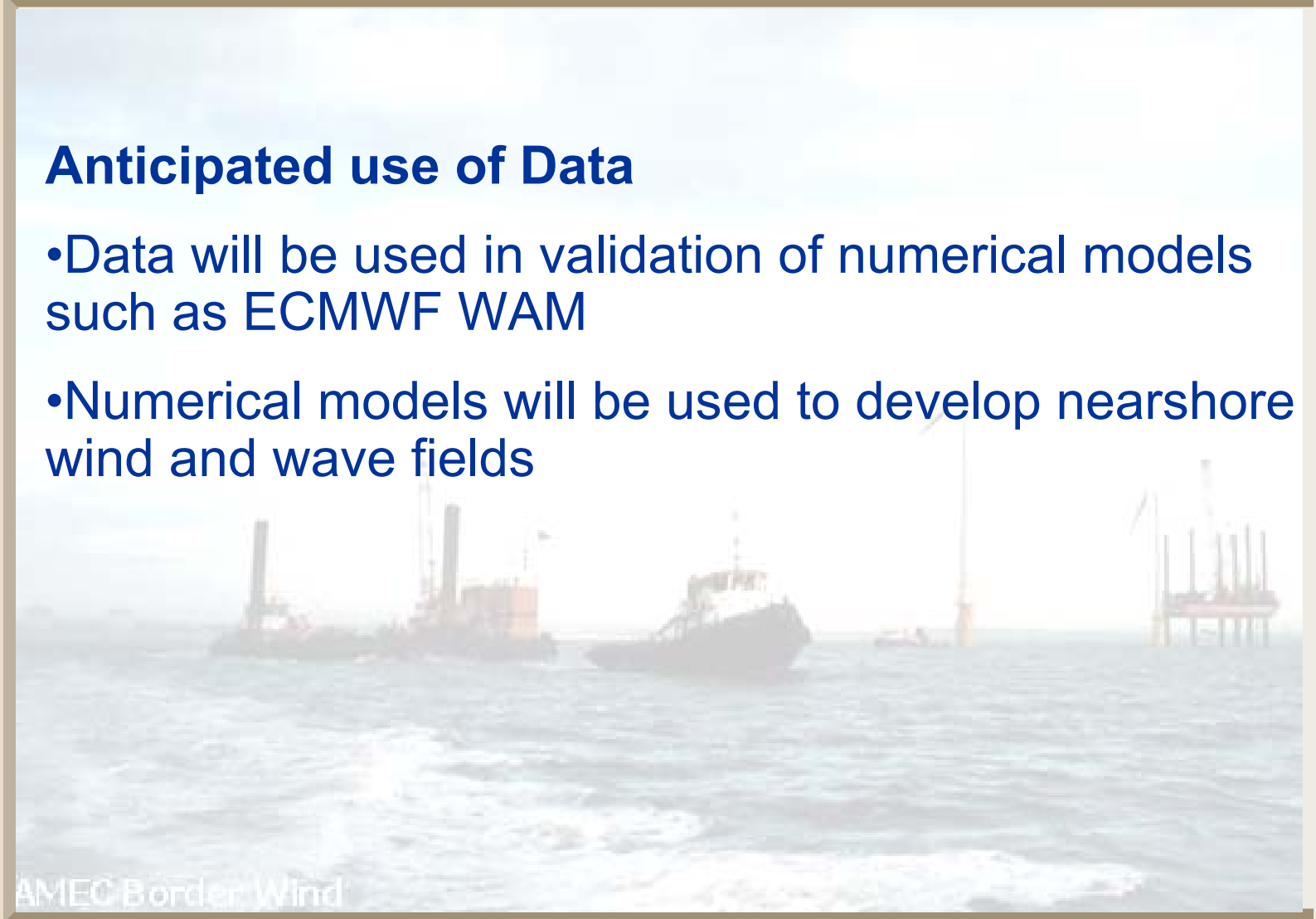


Data may be used for a number of purposes:-

- Identification of potential wind resources
- Identification of potential wave resources
- Provision of metocean criteria to support offshore engineering
- Provision of operating criteria for maintenance planning

