

The Sailbuoy

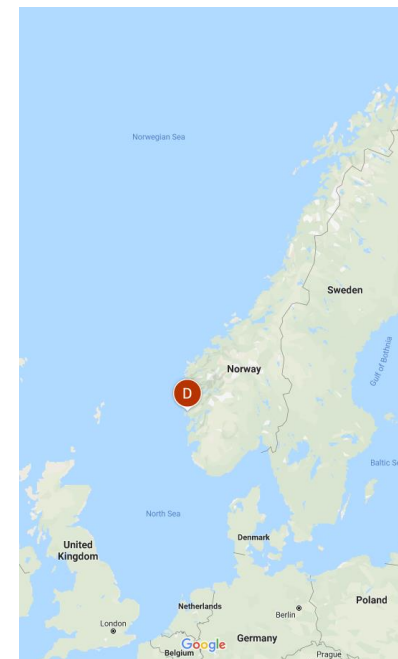
CLIVAR/GOOS Workshop

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



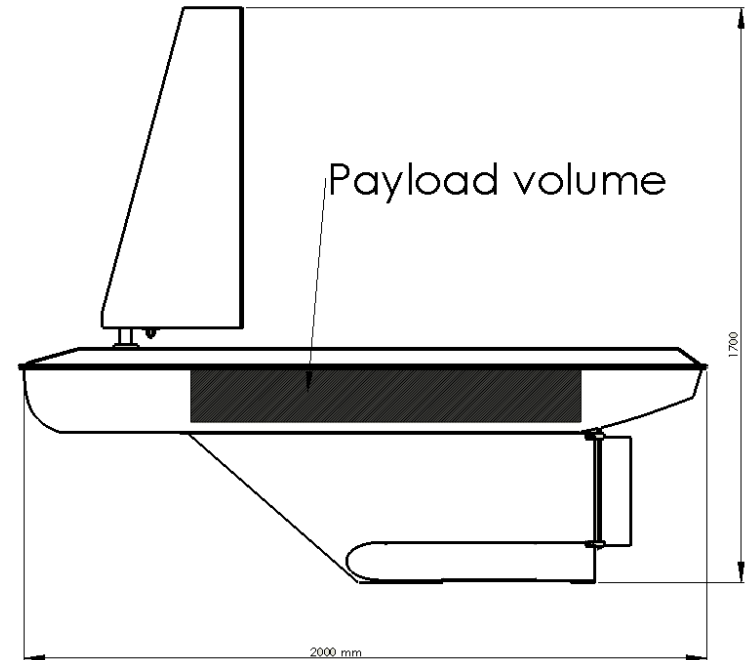
Advantages

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

