

Wind measurement by Floating Lidar

A cost effective tool to collect data for wind resource assessment; for design and operation of offshore windfarm

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WSOS Dusseldorf, 31 May 2024

Biography

Sungsoo Lim

- 2019 - Project Manager, Fugro Norway AS,
- 2014 – 2019 Consultant, Lloyd's Register Asia
- 2008 – 2014 Naval Architect, Daewoo Shipbuilding and Marine Engineering (Currently Hanwha Ocean)

- MSc. Civil Engineering, 2019
- BSc. Naval Architecture and Ocean Engineering, 2008







Quick introduction to Seawatch Wind Lidar Buoy

https://www.youtube.com/watch?v=p3Lwxfzj8Q0

https://www.newcivilengineer.com/opinion/the-future-of-offshore-weather-insights-for-offshore-civils-09-05-2024/

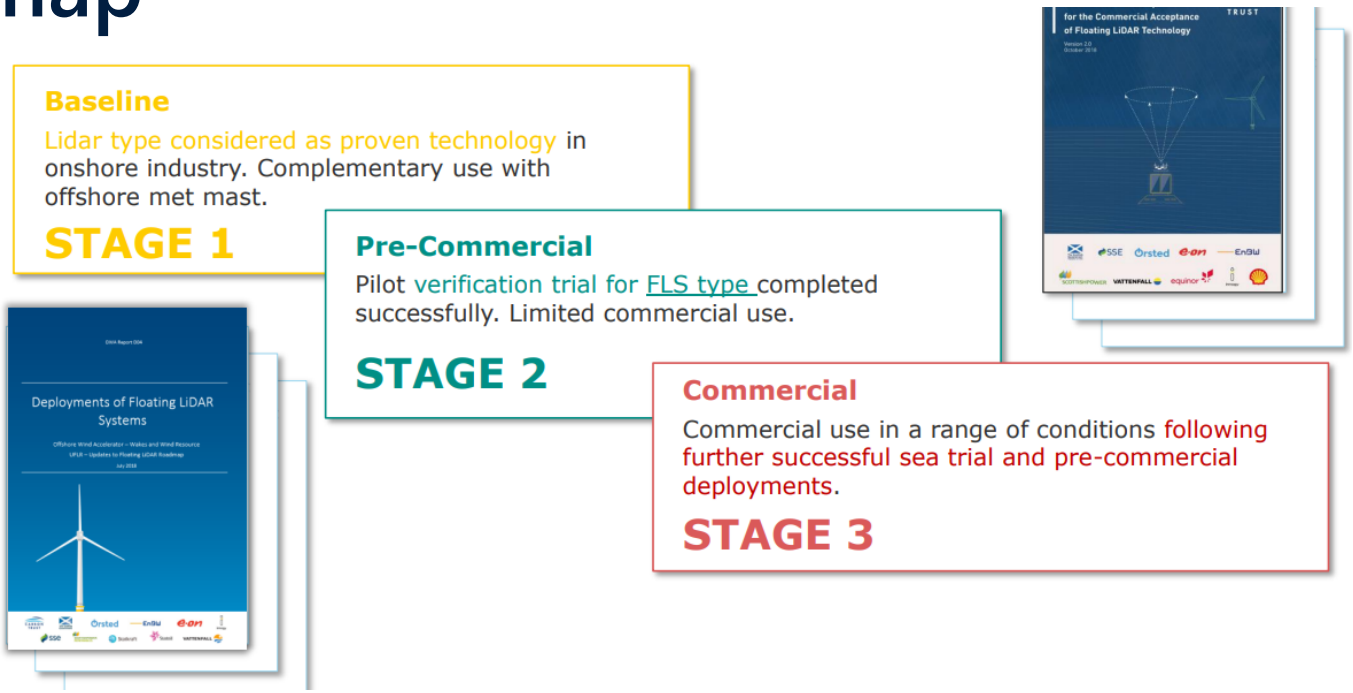
Drivers to floating lidar system

- Deeper water
- Less initial and operating cost
- Easier to be re-installed
- Higher altitude