Anticipated use of Data

- Data will be used in validation of numerical models such as ECMWF WAM
- Numerical models will be used to develop nearshore wind and wave fields



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Example Application of such an approach is a development by Oceanor of WorldWaves software suite:-

- to validate hindcast wind/wave model data using altimeter data
- use validated hindcast data as boundary conditions to an implementation of SWAN

Assessments of potential wind and wave energy have already been undertaken offshore Scotland and in South Pacific

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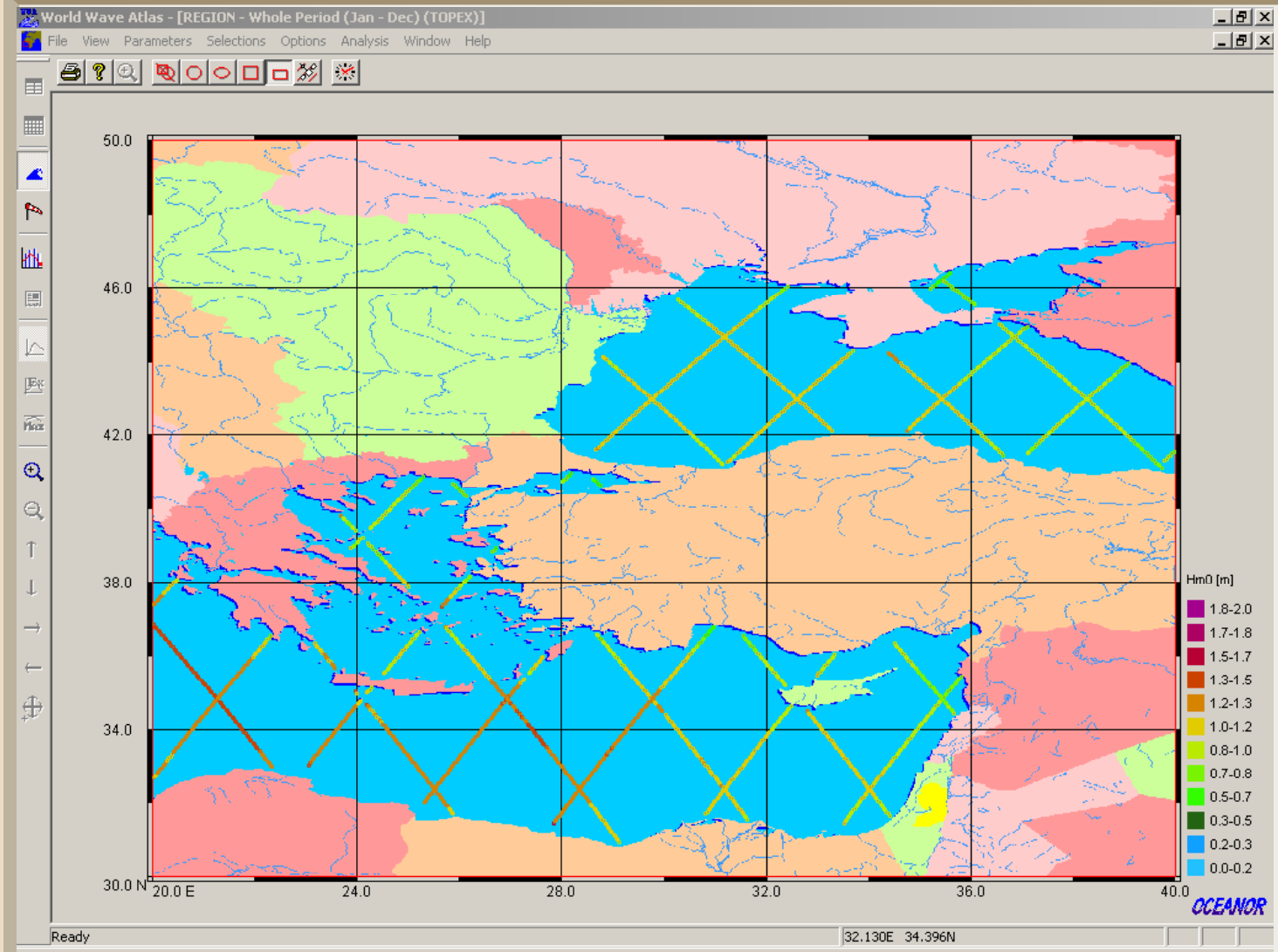

