The Sailbuoy

CLIVAR/GOOS Workshop

From Global to Coastal: Cultivating New Solutions and Partnerships for an Enhanced Ocean Observing System in a Decade of Accelerating Change

Offshore Sensing AS

Offshore Sensing was established in 2014 as a spinoff from Christian Michelsen research which is the majority shareholder. The Sailbuoy technology was developed at CMR since 2005 and is now commercialized , available through Offshore Sensing.

Business model

- Manufacturer model
- Provide services and support
- Piloting support
- Rental

The Sailbuoy

The Sailbuoy is an long endurance unmanned surface vehicle designed to support a wide variety of instrumentation payloads.

Key Features

- Rugged and reliable
- Long endurance autonomous operation
- User friendly
- Handles severe weather conditions (sea state 9+)
- High latitudes and low light conditions
- Real time satellite communication.
- 60 kg – two person operation

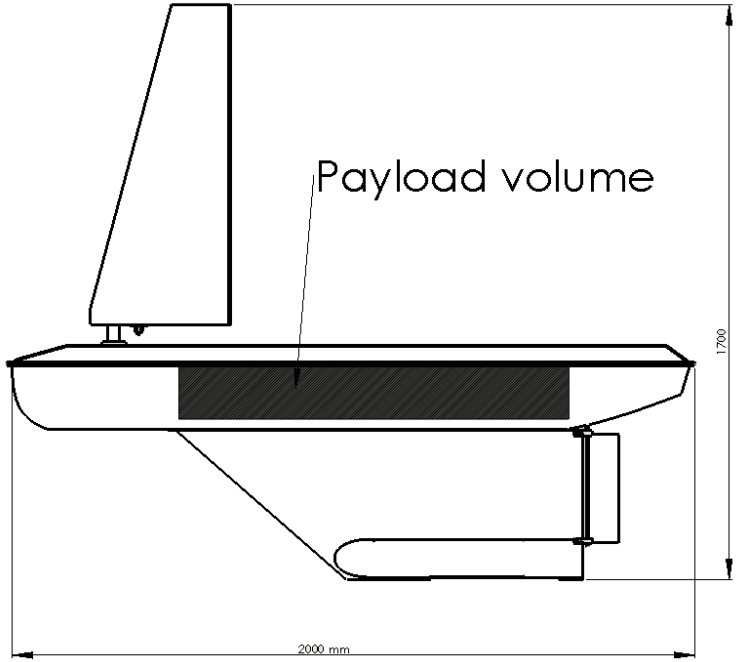
Advantages

- Low operational costs (navigation)
- Low piloting resources
- Easy deployment/retrieval
- Long endurance