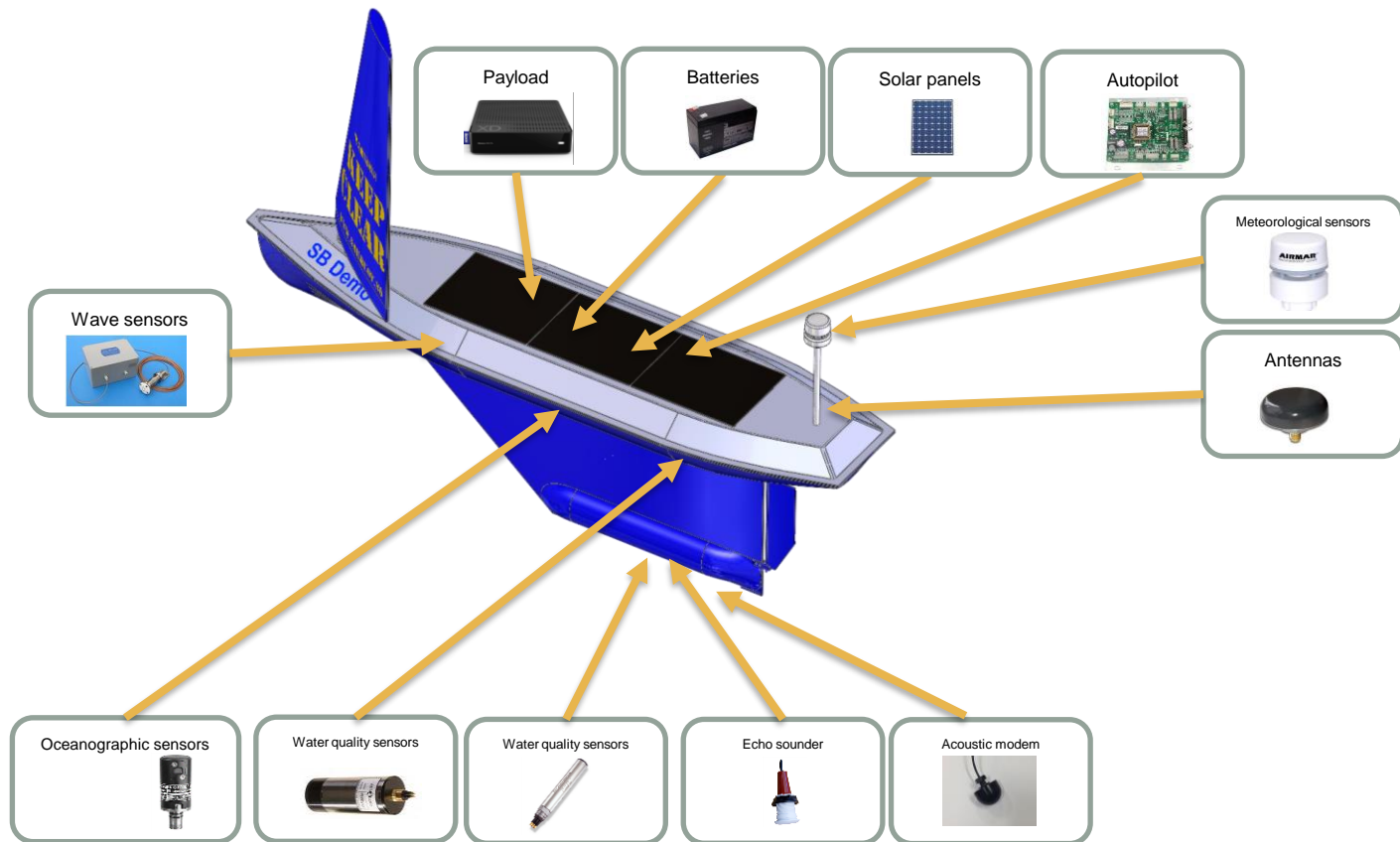


Technical data

- 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

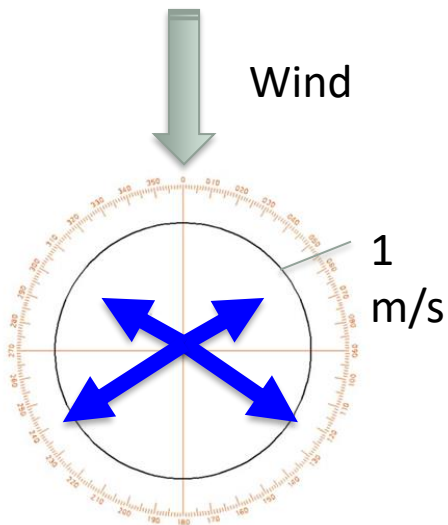


Sensors and Payload