Mean Significant Wave Height

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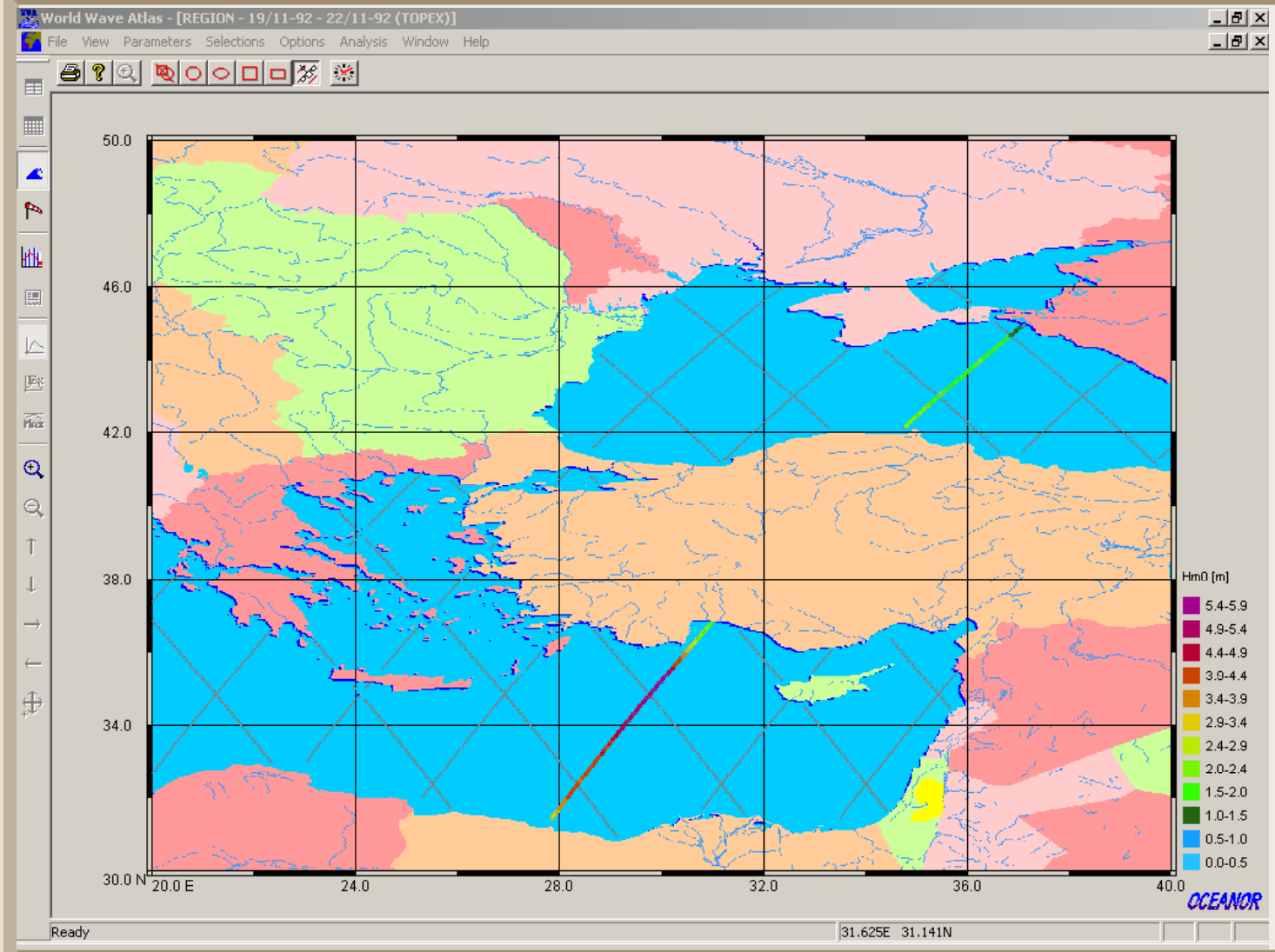

