BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE

Current and Wave Observation in the Southeastern North Sea using Bottom-Mounted AWACs

J. Fischer, Federal Maritime And Hydrographic Agency (BSH), Germany

NORTEK AS

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European user symposium

Overview

- motivation/ marine conditions German Bight :

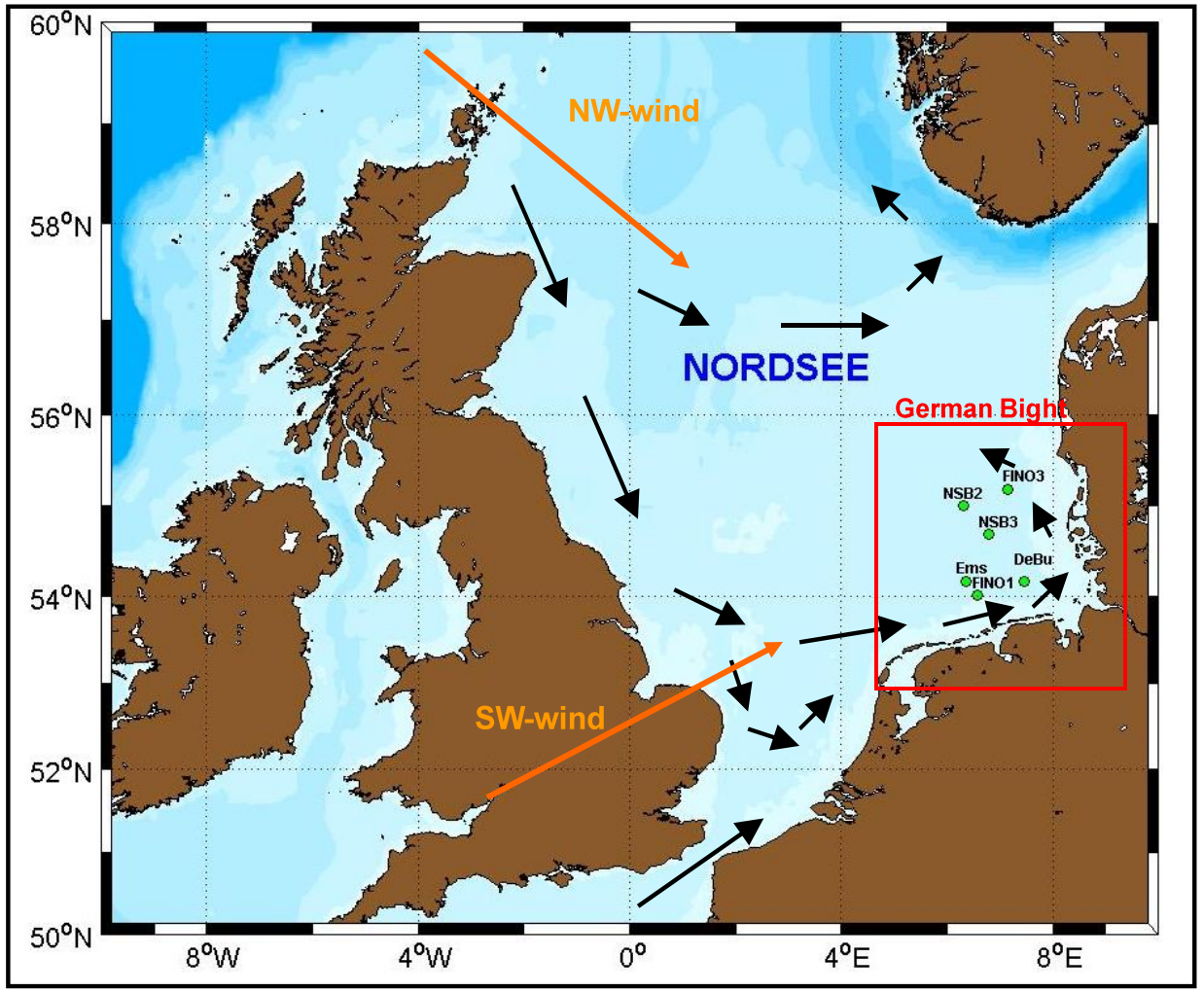
- monitoring programs and projects:

Research Platforms in the North and Baltic Seas (FINO)
Research at Alpha Ventus (RAVE)
Marine Monitoring Network (MARNET)

- measurements

- summary and outlook

motivation



German Bight

- shallow area (~30 - 40 m)
- tidal current velocieties up to 1.5 m/s
- strong wind, due to the NAO
- max. wave heights ~18 m!

FINO Research Platforms in the North and Baltic Seas (FINO)

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FINO1

Position: 54° 0.86' N - 6° 35.26' E;
online since 2003

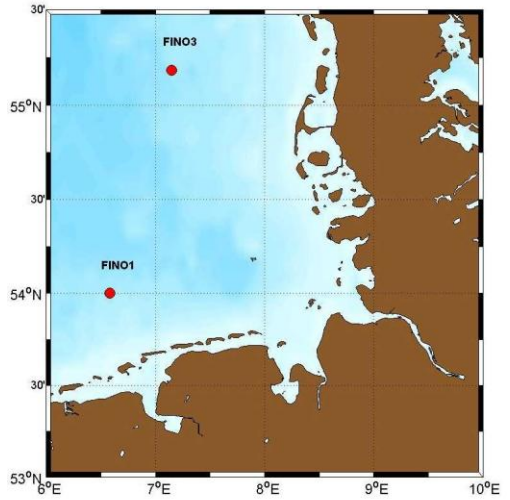
FINO3

Position: 55° 10.99' N - 7° 9.00' ;
online since 2009

- main research focus
-> meteorology, oceanography, ecology and bird migration

- collecting/ analyze data in purpose to build and operate offshore wind farms in the rough marine climate
-> „alpha ventus“ is located ~400 m from FINO1