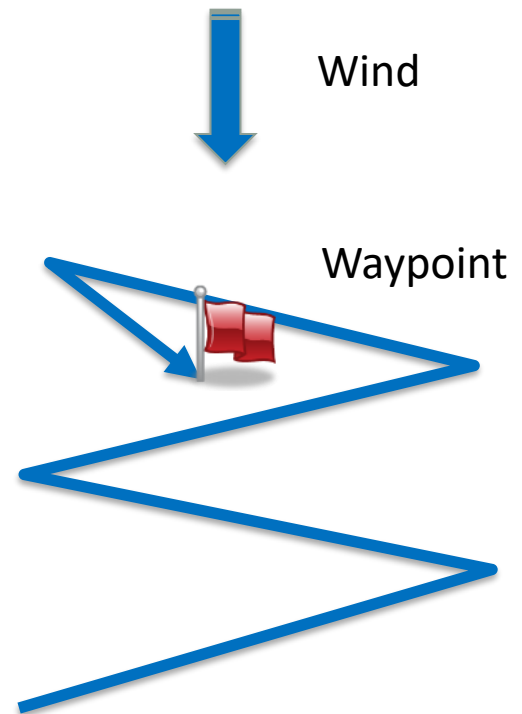


How it works

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

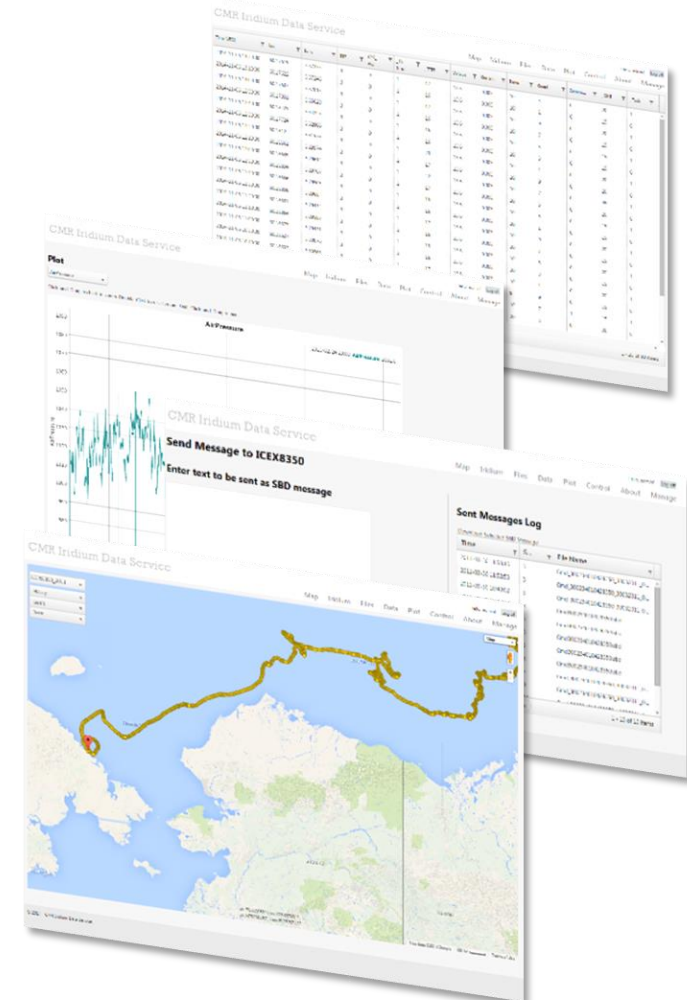


Sailing directions



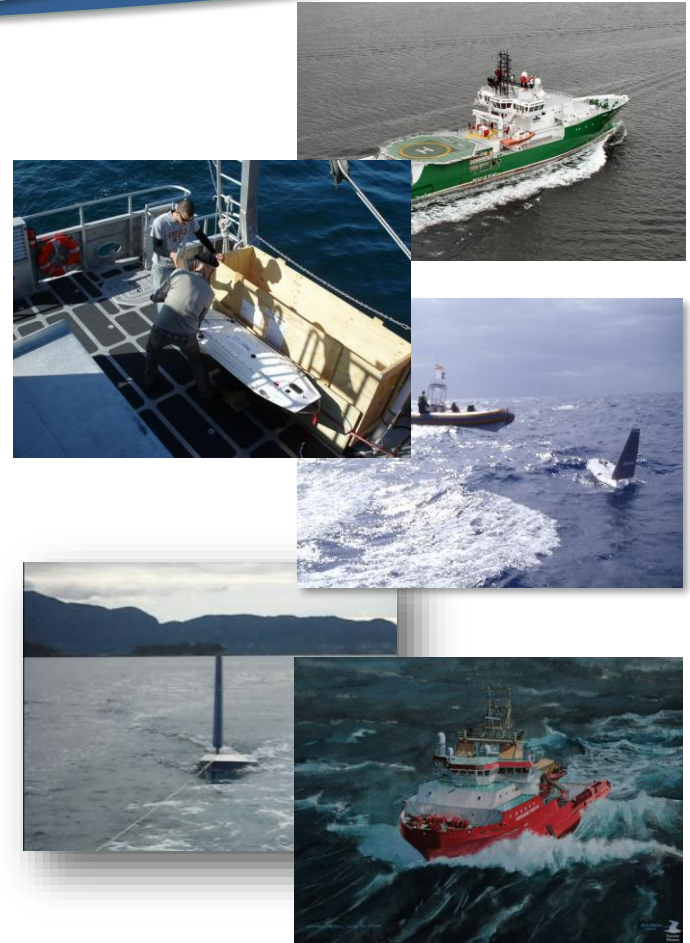
Control and data