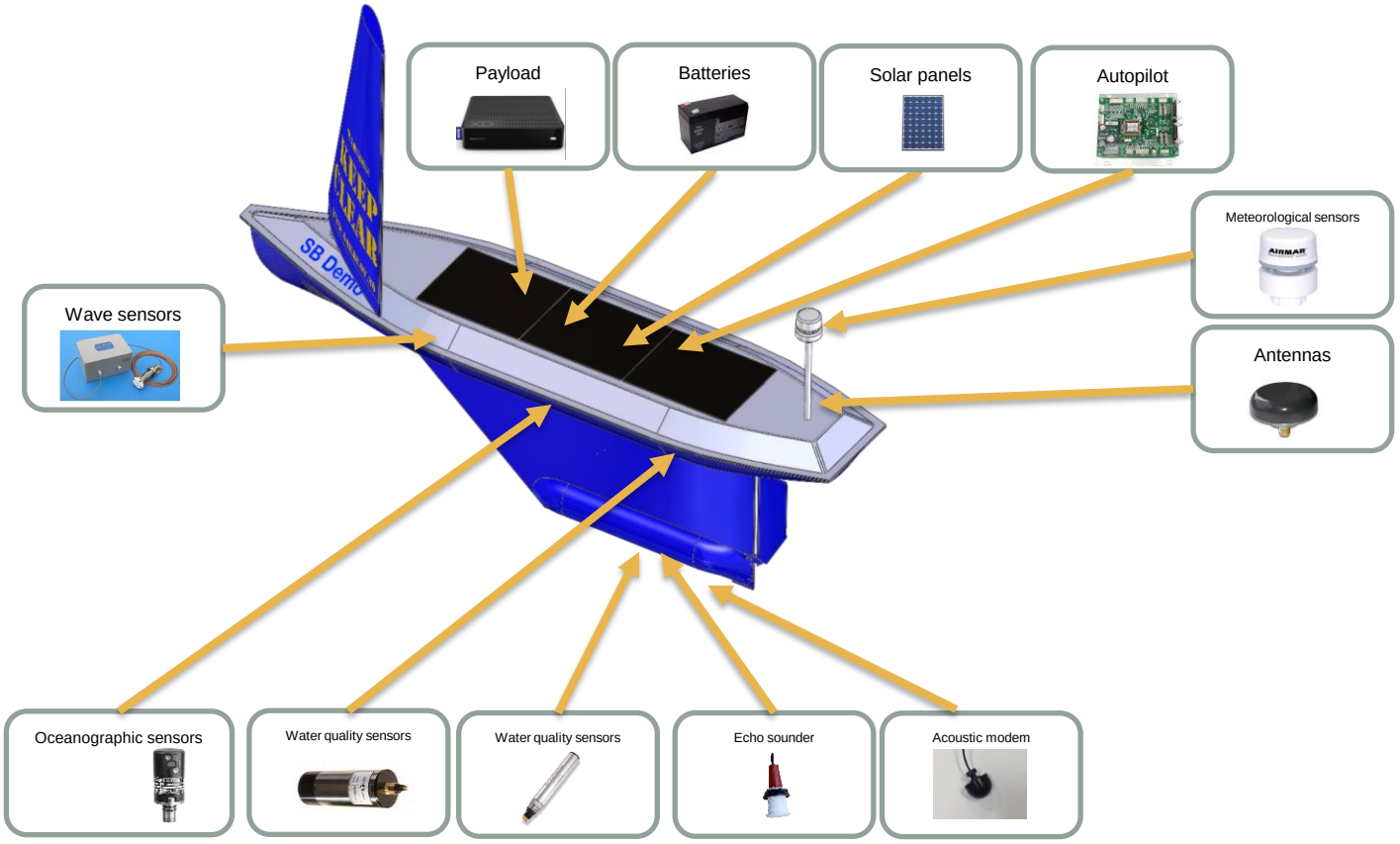
- Collison proof
- Robust
- Withstands bad weather
- Real time communication
- 60 kg - 2 man handling
- Redundant systems
- Presents little danger to other crafts
- Easy piloting , autonomous
- Low visibility
- Low acoustic signature
- Low electromagnetically signature (RADAR)
- Simple design, few moving parts
- Low power design (4 months with no sun)

Technical data

- Length: 2m
- Displacement: 60 kg
- Payload: 10 kg
- Speed: 1-3 knots
- Tested to 30 m/s wind
- On-board autopilot and data logger.
- Mission duration: 6 months
- Satellite communication
- 30W solar panels

