



Fugro Norway AS – OCEANOR
Norwegian Forum for Autonomous Ships
15th June 2017



Fugro's Oceanographic Business Line

243 employees

Fugro GEOS (Wallingford, Houston, KL, Singapore, Perth)

Fugro OCEANOR AS (Trondheim, Sandnes, Madrid)

**ISO 9001:2000
OHSAS 18001:1997**

SEAWATCH GLOBAL DISTRIBUTION

ALL SEAWATCH REGIONS

North & South America

Argentina	Peru
Chile	Venezuela
Ecuador	USA

Europe & Africa

Finland	Portugal
Greece	Russia
Iceland	South Africa
Ireland	Spain
Israel	Sweden
Italy	UK
Norway	

Middle East

Bahrain	Qatar
Iran	Saudi Arabia
Kuwait	Syria
Oman	

Australasia

Australia	Malaysia
China	Taiwan
India	Thailand
Indonesia	Vietnam

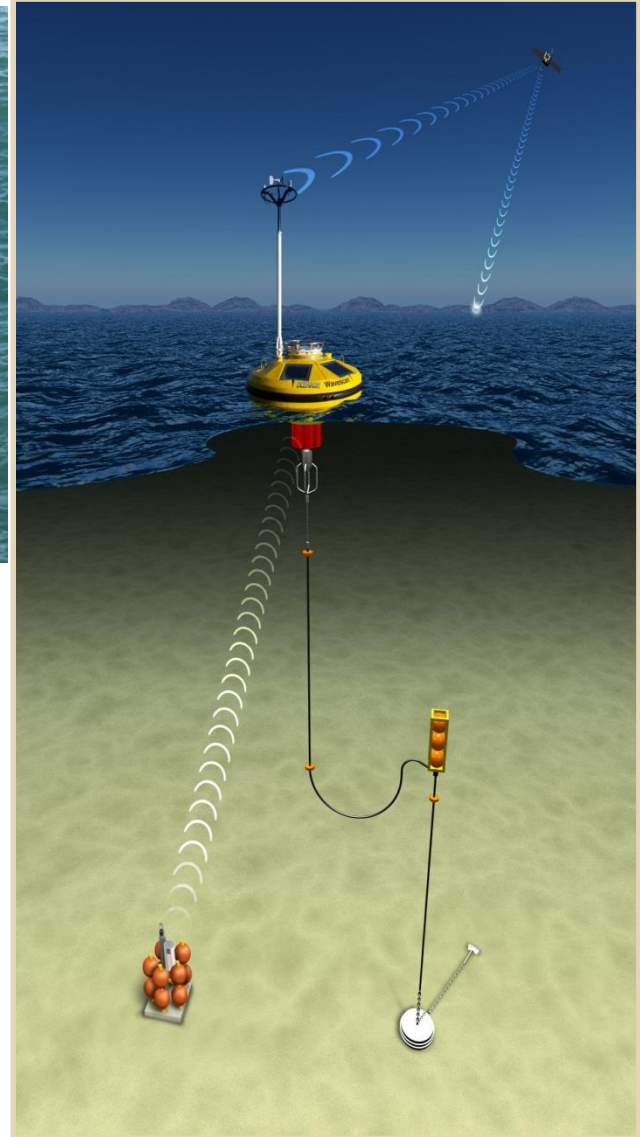

North & South America


Europe & Africa


Middle East


Australasia

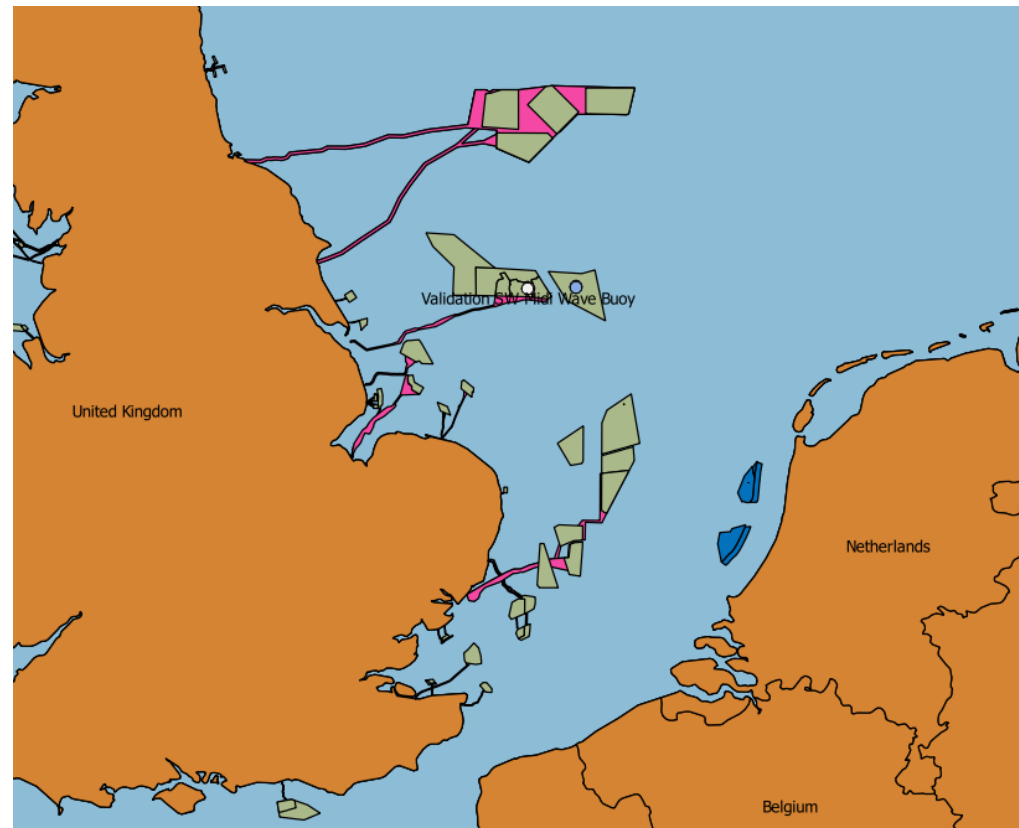
Seawatch/ Real Time Monitoring buoys



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Measuring Europe's wind resource

- DNVGL certified type validation
 - Bankable data
 - Wind speed and direction 4m – 200m
-
- Navitus Bay Wind Park - 2014
 - Borssele Wind Farm Zone - 2015
 - Hollandse kust zuid WFZ – 2016
 - Baltik Srodkowy III - 2017
 - Hollandse kust noord WFZ - 2017
 - East Angla Three WFZ - 2017
 - Hornsea 3 Wind Farm - 2017