- 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



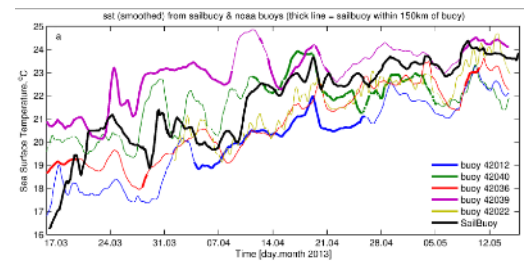
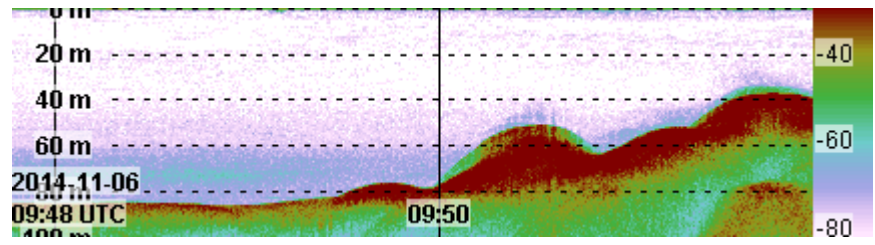
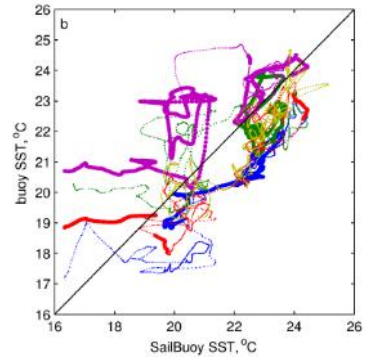
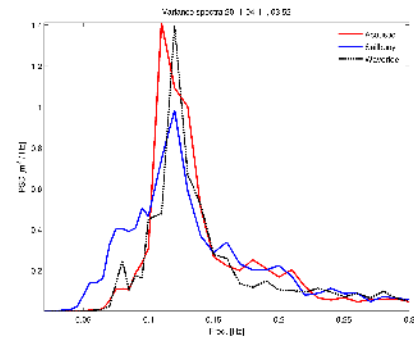
Data