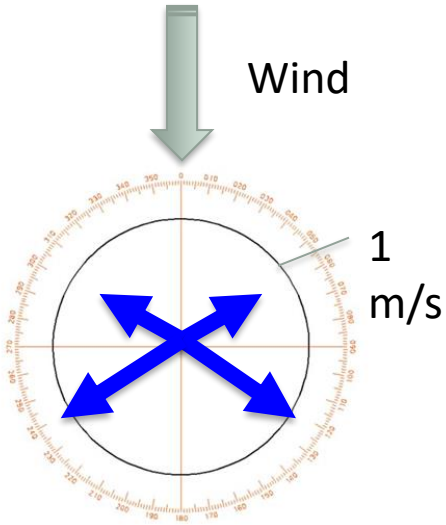


Sensors and Payload

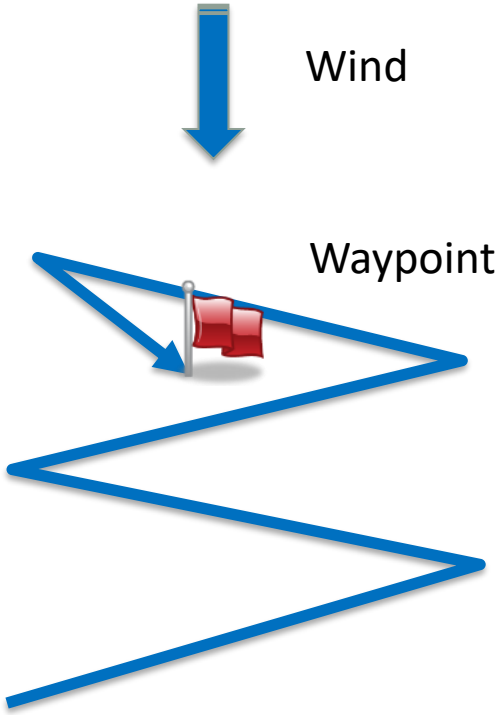


How it works

- Wind driven
- No go directions (against the wind).
- Automatic course calculation

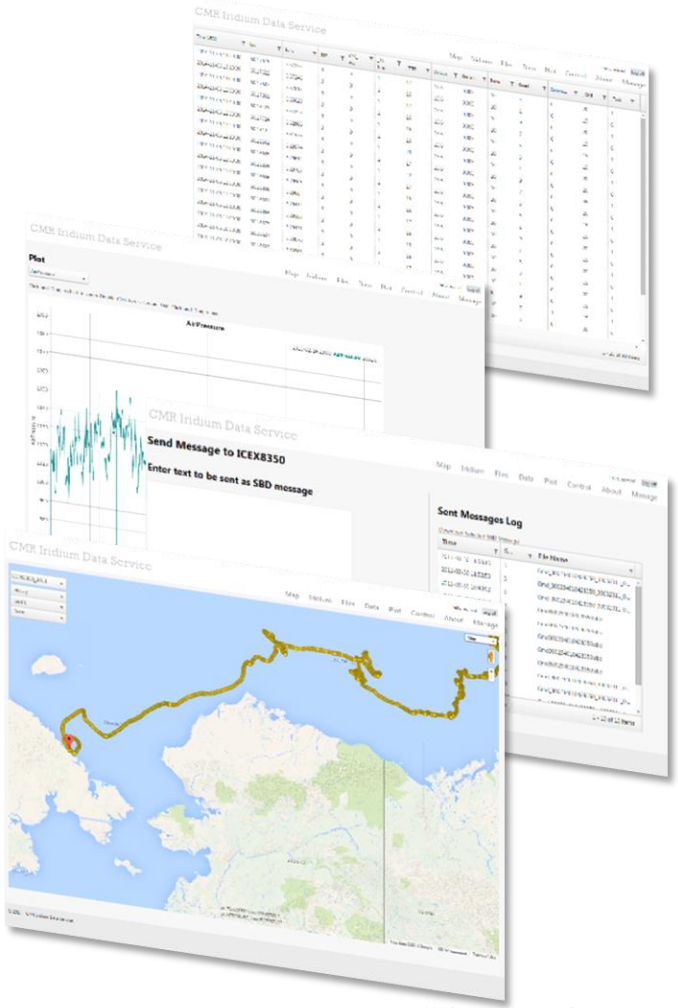


Sailing directions



Control and data

- Iridium data service
- Cloud based (Azure)
- User friendly
- Responsive
- User account login
- Real time data (~1min latency)
- Control panel
- Data download