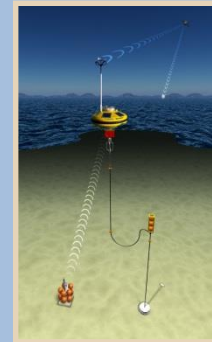


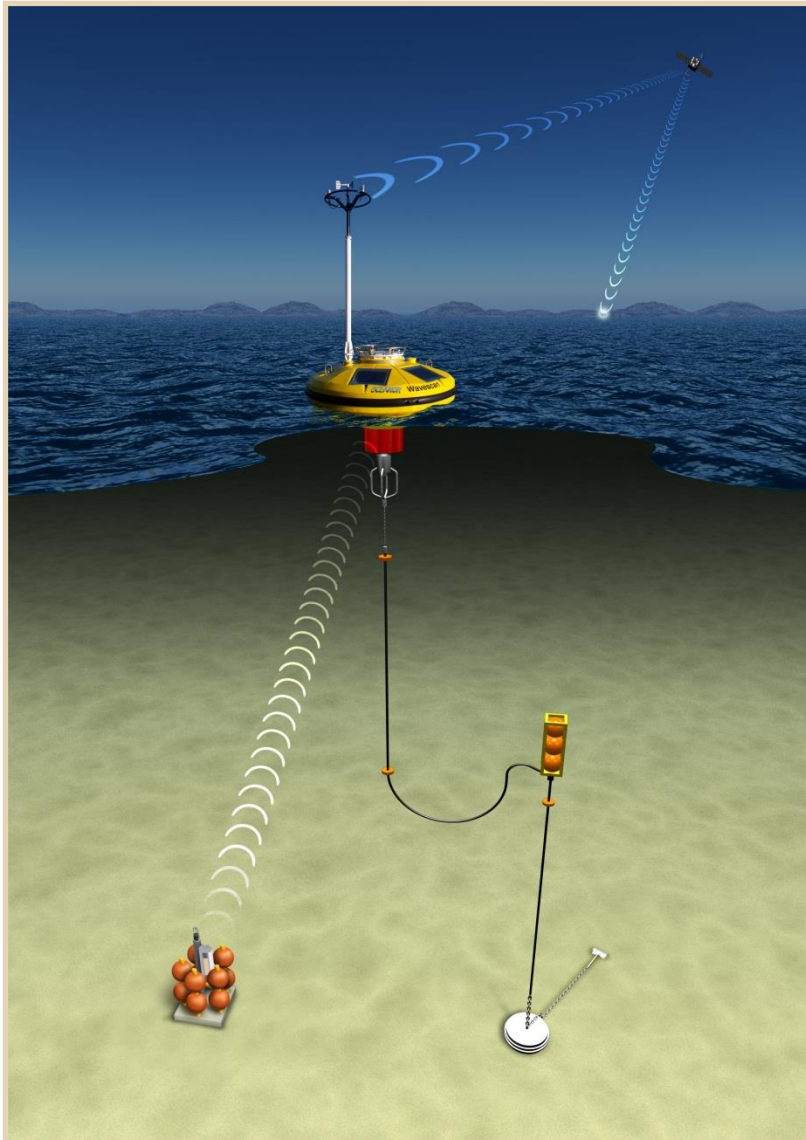
<http://offshorewind.rvo.nl>

Buoy Networks - India



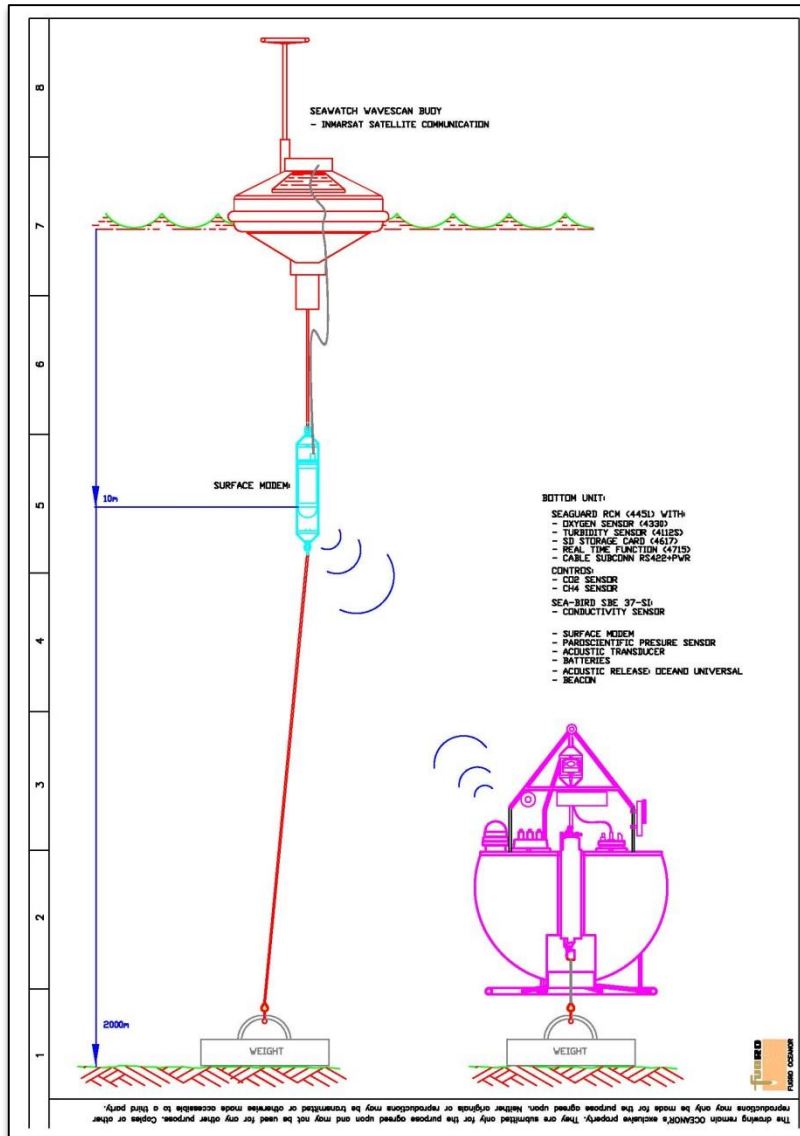
Buoy Networks - China





- **The Seawatch Deep Sea Module:**
- Ensures accurate and timely tsunami detection
- Is highly reliable - low in complexity
- Contains only 2 parts: combined processor-pressure sensor unit & acoustic release-modem unit
- Uses state-of-the-art low-power electronics for long deployments
- Integrates with existing buoy systems
- Features built-in test functionality for system verification
- Uses two-way communication for easy interrogation and performance control
- Provides essential information for early tsunami detection