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

TIME (UTC)	T	SR	SRG	T (km)	T (10)	T (1)	T (0.1)	T (0.01)	T (0.001)	T (0.0001)	T (0.00001)	T (0.000001)	T (0.0000001)	T (0.00000001)	T (0.000000001)	T (0.0000000001)	T (0.00000000001)	T (0.000000000001)	T (0.0000000000001)	
2014-08-22 13:00:00	41.89940	-159.145	1	22	54	10	5.003	390	0	40	1	1	-50							
2014-08-22 13:05:00	41.89952	-159.152	1	76	14	10	5.005	181	0	40	1	1	-50							
2014-08-22 13:10:00	41.89963	-159.160	1	82	14	10	5.008	190	0	50	1	1	-50							
2014-08-22 13:15:00	41.89977	-159.165	1	71	14	10	5.005	188	0	40	1	1	-50							
2014-08-22 13:20:00	41.89988	-159.178	1	44	14	10	5.008	189	0	40	1	1	-50							
2014-08-22 13:25:00	41.89985	-159.185	1	37	14	10	5.005	187	0	50	1	1	-50							
2014-08-22 13:30:00	41.89979	-159.192	1	20	14	10	5.008	186	0	50	1	1	-50							
2014-08-22 13:35:00	41.89952	-159.198	1	23	14	10	5.005	185	0	40	1	1	-50							
2014-08-22 13:40:00	41.89933	-159.204	1	23	17	10	5.005	184	0	40	1	1	-50							
2014-08-22 13:45:00	41.89915	-159.210	1	52	14	10	5.005	183	0	50	1	1	-50							
2014-08-22 13:50:00	41.89878	-159.215	1	58	14	10	5.005	182	0	40	1	1	-50							
2014-08-22 13:55:00	41.89847	-159.224	1	44	14	10	5.008	181	0	40	1	1	-50							
2014-08-22 14:00:00	41.89810	-159.230	1	71	14	10	5.005	180	0	40	1	1	-50							
2014-08-22 14:05:00	41.89781	-159.237	1	54	14	10	5.008	179	0	50	1	1	-50							
2014-08-22 14:10:00	41.89753	-159.244	1	73	14	10	5.005	178	0	40	1	1	-50							