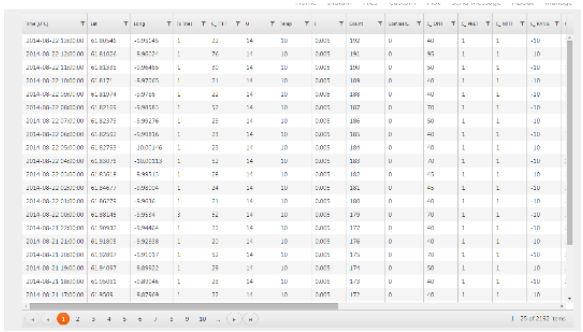


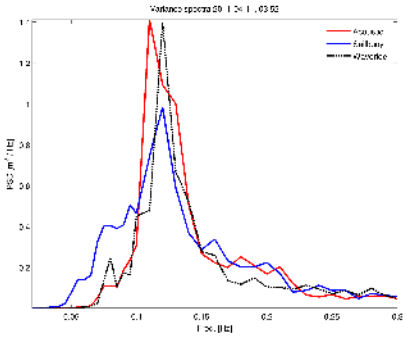
Deployment

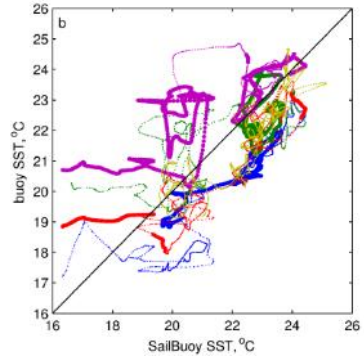
- Two man deployment
- Towed
- Crane
- Simple magnetic On/Off switch

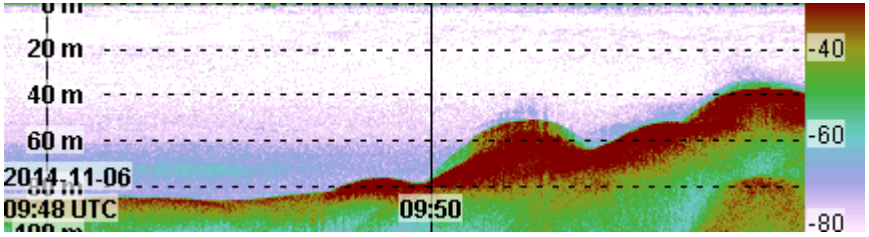
Data

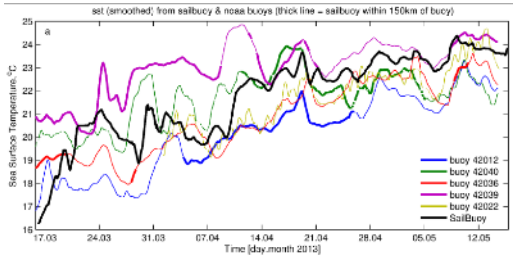
- Real-time data
  - Raw data
  - Preprocessed data
- Onboard disk storage









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+++ATZ:2:OK
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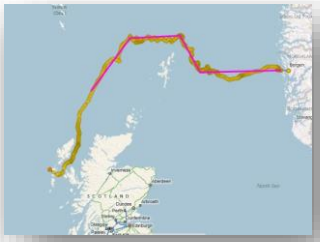
Misson challenges

The following may affect the mission

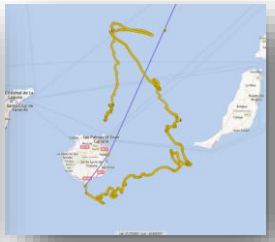
- Surface currents
- Calm
- Storms
- Ice/icing
- Fishing activity