FINO Homepage: http://www.fino-offshore.de/



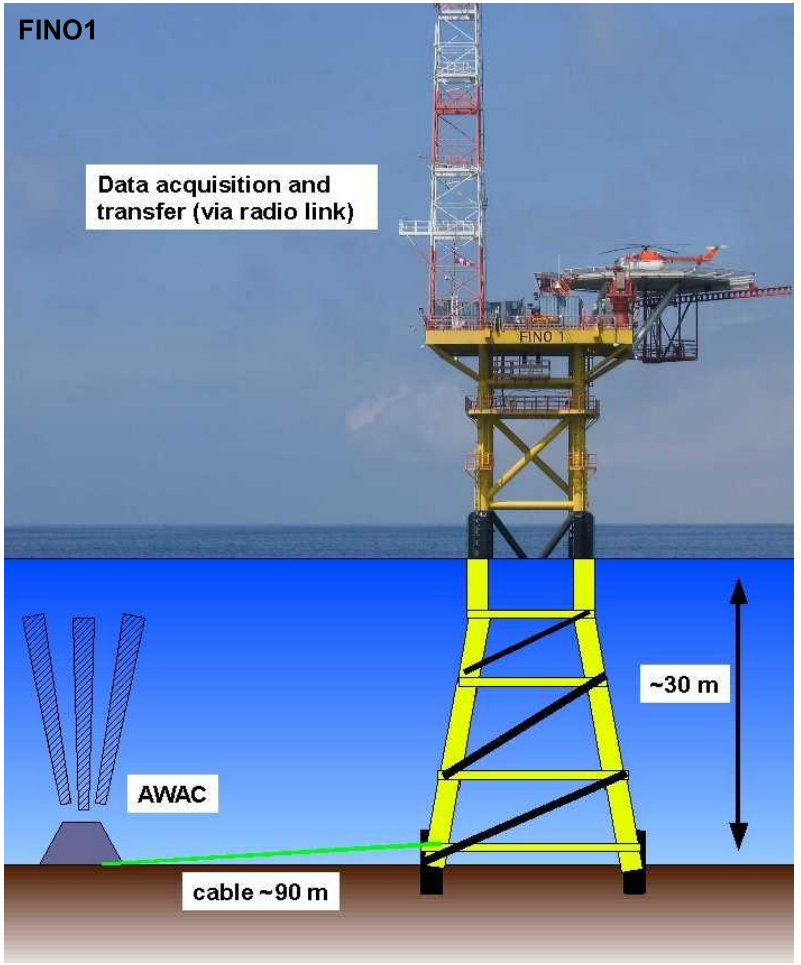
FINO 1 2 3
Forschungs- und Entwicklungsplattformen in Nord- und Ostsee Nr. 3

oceanographic-measurement

Instruments	Parameter
waverider buoy	sea State
AWAC	currents and waves
radar gauge	water-level sicnificant wave height
camera	visual impressions of swell conditions
temperature-sensor	temperature
conductivity (CTD)	salinity
oxygen-optode	oxygen saturation
WaMoS II	sea State

+ measurements of meteorology, ecology and bird migration (realized by project partners)

Fino data are stored in a database and is free available via internet: http://fino.bsh.de/



AWAC used in online mode

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alpha ventus:

- first german Offshore Wind Farm
- 45 km north of the East Frisian island of Borkum (German Bight)
- 30 m water depth
- 12 offshore wind energy plants at 5MW
- plant manufactures: Multibrid & REpower

„far, deep, harsh und high“

BSH coordinate the measurements and carry out the marine observations

several research projects:
foundation & structures, offshore technologie & monitoring, environment, grid integration

RAVE RESEARCH AT ALPHA VENTUS
Eine Forschungsinitiative des Bundesumweltministeriums

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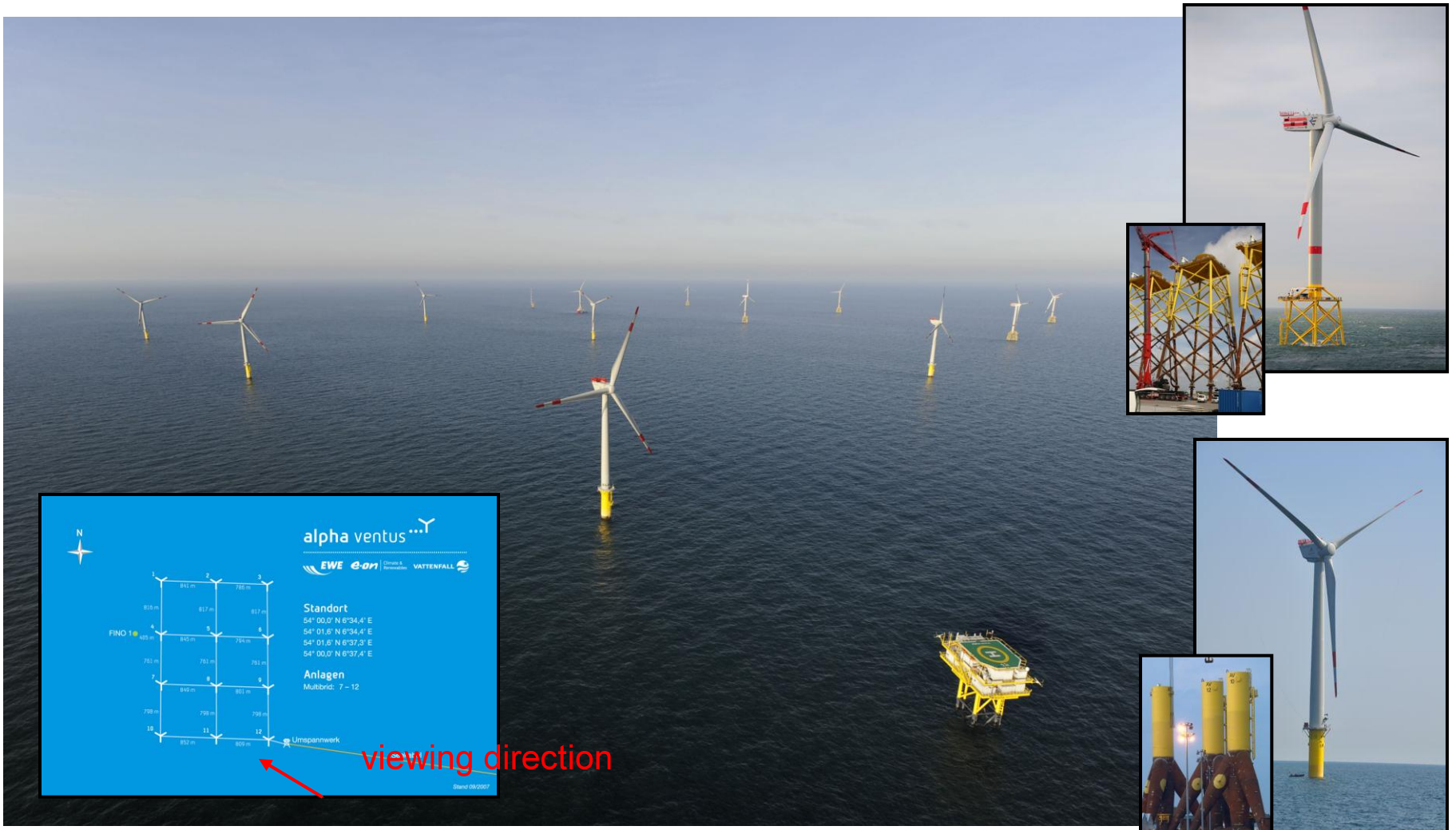