2014-08-22 14:15:00	41.89725	-159.250	1	22	17	10	5.008	178	0	40	1	1	-50							
2014-08-22 14:20:00	41.89687	-159.257	1	52	14	10	5.005	175	0	50	1	1	-50							
2014-08-22 14:25:00	41.89657	-159.262	1	38	17	10	5.005	174	0	40	1	1	-50							
2014-08-22 14:30:00	41.89625	-159.266	1	20	14	10	5.003	173	0	40	1	1	-50							
2014-08-22 14:35:00	41.89594	-159.274	1	37	14	10	5.005	173	0	40	1	1	-50							

```

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+++AT?UT:10:597.531758
+++ATZ:2:OK
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Mission challenges

The following may affect the mission

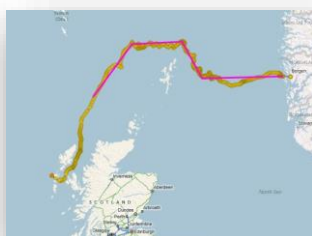
- Surface currents
- Calm
- Storms
- Ice/icing
- Fishing activity



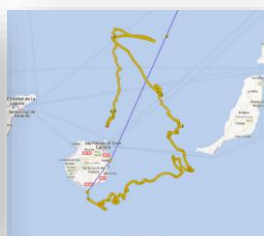
Selected Missions



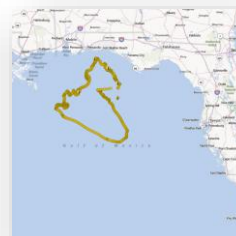
North sea 3 weeks
2009



North sea 4 weeks
2011



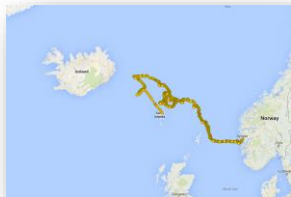
Canaries 3 weeks
2012



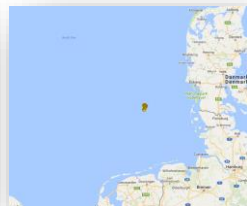
Gulf of Mexico 8 weeks
2013



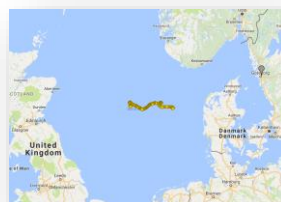
Spitsbergen 1 week
2013



North sea 4 weeks
2014



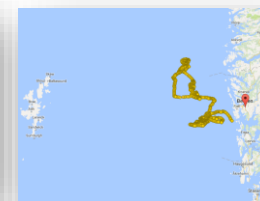
German Bight 1 week
2015



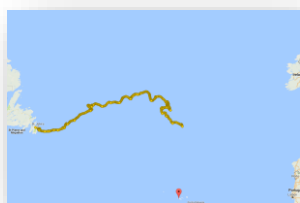
North sea 3 weeks
2015



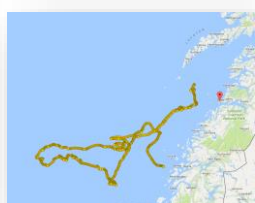
North sea 8 weeks
2016



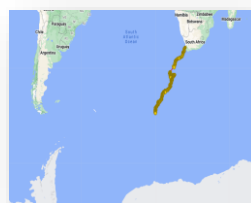
North sea 4 weeks
2016



Atlantic 9 weeks
2017



Vestfjorden 5 weeks
2017

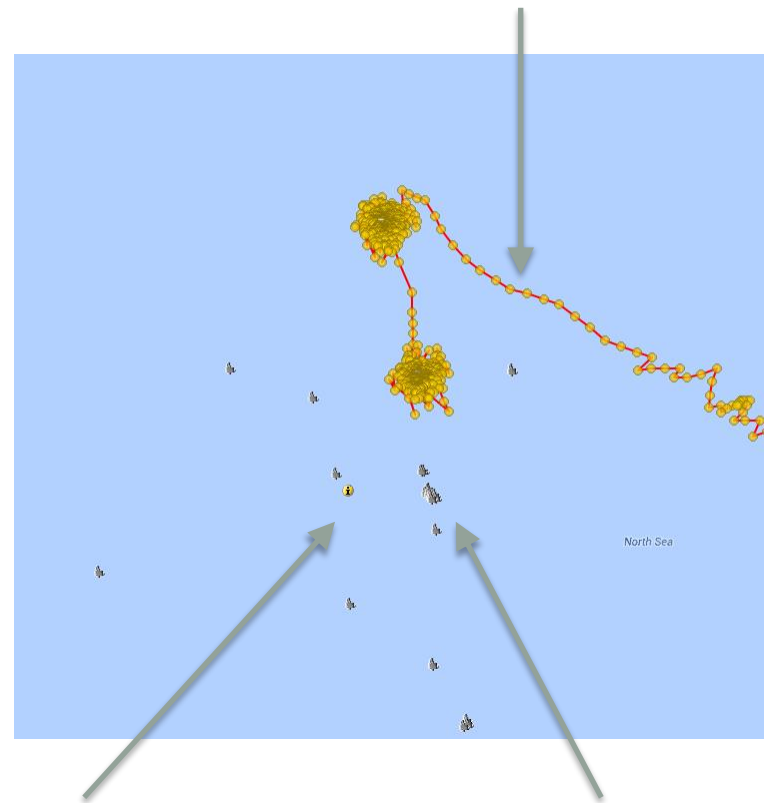


Southern Ocean
5 months 2019



Wave mission at Ekofisk