Carbon Trust OWA Roadmap

- Stage 1 : Baseline
- Stage 2 : Pre-commercial
- Stage 3 : Commercial
  - First FLS in 2022

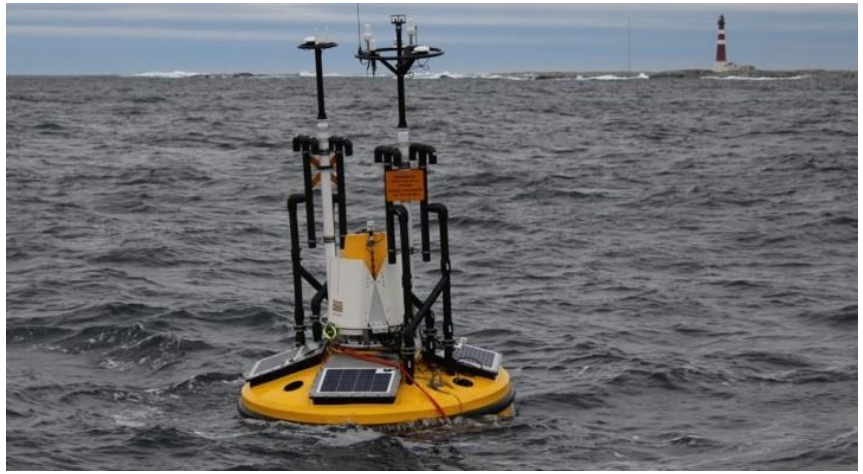


https://www.carbontrust.com/resources/roadmap-for-commercial-acceptance-of-floating-lidar

Frøya offshore validation site



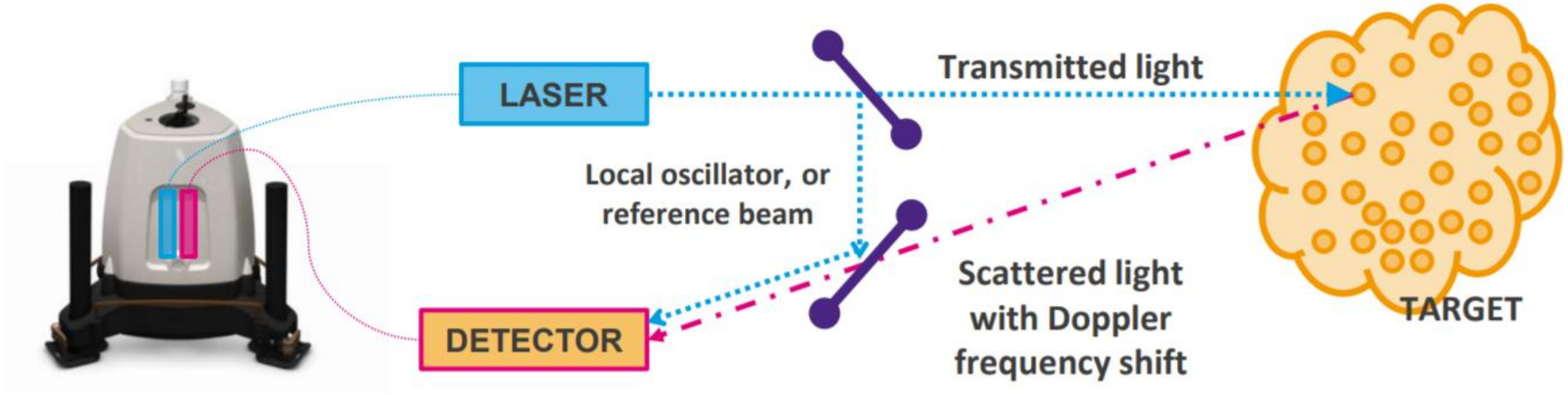








Lidar measurement



https://www.epic-assoc.com/wp-content/uploads/2021/03/Manuel-Quessier_ZX-lidars.pdf