Selected Missions

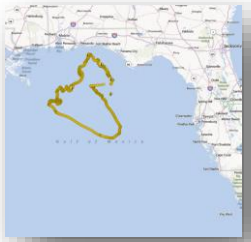
North sea 3 weeks 2009



North sea 4 weeks 2011

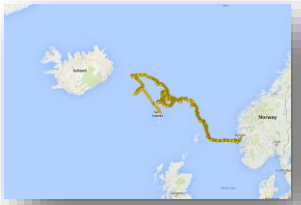


Canaries 3 weeks 2012

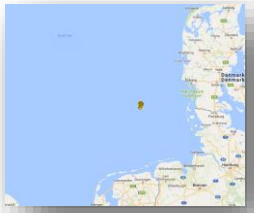


Gulf of Mexico 8 weeks 2013

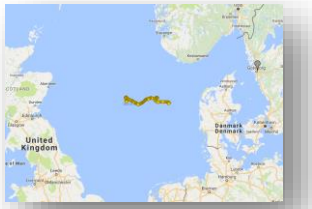
Spitsbergen 1 week 2013



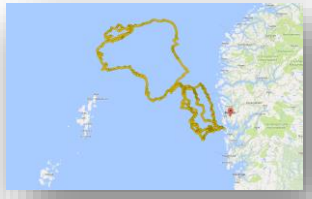
North sea 4 weeks 2014



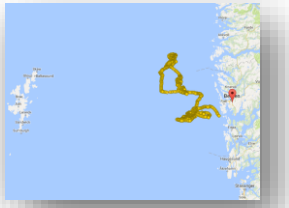
German Bight 1 week 2015



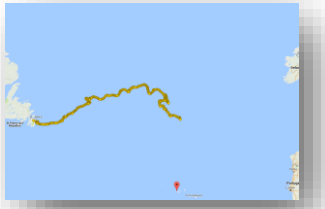
North sea 3 weeks 2015



North sea 8 weeks 2016

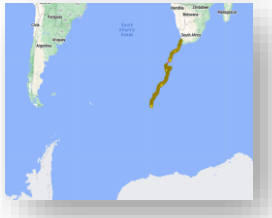


North sea 4 weeks 2016



Atlantic 9 weeks 2017

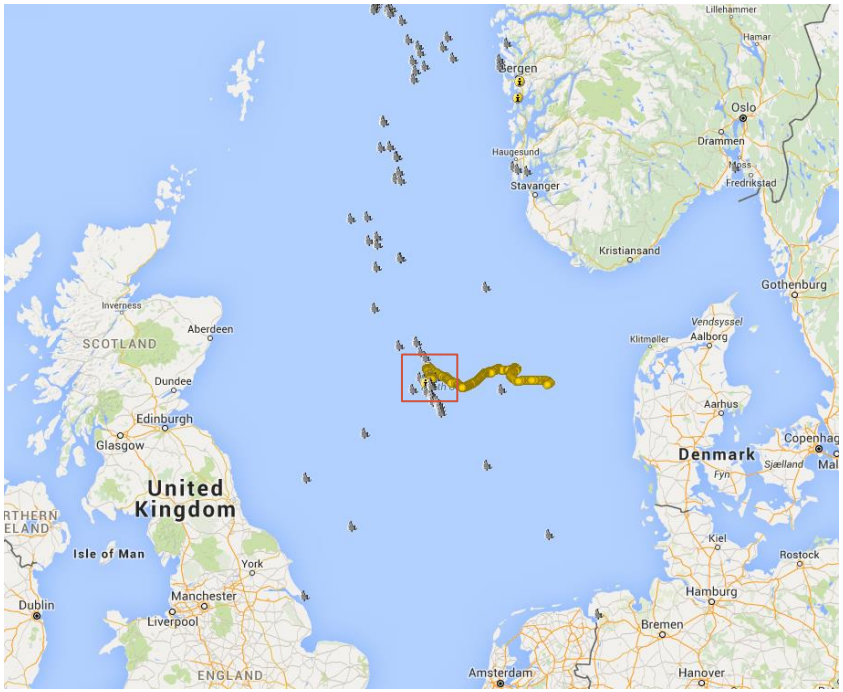
Vestfjorden 5 weeks 2017

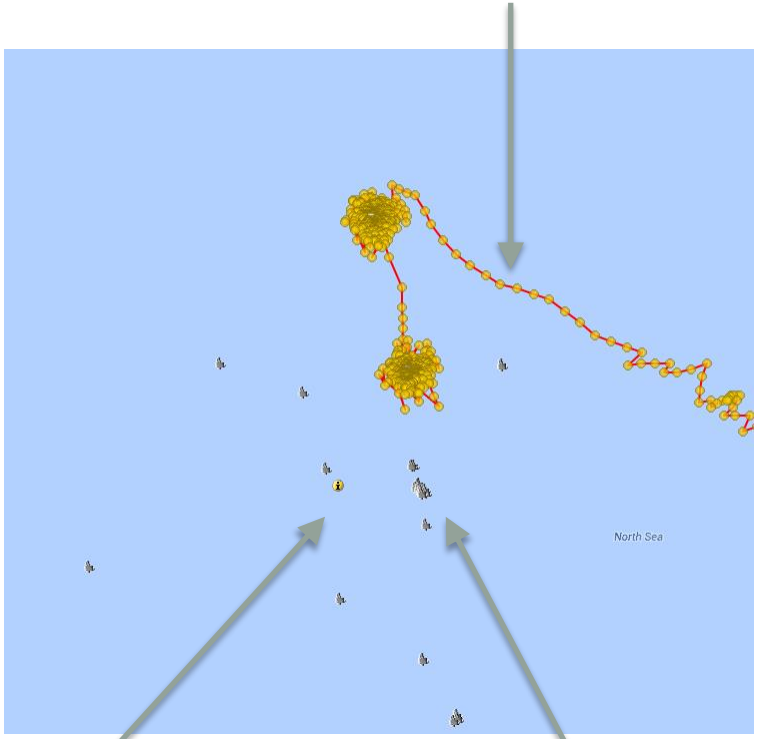


Southern Ocean 5 months 2019

Wave mission at Ekofisk

Deployed by Haakon Mosby 30 October 2015 for 3 weeks.
Wind 3-22 m/s Waves 2-13m