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

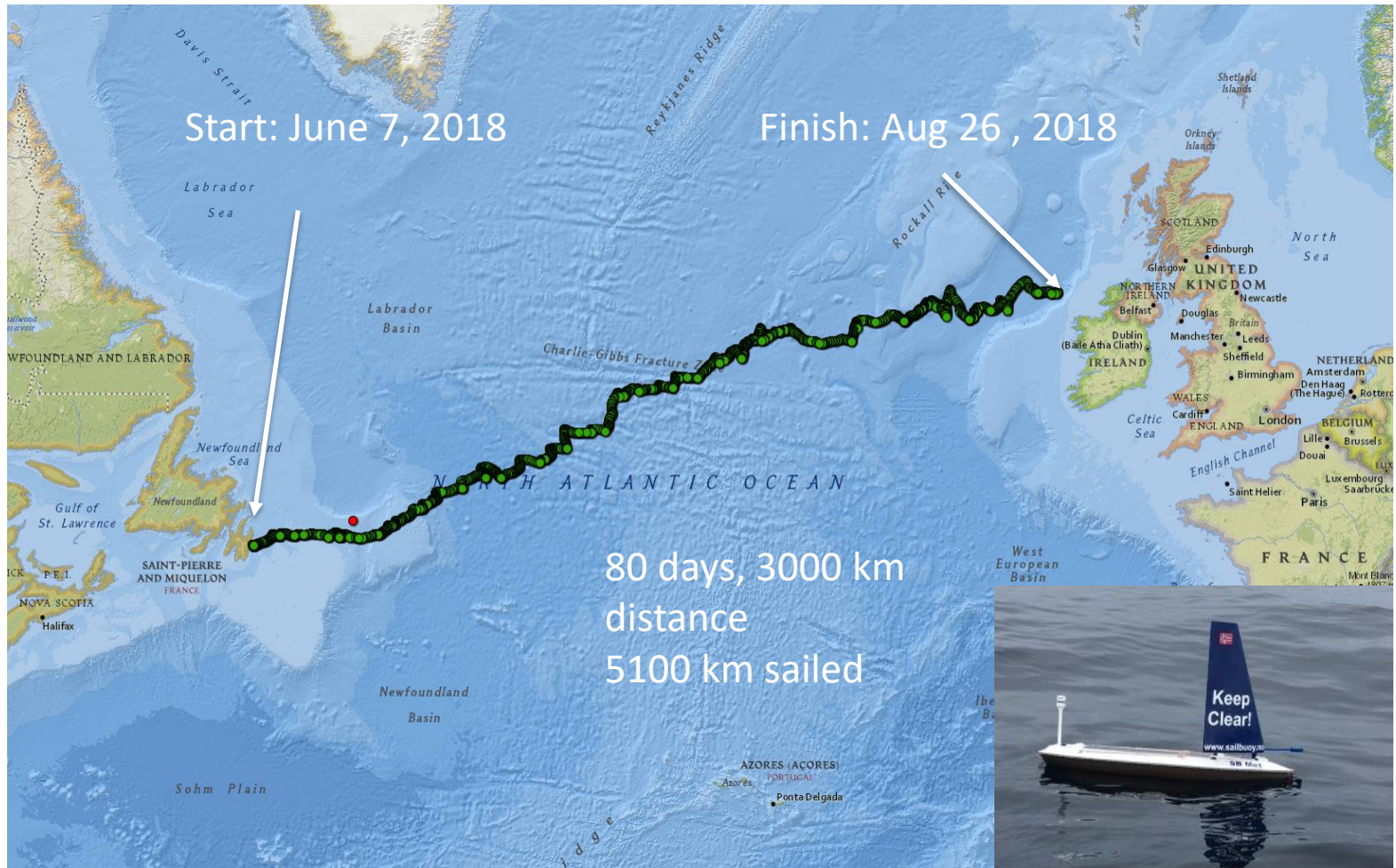


Waverider buoy

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



Article

SailBuoy Ocean Currents: Low-Cost Upper-Layer Ocean Current Measurements

Nellie Willenweber^{1,2,3,4}, Lars R. Hole^{4,*}, Peygham Ghaffari⁵, Inger Camus⁶ and Lionel Camus⁶

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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

Sailbuoy
Sett 4,3k ganger • for 5 år siden
Sailbuoy

Sailbuoy SB Met
Sett 670 ganger • for 2 år siden
Sailbuoy

Sailbuoy collision
Sett 591 ganger • for 5 år siden
Sailbuoy

Sailbuoy drop test
Sett 242 ganger • for 5 år siden
drpeddie

Sailbuoy c
Sett 3,2k ganger • for 5 år siden
drpeddie

Sailbuoy
Sett 3,5k ganger • for 5 år siden
drpeddie

Sailbuoy
Sett 3,5k ganger • for 5 år siden
Sailbuoy

SailBuoy Seatrial
Sett 2,6k ganger • for 12 år siden
drpeddie
Test of an automatic mobile instrument platform: SB01 at O6, Norway 2009. Developed by CMR Instrumentation.

Sailbuoy deployment Bergen June 2021 Copyright Offshore sensing
Sett 63 ganger • for 1 år siden
Akrvaplan-niva

Offshore Sensing AS deploy Sailbuoy ahead of its Atlantic crossing
Sett 766 ganger • for 3 år siden
InfoBigTuber
Offshore Sensing AS deploy Sailbuoy, a robot boat, ahead of its Atlantic crossing. Offshore Sensing has built 14 Sailbuoys, which ...

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www.sailbuoy.no

Or just google sailbuoy 😊