Storm Event

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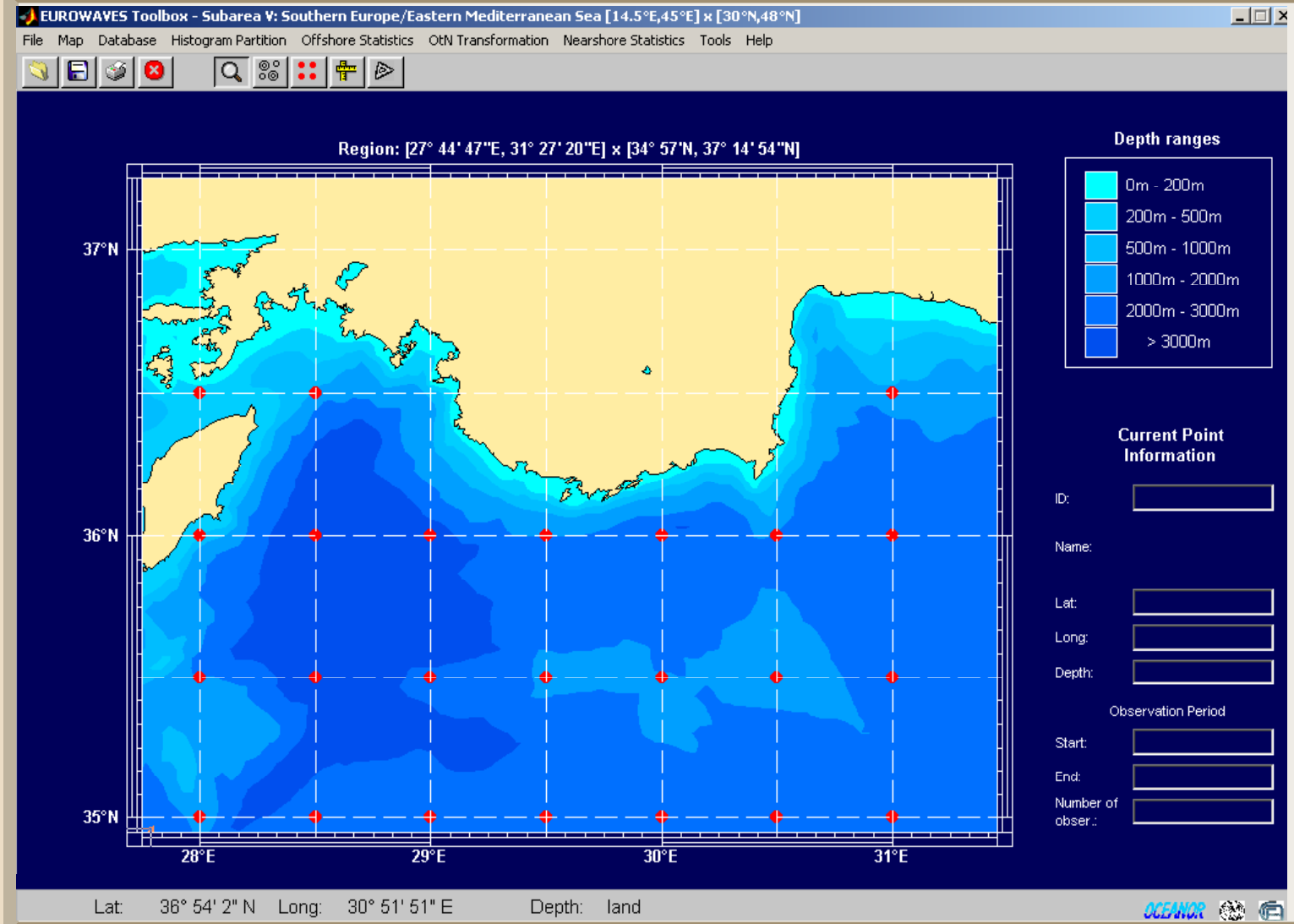