Seawatch Wind Lidar Buoy Design

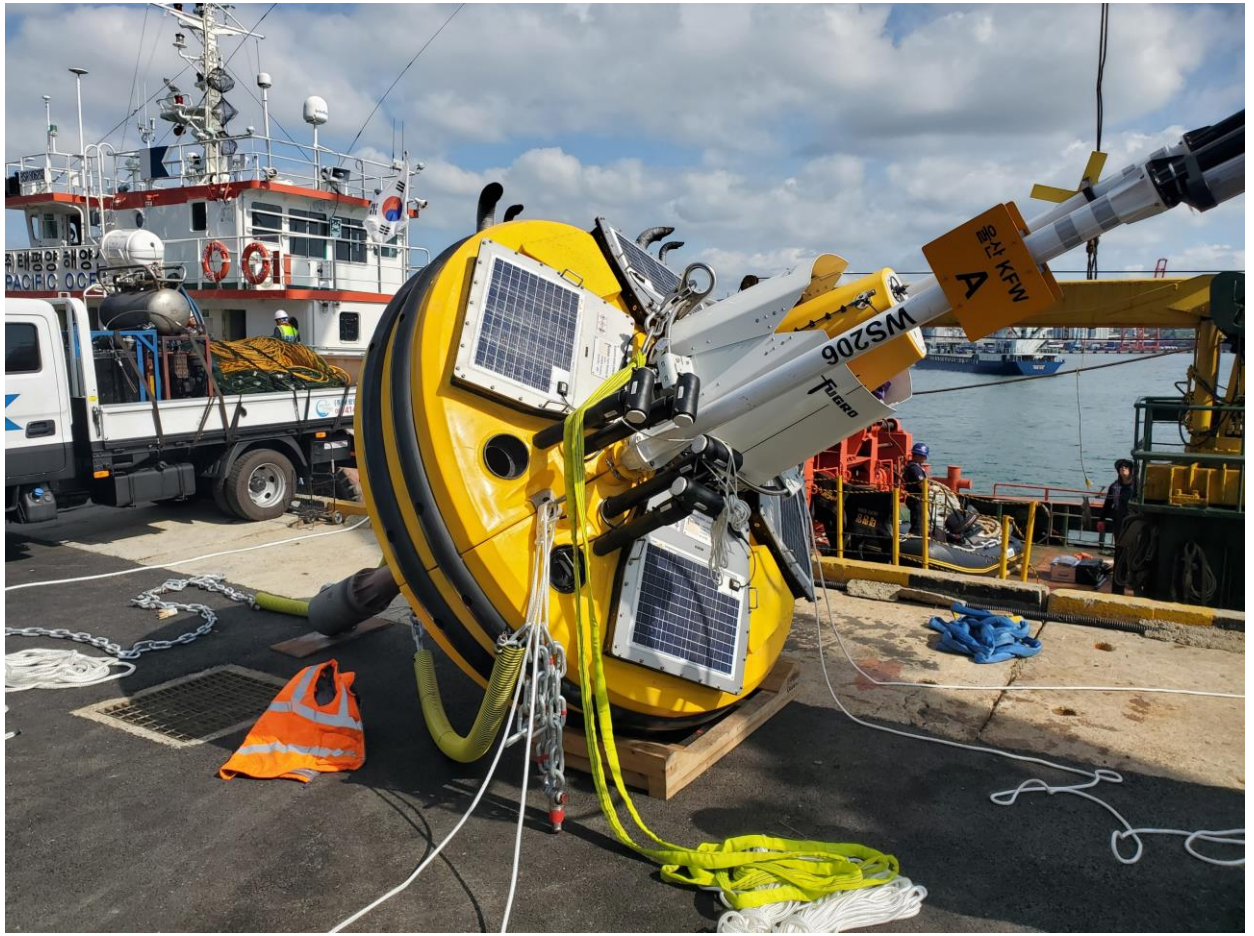
- IPX8 grade cylinder for electronics
- Energy mix: Fuel cell + rechargeable batteries + solar panel + non-rechargeables
- Performs multivariate analysis offshore
- Transmits data, receive command to execute
- Alerts on out of bound values
- Observe nearby vessels over AIS