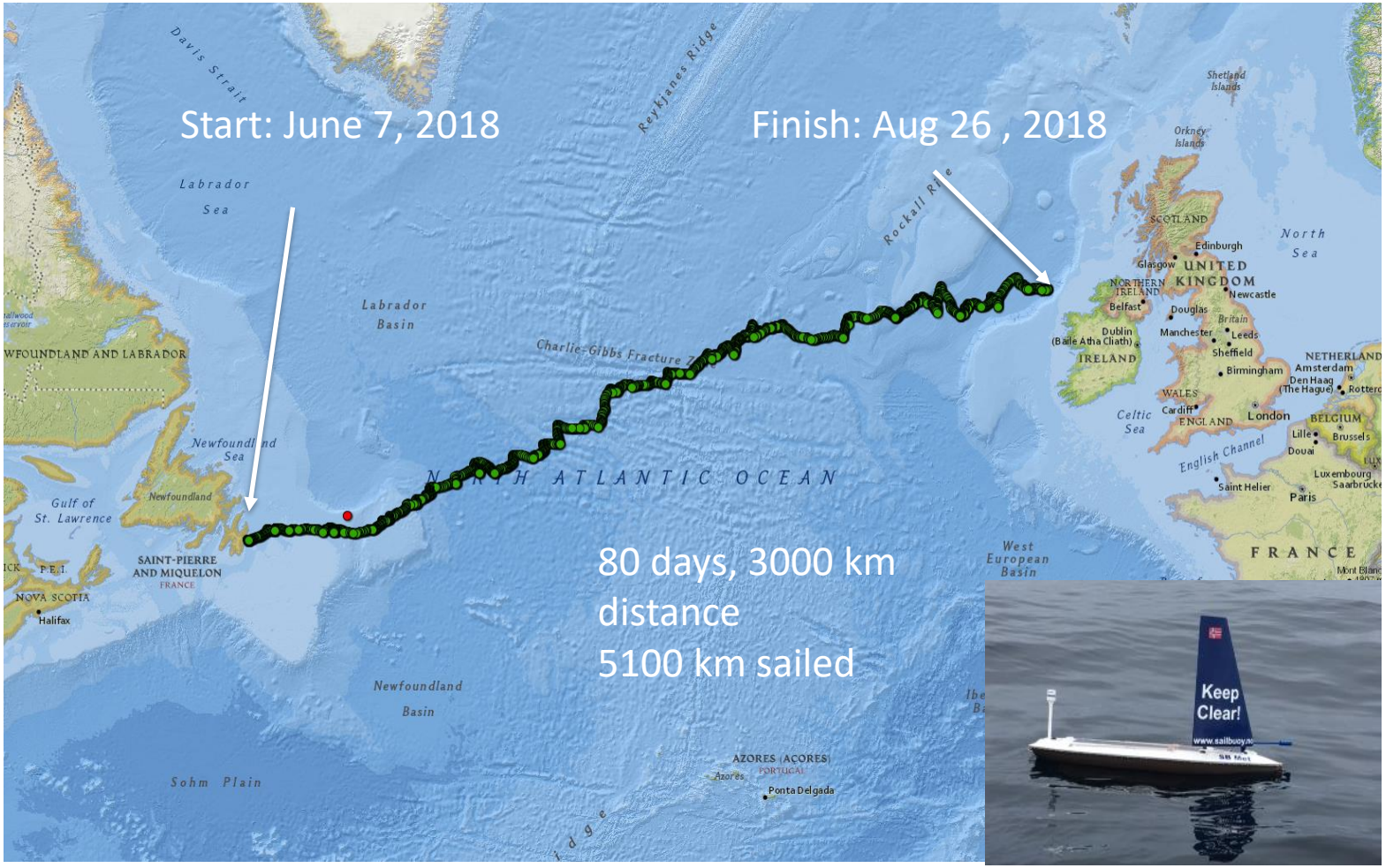


SB Wave track

Waverider buoy

Ekofisk oil field

Transatlantic crossing



SB Met

Currently intergrated sensors

Echo sounder
https://www.kongsberg.com/maritime/products/ocean-science/ocean-science/es_scientific/simrad-wbt-mini/

Transducers
https://www.kongsberg.com/maritime/products/commercial-fisheries/td/200-khz/es200-7cdk/
https://www.kongsberg.com/maritime/products/commercial-fisheries/td/333-khz/es333-7cdk/
120kHz should be available in 2022

Oxygen
https://www.aanderaa.com/oxygen-sensors_4831

Current measurement
https://www.aanderaa.com/stand-alone-current-sensor 5400

Optical sensors
https://www.seabird.com/eco-triplet/product?id=60762467720
https://www.seabird.com/eco-fluorometer/product?id=60429374754
https://www.turnerdesigns.com/c3-submersible-fluorometer

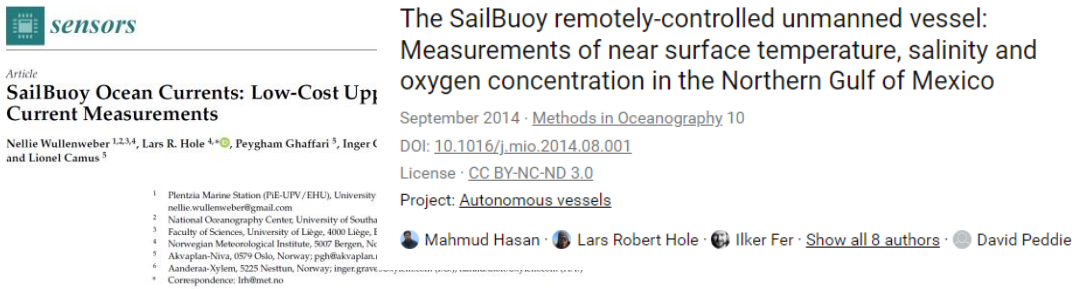
Conductivity and temperature
https://www.aanderaa.com/conductivity-sensor_5819
https://www.nbosi.com/products
https://rbr-global.com/products/ctd_gliders_auvs/rbrlegato

Wave measurement
https://www.datawell.nl/Products/Motionsensors.aspx__DWR-G

Met sensors:
https://www.airmar.com/weather-description.html?id=154
https://fttechnologies.com/wind-sensors/ft7-series/

Acoustic modems
https://evologics.de/acoustic-modem/42-65

Publications


sensors

Article

SailBuoy Ocean Currents: Low-Cost Upp
Current Measurements

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and Lionel Camus [5]

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[6] Aanderaa-Xylem, 5225 Nesttun, Norway; inger.grave
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The SailBuoy remotely-controlled unmanned vessel: Measurements of near surface temperature, salinity and oxygen concentration in the Northern Gulf of Mexico