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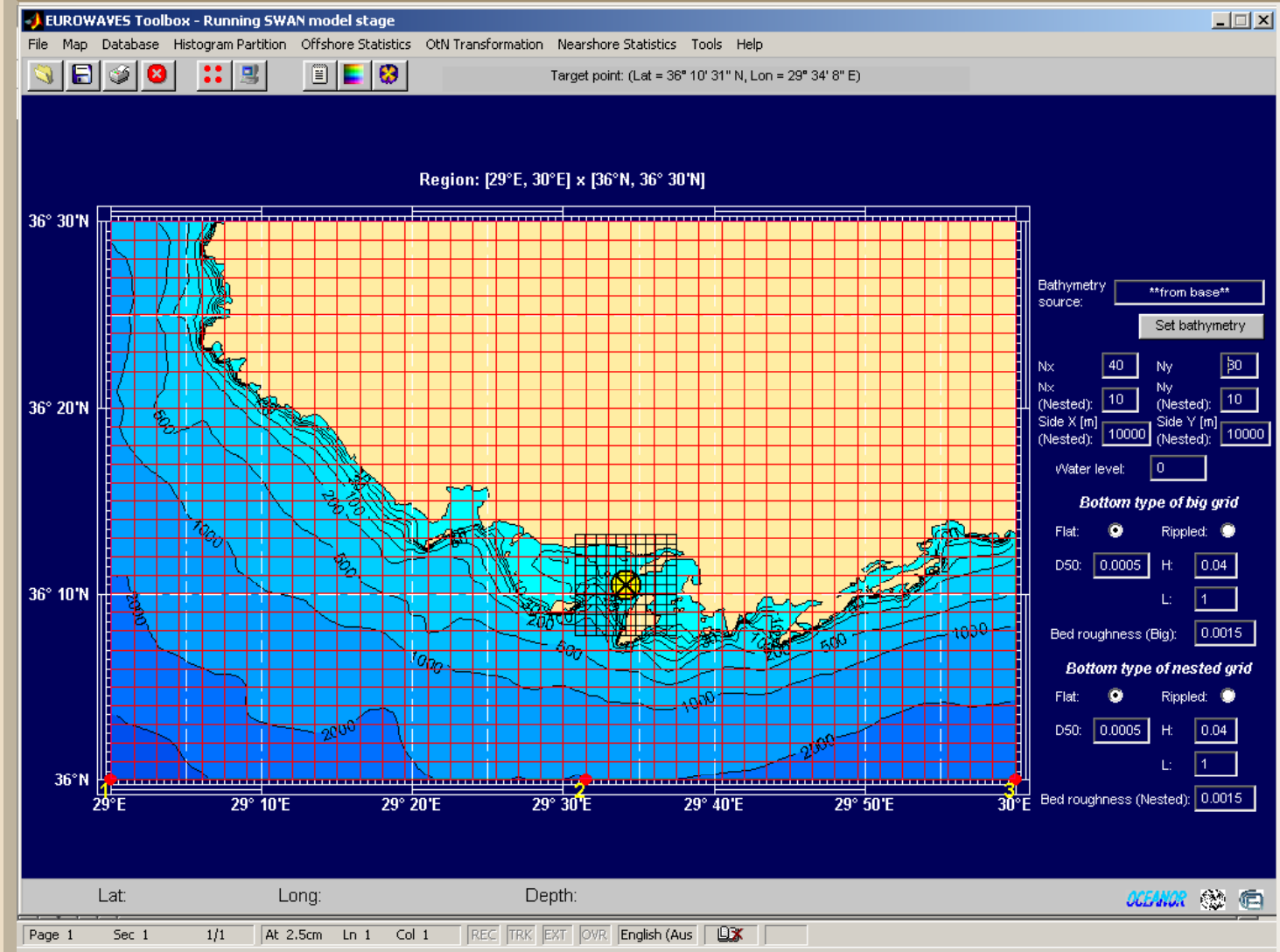