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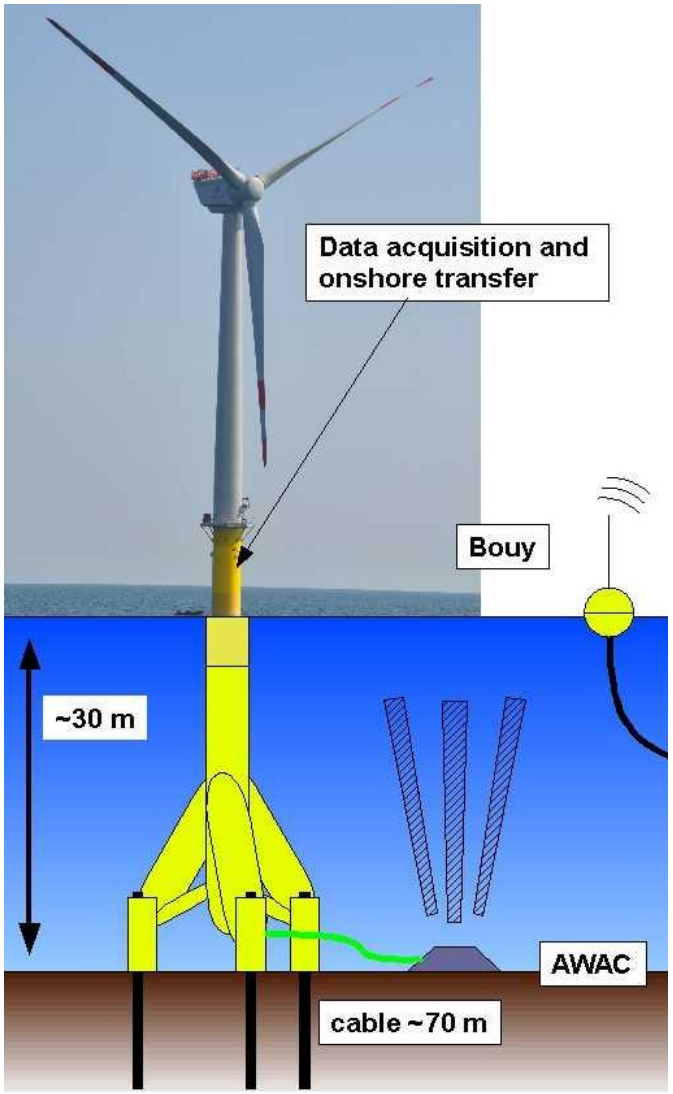
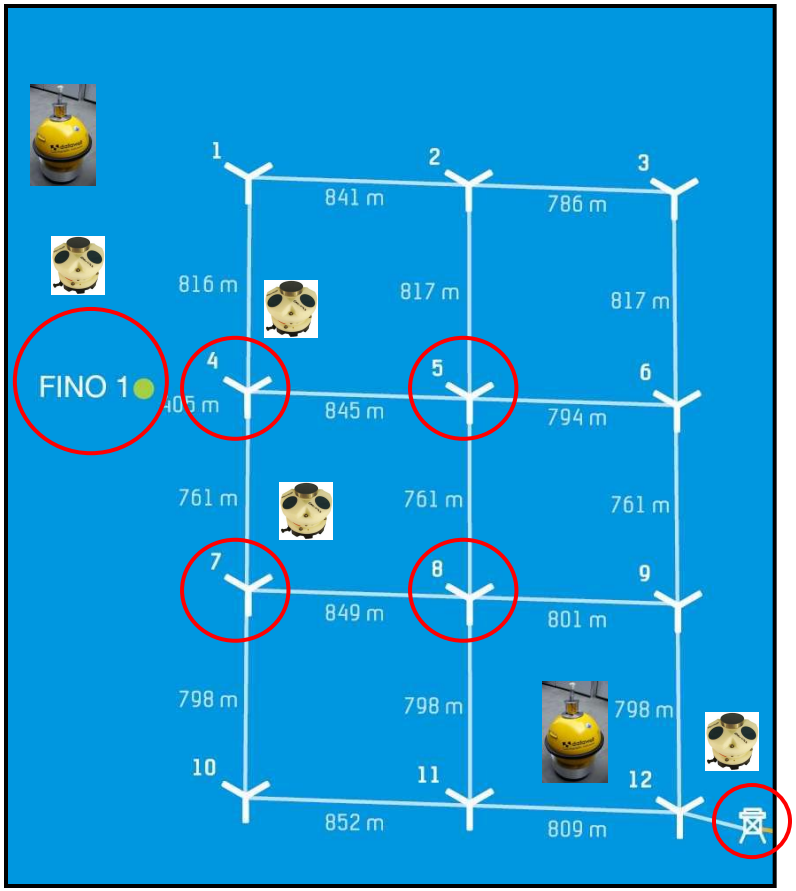