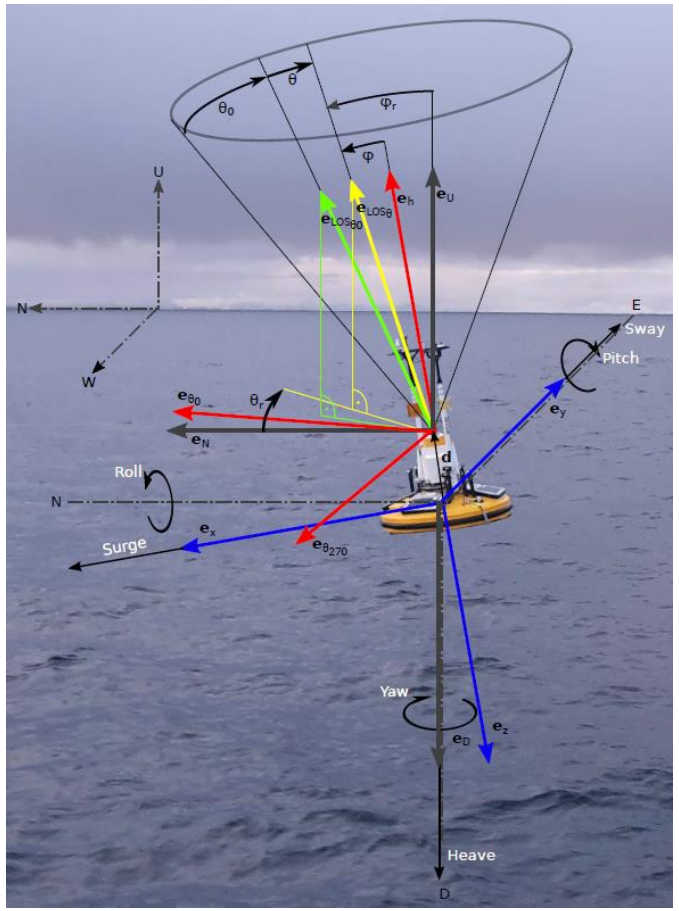
https://www.youtube.com/watch?v=4pVqD5Lz0XA

SWLB Parameters

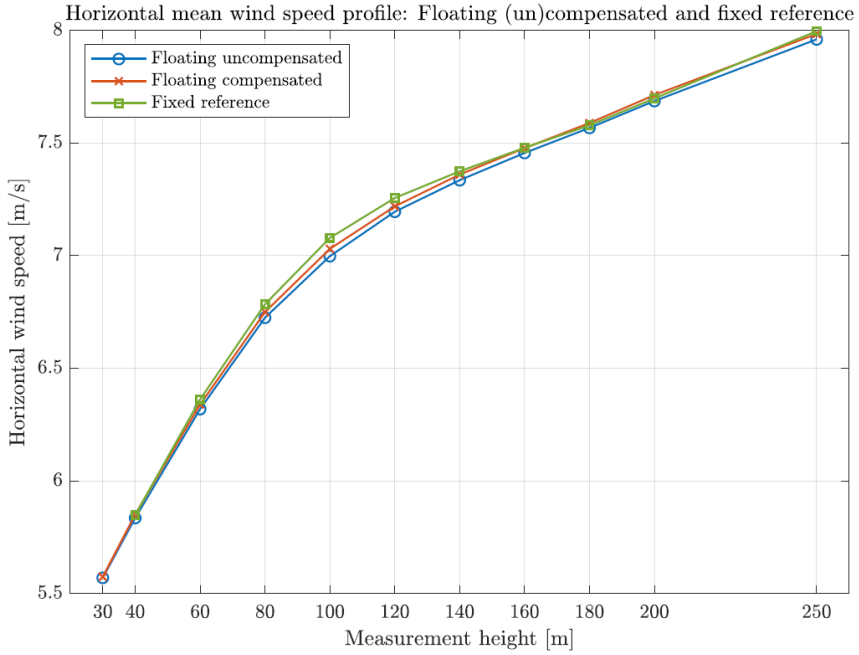
- Wind speed, direction with 10 configurable wind heights upto 300m
- Wave height, period, direction
- Current velocity, direction profile
- CTD
- Water level, surface temperature
- Air pressure, temperature, humidity
- Position data
- Motion data, Vessel data (Optional)

