Wave profiles derived from nautical X-band radar as data source for ship motion prediction

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Outline

- WaMoS II introduction individual waves
- OWME ship motion forecasting
- ONR HiRes and the way ahead
- Summary







Radar data analysis scheme



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... R&D ... Individual waves – sea surface elevations





Radar backscatter

Sea surface elevations

...The following is about a project OWME, demonstrating to use high resolution radar wave data as input to ship motion forecasting ... to predict quiescent periods up to 120 s ahead.... operational...



European Joint Industry Project OWME

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Partners: Statoil-Hydro ,Total, Seaflex/Kongsberg,TU-Delft, OceanWaveS, University of Oslo, MARIN Time critical application – data sampling had to be re-structured and individual wave analysis had to be restricted to small sub areas



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Sea surface elevations were calculated, with window placed in main wave direction. Data is about 1 nm off platform.





Example of sea surface elevation at 1 particular location over time

Short validation phase Drifting wave rider buoy and radar area shifted into same area



Location and timing are very important....

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OWME conclusions

WaMoS II surface elevation time traces can be incorporated into ship motion forecasting models

120 s forecasting period for quiescent periods in **moderate** seas is possible

Even more accurate **temporal and spatial** info is required!!!

Extend Validation get more data (Bimodal Seas/Higher Waves)





ONR-DRI HiRes experiment 2010

buoys, **planes**, ve ssels...

... plus laser wave profiles at FLIP, plus deterministic models....

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Preliminary results – Comparison WAMOS/Airborne LIDAR SIO Pier

Challenge? Combining WAMOS Elevation Maps, and Airborne topographic map (Collaboration Ken Melville, E. Terrill and T. de Paolo)



Preliminary results – Comparison WAMOS/Airborne LIDAR SIO Pier



K. Melville

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Preliminary results – Comparison WAMOS/Airborne LIDAR SIO Pier October 5th 2007 – Flight2

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Waves are rather high and most probably create shadowing + range dependency

K. Melville



Preliminary results: wave elevations in m



Transect comparison, taken at the middle of flight path 2

K. Melville & E. Ter

Summary

- Individual wave heights can be retrieved from X-Band radar
- It is quite a challenge to validate the data
- ... and its potential is not fully explored yet
- Validations in HiRes will be very valuable
- ... together with the incorporation into the deterministic models
- We'll see where it goes from there