oceanographic Investigation in the test site „alpha ventus“



MARNET

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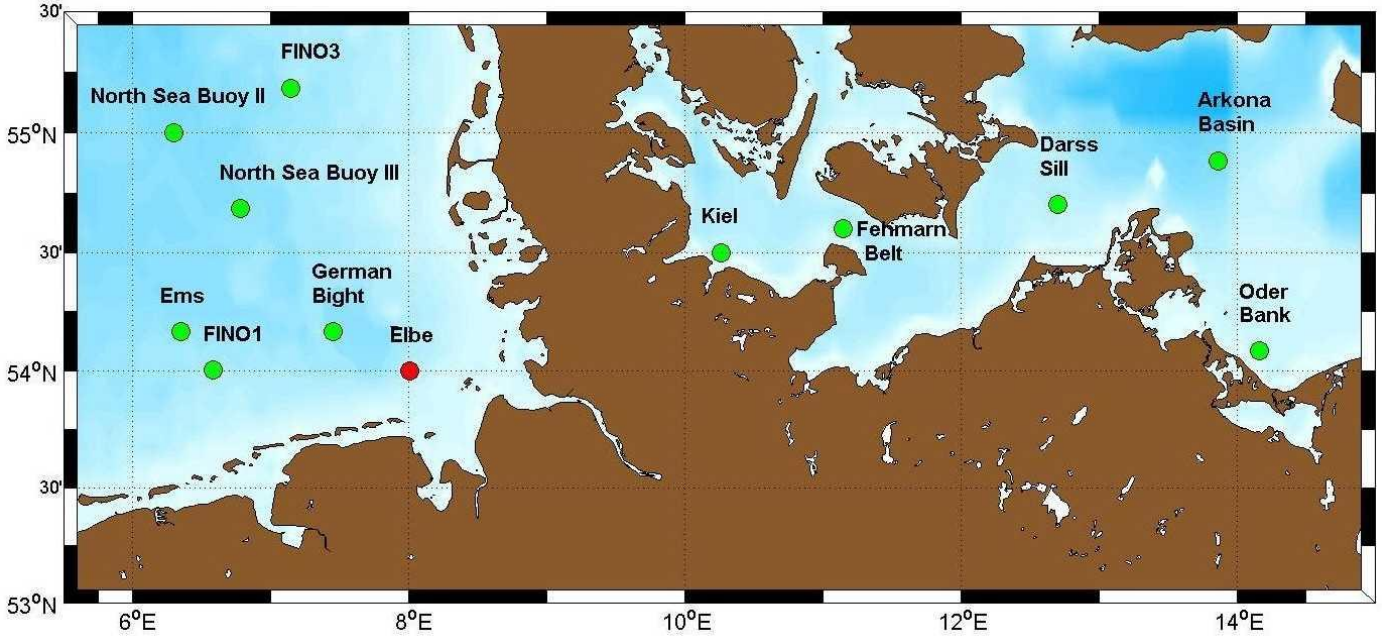
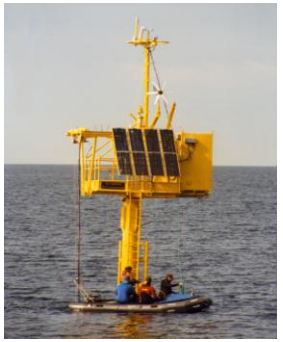
MARine Monitoring NETwork in the North and Baltic Sea





MARNET

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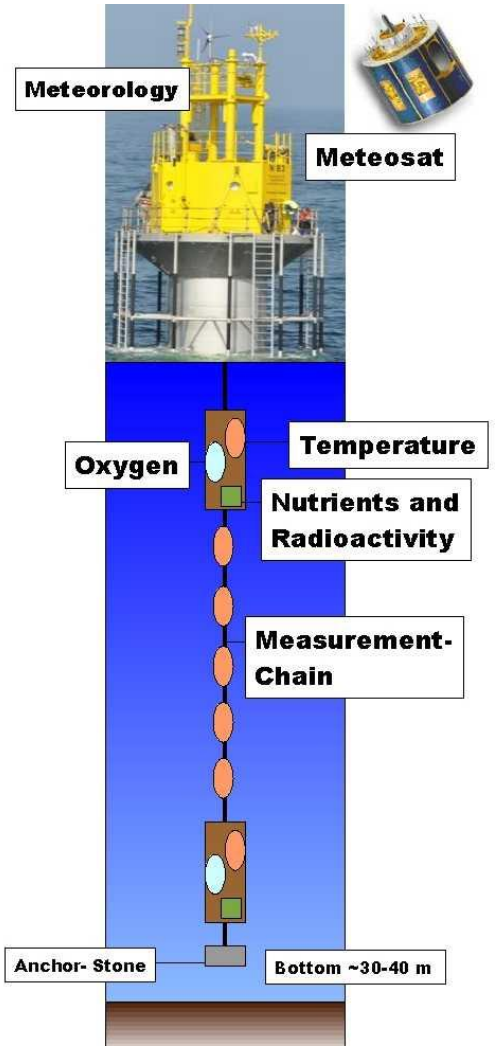
main tasks:

- monitoring of physical, hydrological, chemical and biological parameters in shallow coastal waters
- monitoring of changes of marine climate
- support of marine services (i.e. sea ice service)
- support of operational models

challenges & boundary conditions:

offshore measuring -> rough weather conditions
operation & maintaince -> biofouling
permanent operation -> data timeseries since 1986
availability of real time data -> satellite (Meteosat)

Typical monitoring build-up



outlook: measurement of waves & currents;

At work

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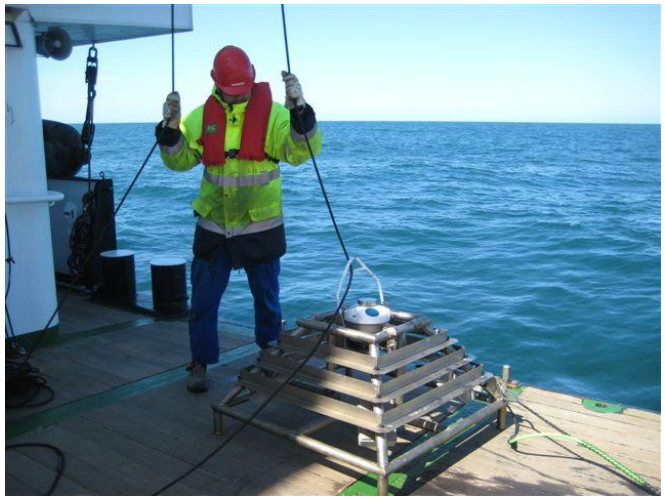
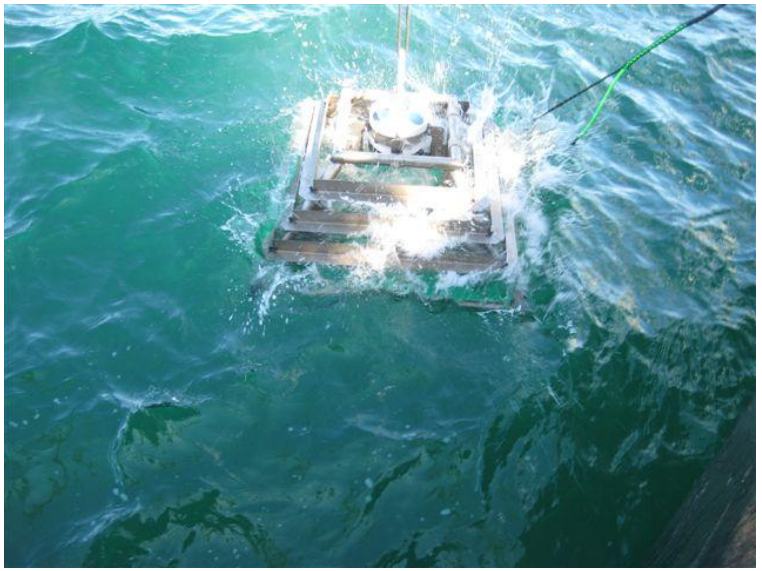
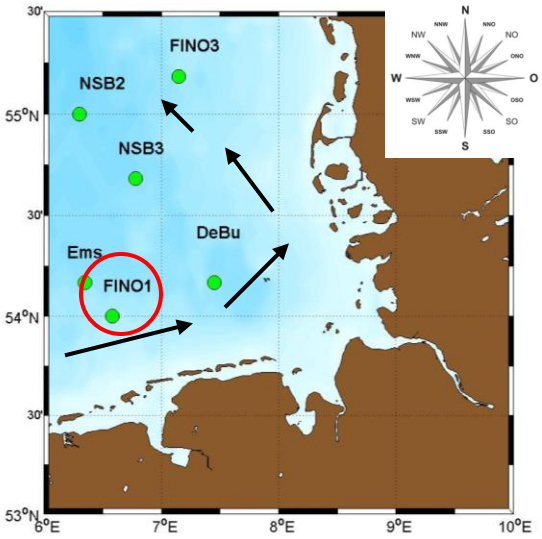
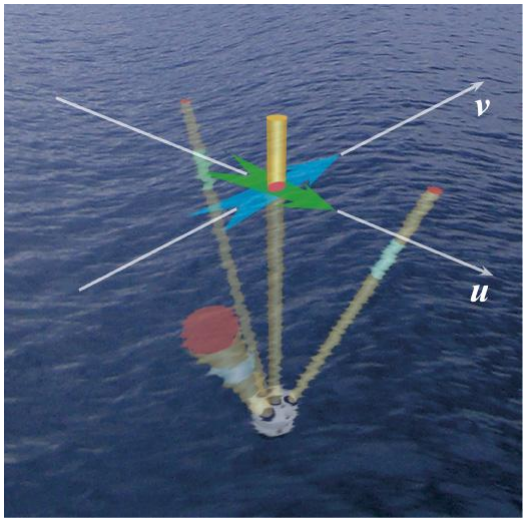