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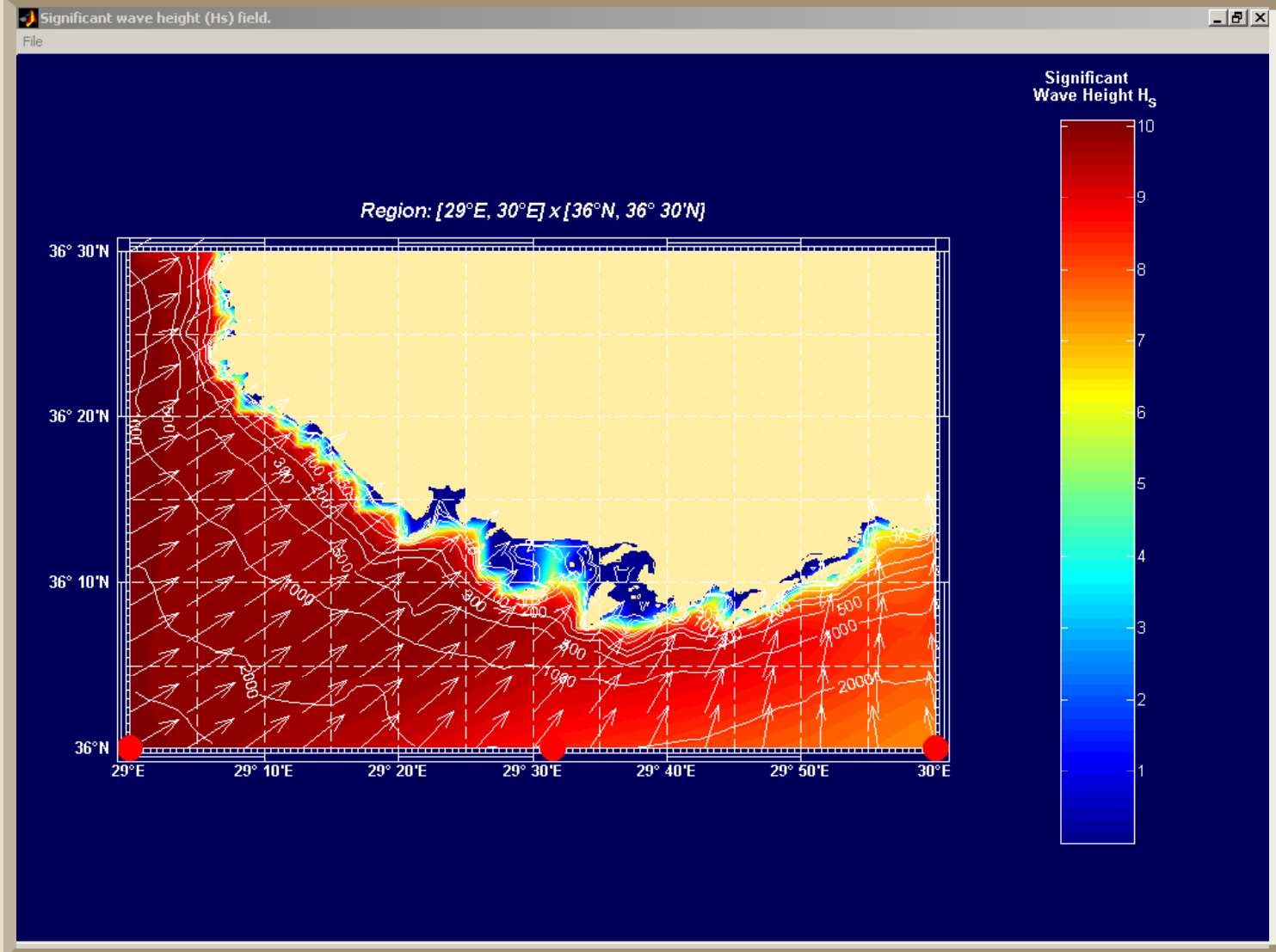