September 2014 · Methods in Oceanography 10

DOI: 10.1016/j.mio.2014.08.001

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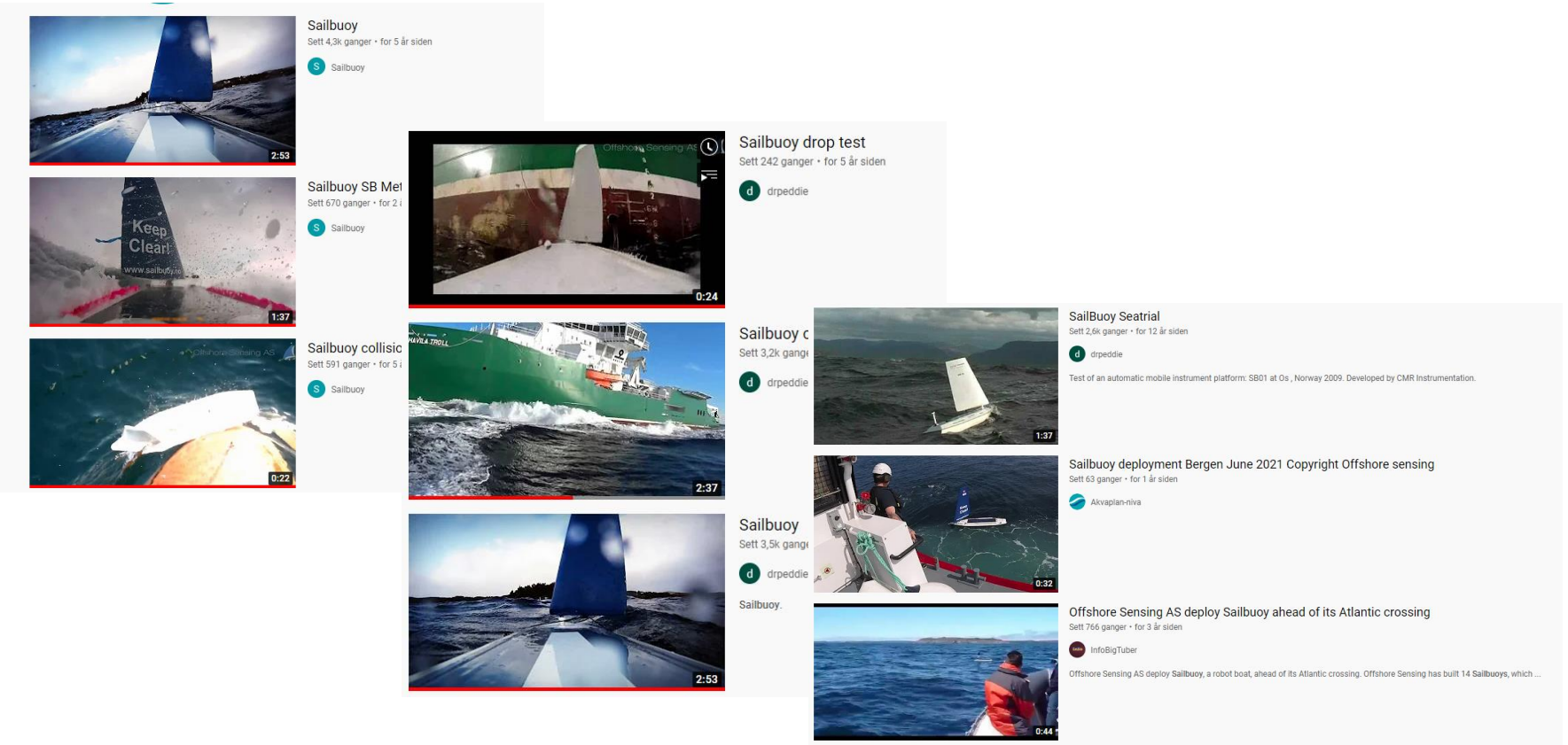
Project: Autonomous vessels

Mahmud Hasan · Lars Robert Hole · Ilker Fer · Show all 8 authors · David Peddie

- SailBuoy Ocean Currents: Low-Cost Upper-Layer Ocean Current Measurements
- SailBuoy raw data
- Upper layers velocity field observation using the Sailbuoy integrated current profiler: Polar Front experiment
- CMR SailBuoy deployment in the Northern Gulf of Mexico
- Near surface oceanographic measurements using the SailBuoy
- Directional Wave Measurements using the Offshore Sensing SailBuoy
- Mid-summer vertical behavior of a high-latitude oceanic zooplankton community
- The SailBuoy remotely-controlled unmanned vessel: Measurements of near surface temperature, salinity and oxygen concentration in the Northern Gulf of Mexico

Videos

- https://www.youtube.com/results?search_query=sailbuoy



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Or just google sailbuoy ☺