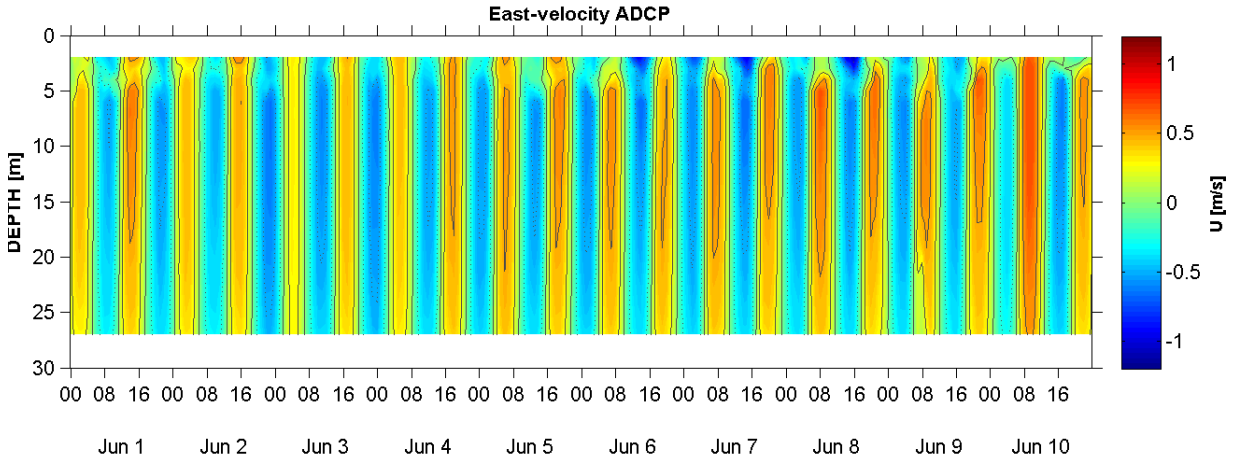


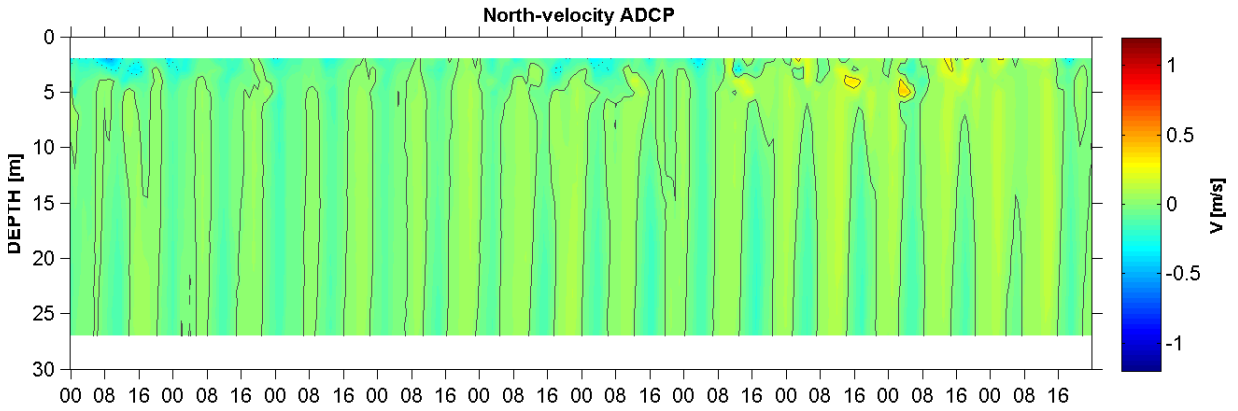
Measurements (currents)



FINO1







Measurements (currents)

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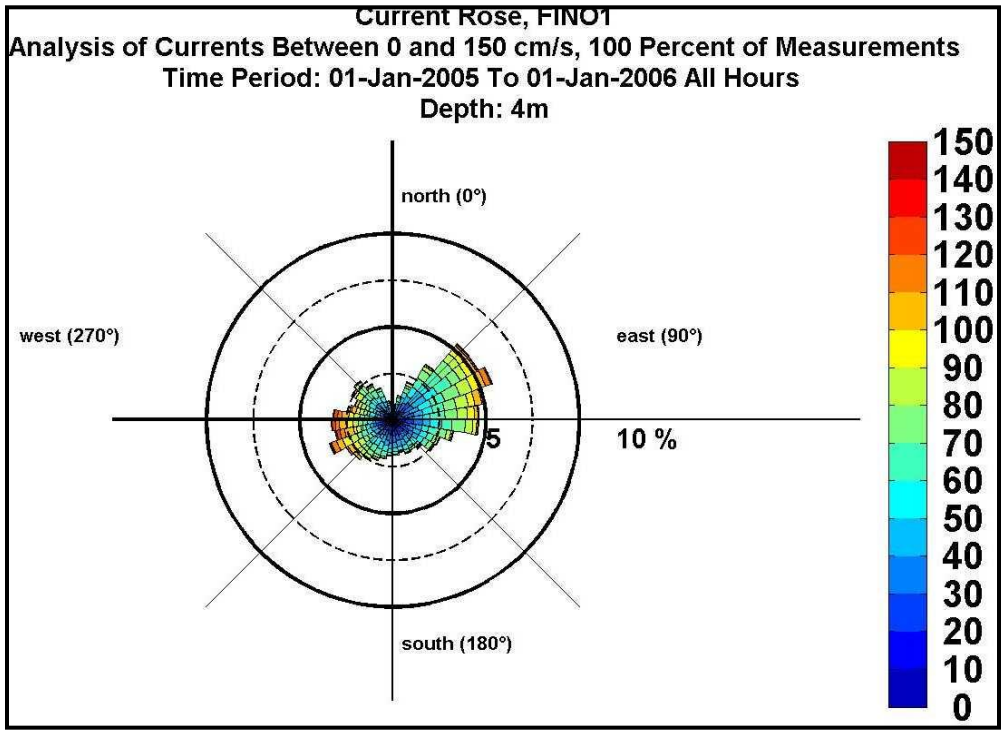
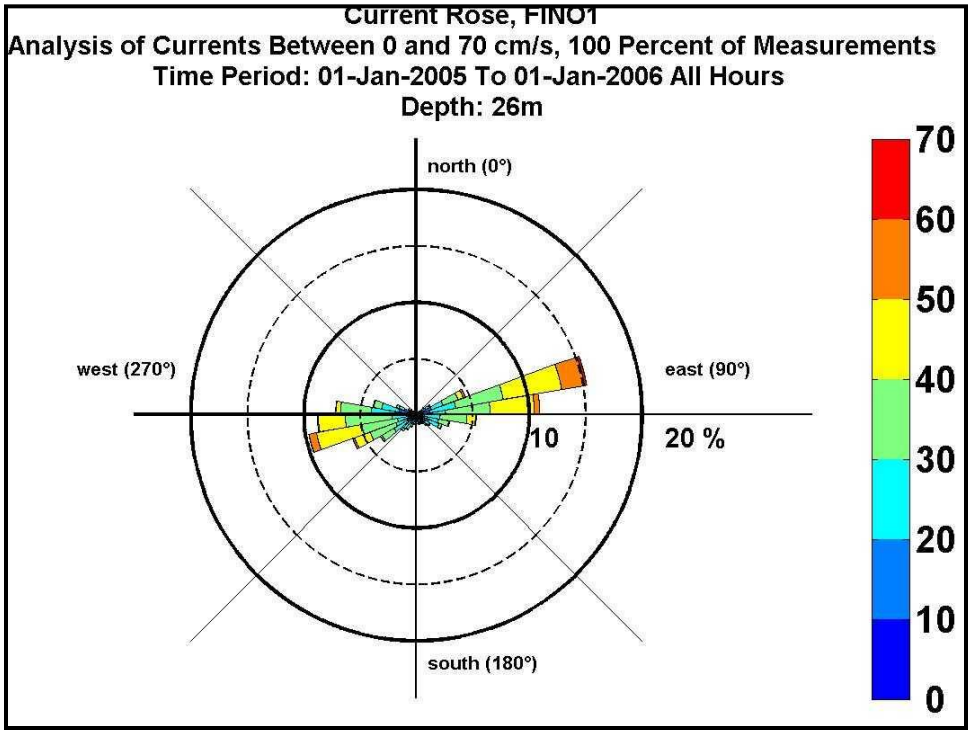
FINO1 Currents (distributation & strength; 2005)