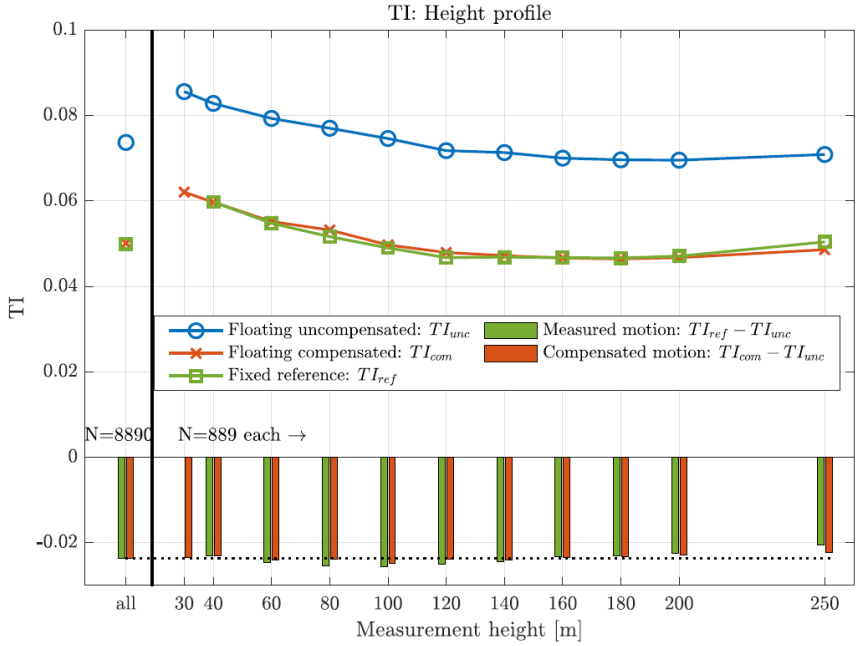


Motion compensation

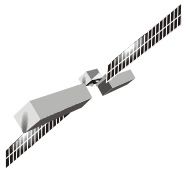


Felix et al., Remote Sens. 2020, *12*, 898





Seawatch System





Data transmission

Data from other sources

OCEANOGRAPHIC BUOYS



Data storage



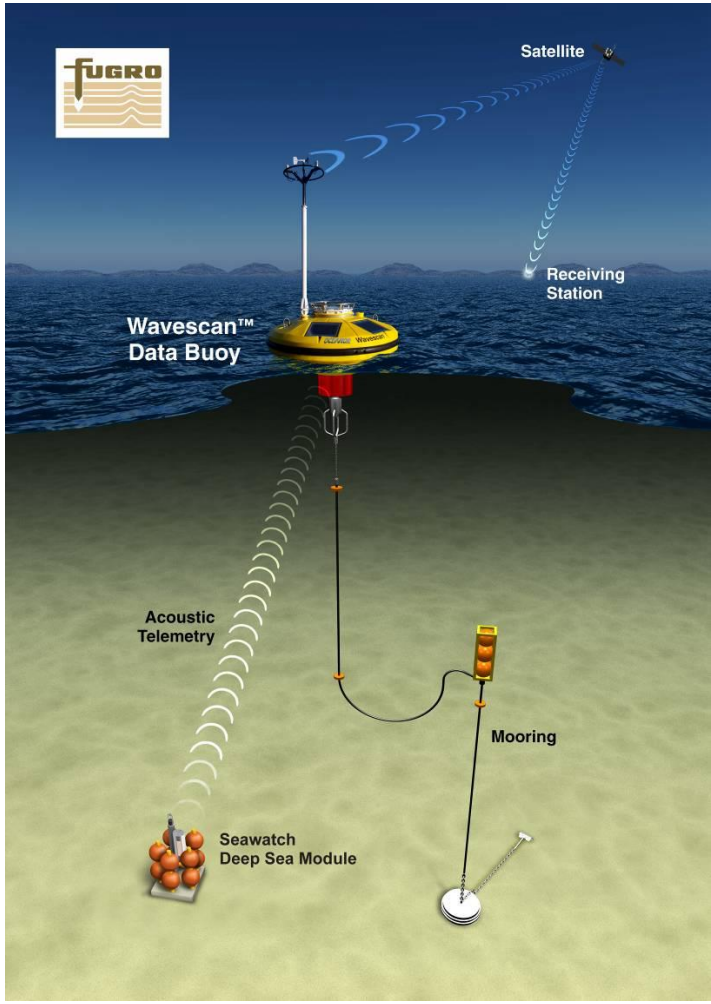
PROCESSING CENTRE

- Data control, analysis and storage
- Numerical modelling
- Forecasting



INFORMATION DISTRIBUTION

- **Authorities**
- **Coastguard**
- **Research institutions**
- **Offshore industry**
- **Tourism**
- **Fisheries**
- **Aquaculture**
- **Shipping**

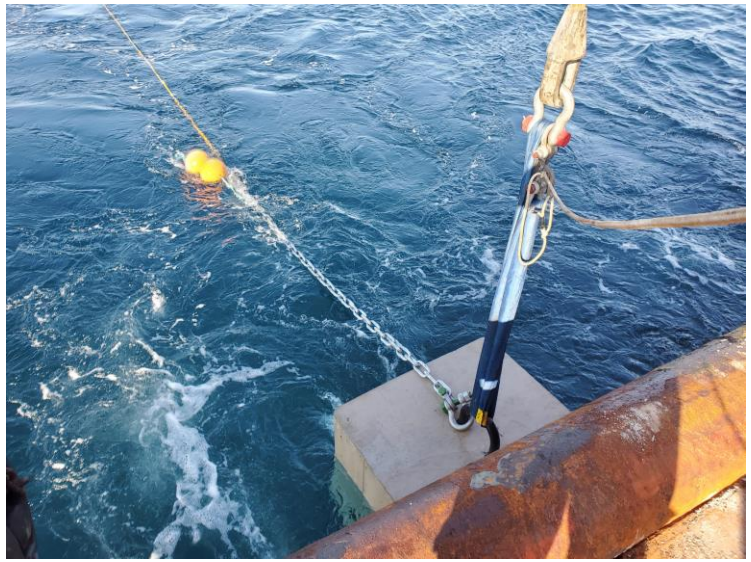


FUGRO

SWLB Operation

- Installation
  - “Tow buoy and drop anchor”
- Service / Maintenance
  - Swap by support vessel
- Decommissioning
  - Re-usable equipment
  - No harm to environment







Stakeholders

- Regs and Authority (Environmental protection & Fishery)
- Local community
- Navy/Coast guard
- Vessels & Infrastructures



Reseach and Development

- Wind-assisted propulsion verified by Lidar wind measurement
- Autonomous vessel inspection
- Buoy design for offshore maintenance platform

Together we create a safe and liveable world



Thank you

Sungsoo Lim


SEAMATCH
MEWO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WS187
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