Sea surface elevation maps obtained with a nautical X-Band radar

- Examples for WamoS II stations -

LaSSe FKZ 03SX218E

Katrin Hessner OceanWaveS GmbH, Germany

Konstanze Reichert Ocean WaveS Padific Ltd. New Zealand

<sup>10th</sup> INTERNATIONAL WORKSHOP ON WAVE HINDCASTING AND FORECASTING

November 11-16th, 2007at Turtle Bay Resort, North Shore, Oahu, Hawaii, USA

# Contents

- WaMoS II measuring principle
- Installation at Fino, North Sea
- Sea surface elevation maps
- Extreme Storm event Oct/Nov 2006 FINO
- Summary and Outlook



### Components of WaMoS II and applications





Remote PC

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#### **WaMoS II radar images from the Dutch coast:** Time series of *Sea Clutter* image with directional unambiguity



#### Corresponding frequency-direction spectrum



OceanWaveS GmbH

Statistical wave parameter: Hs, Tp,  $\theta p$ swell and wind sea parameter

Type approved by DNV and GL.



- Stere



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#### FINO 1 Platform, German Bight, North Sea



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#### **FINO 1 Platform, German Bight, North Sea** Time Series of statistical wave parameter



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#### **FINO 1 Platform, German Bight, North Sea** Extreme Storm event Oct 31/ Nov 1



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### **FINO 1 Platform, German Bight, North Sea** Inversion Scheme (Nieto et al, 2004) : Sea Surface elevation maps Directional wave finding allgorithm: Individual wave information





#### FINO 1 Platform, German Bight, North Sea



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## **FINO 1 Platform, German Bight, North Sea** Wave and Crest Height





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### **FINO 1 Platform, German Bight, North Sea** Wave with maximum Crest height C = 11.7 m





#### Superposition of two Wave Systems



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## **Summary and Conclusions**

- WaMoS II delivers directional wave spectra and statistical sea state parameters in real time on an operational basis
- Inversion scheme delivers sea surface elevation in space and time
- Directional wave finding algorithm allows to determine individual wave parameter like wave height, crest height, wave steepness, etc
- Sea surface elevation maps of an extreme storm event at FINO 1 Nov 2006 showed:
  - => The order of magnitude of the individual waves is realistic
  - => Spatial wave height distribution gives insight into generation processes of extreme waves
  - => Validation of individual waves is a complex field that needs more attention.

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### Outlook and Future activities

- Validation of spatial surface elevation data
- Extrapolation of surface elevation information in time and space
- Exploration of potential of WaMoS II as a tool for ship motion forecasting

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