current-rose (4 m)

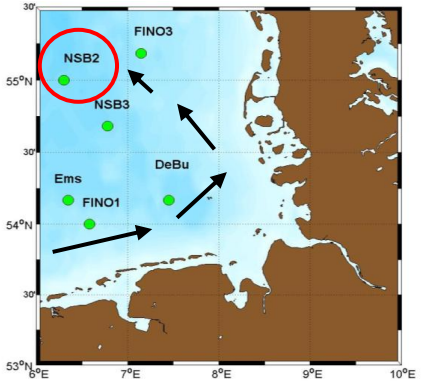


current-rose (26 m)

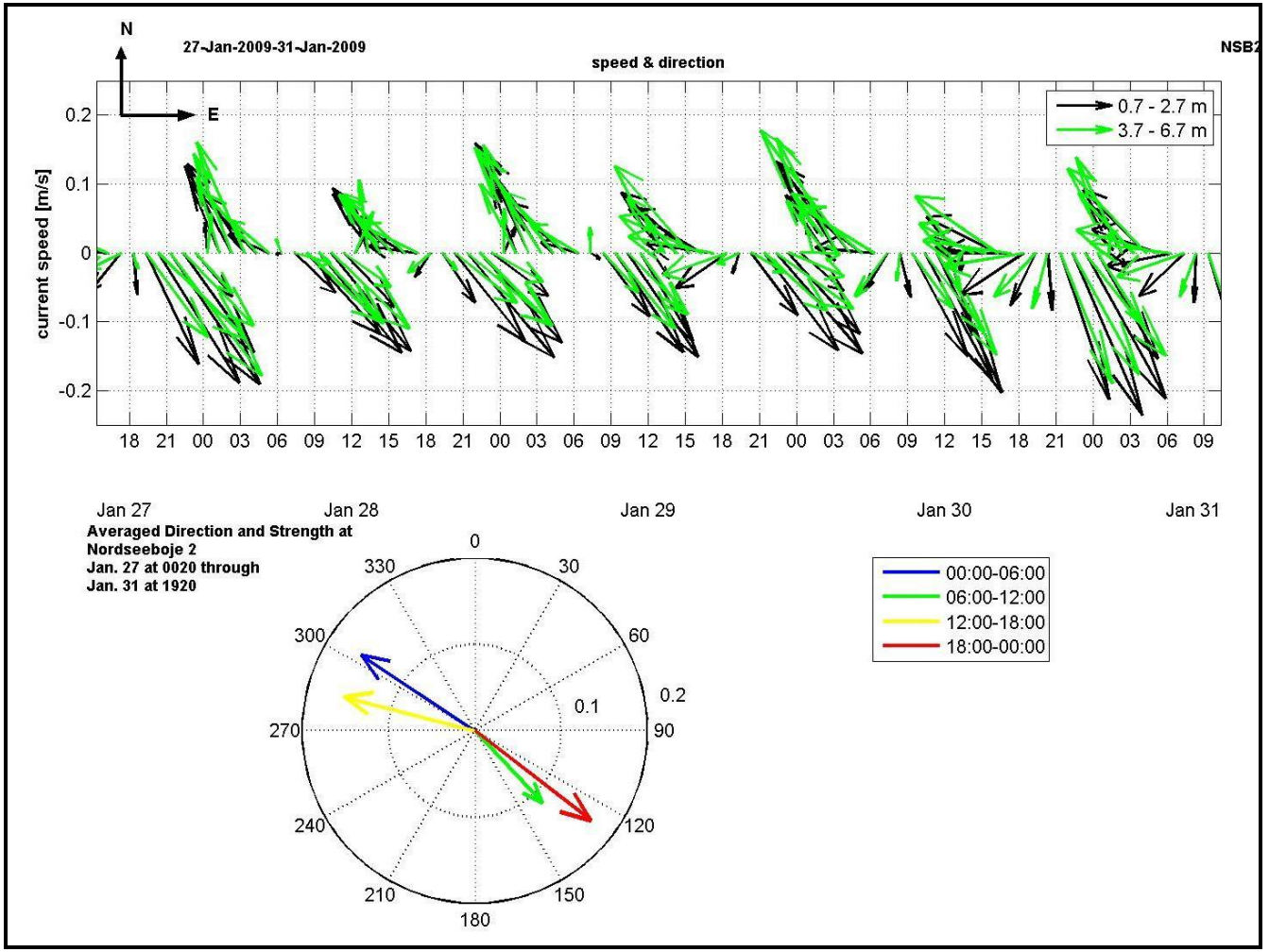


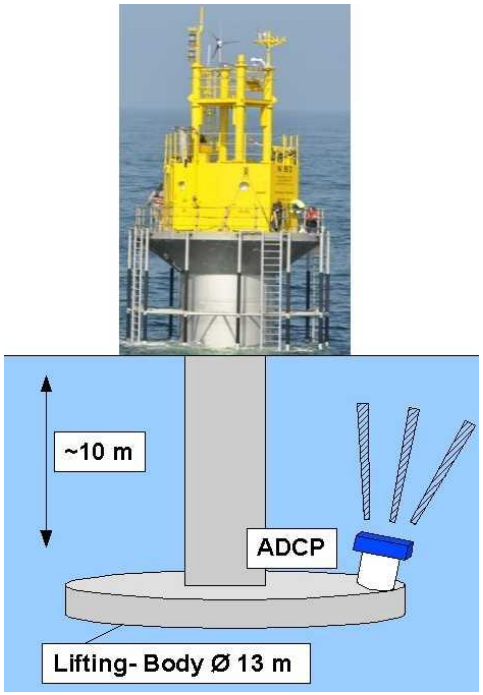
Measurements (currents)

BUNDESAMT FÜR SEESCHIFFFAHRT UND HYDROGRAPHIE



North Sea Bouy II





Measurements (waves)

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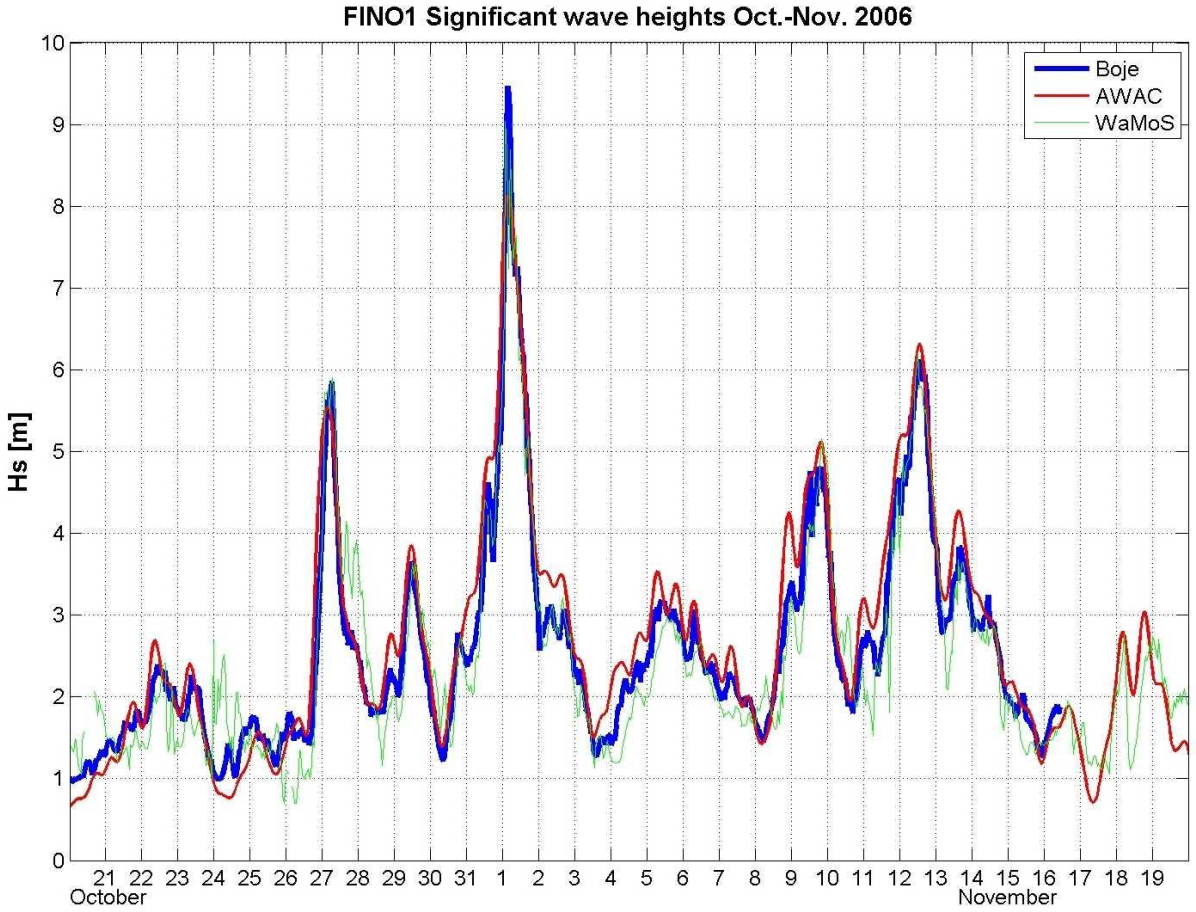
Extreme Waves at FINO1

Storm “Britta” (Nov. 2006)



working plateu in 15 m above chart datum

Measurements (waves)

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Storm at October 2009

summary and outlook

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- increase of offshore activities

-> generated high demand on knowledge of prevailling oceanographic conditions

- research & monitoring programms

-> AWACs deliver real-time and long-term statistics of marine conditions.

-> ensure safe operation and provide reliable data (i.e. for computation of design loads and forces acting on offshore structures)

- outlook

further development of ocean monitoring (in particular current & wave measurments in the German Bight)

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Thank you for your attention!

www.bsh.de