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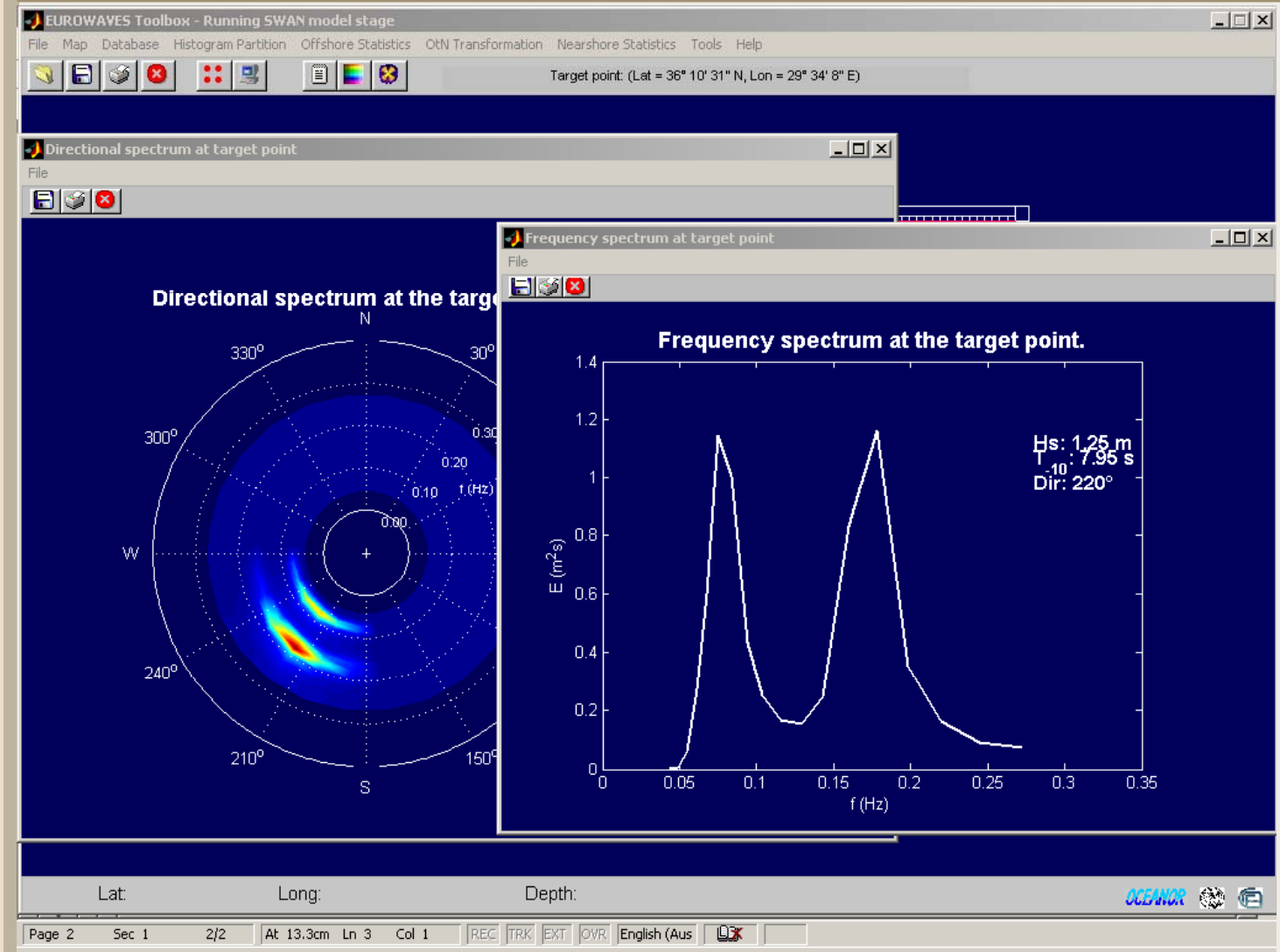

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Anticipated Developments of World Waves in support of the Offshore Renewables market:-

- Addition of new statistical modules for wind and wave energy assessments anywhere worldwide, including resource assessments, extreme analysis and influence of climate change on the resource.
- new wind models are being considered both for coastal wind transformations and for predictions at various exposure levels.

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