SEAWATCH Seabed Observatories

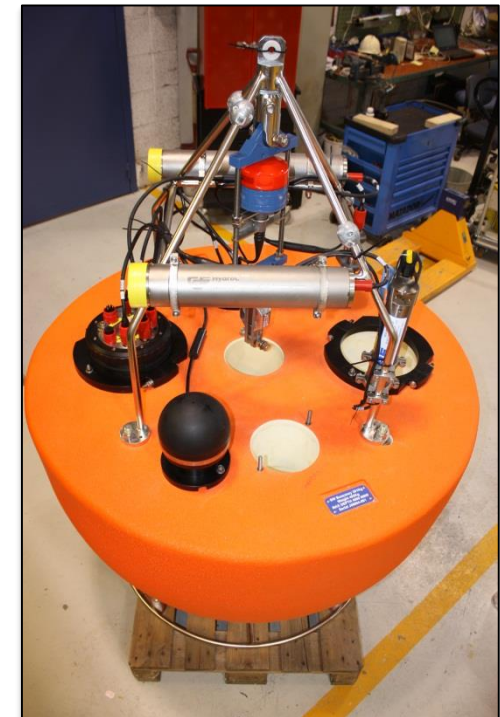


Applications

Tsunami
Climate change
Subsea vents
Deep sea biology
Coral reef

Parameters

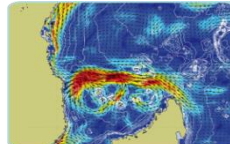
Water pressure/level
Currents
Cond/temperature
Turbidity
pH
Oxygen
Hydrocarbon/CH4
Hydrocarbon/CO2



Sewatch buoy applications

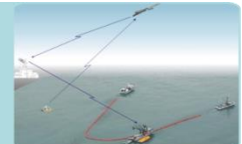


Renewable Energy



Weather forecasting

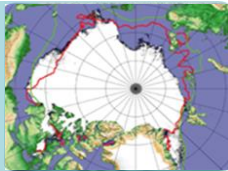
Contingency



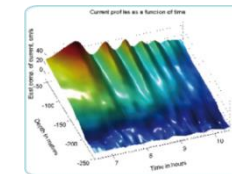
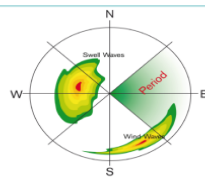
Harbour and vessel traffic



Acquisition of long term data for climate studies



Acquisition of design data for e.g. offshore developments and coastal engineering activities



Studies of oceanographic/meteorological processes

Real time data during operations



Monitoring of water quality from pollution sources such as oil terminals and industry plants



Buoy Autonomy

- Is a metocean buoy autonomous?
- Collects data from various sensors
- Performs multivariate analysis on collected data
- Transmits data, receives commands to execute
- Alerts when parameters are out of bounds or it is out of position
- Starting and stopping instruments based on power available
- Starting and stopping fuelcell charging
- Provides position and observations over AIS to nearby vessels
- However, no propulsion or GPS waypointing

Support Unmanned Surface and Subsurface Vessels

On-going Projects

- eFarled – Wavescan Implementation of AIS AtoN Hydrological Message 8 broadcasted to Kystekspresen Brekstad – Kristiansund
- Hellenic Center of Marine Research – Wavescan + AIS AtoN Hydrological msg 8 broadcast to ferry crossings
- Statoil project Troll – Wavescan as 4G gateway to subsea resident ROV streaming video and providing control. Supply vessel does not need to stay while ROV operates, drop and leave.

Possibilities

- Buoy as a hub for charging, data upload/download
- High precision GPS positioning on buoy(s) with acoustic positioning subsurface relative to surface buoy

- Rough conditions
- Autonomous vessels are typically small with less/no free-board
- OCEANOR has 30 years experience what works in which conditions – Sea states, currents, winds





Thank you for your
time

Vegar Neshaug
Fugro Norway AS

NFAS Trondheim June 2017

