cmr Instrumentation

CMR Unmanned Ocean Vessel

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The CMR group

- 5 Business units employing 150 people
  - CMR Computing
  - CMR Energy
  - CMR Gexcon
  - CMR Instrumentation
  - CMR Prototech

- Research for industrial development
- "From idea to product"

- Analysis and solving of complex challenges
- Solutions through prototypes and demonstrations
- Pioneers in science and technology since 1930

CMR Instrumentation

Instrumentation R&D ranging from ideas to qualified industrial measurement solutions and products in close cooperation with our clients and partners

Oil & gas

Environment & geophysics

Fisheries & fish farming

Energy

Medicine

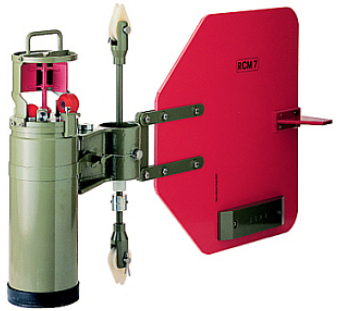
Environment & Geophysics

- Remote battery powered instrumentation for extreme environments.
- Experimental prototypes and one off instruments
- Small to medium scale production









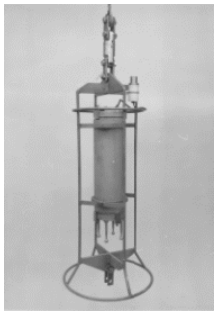



Figure 4. Acoustic current Meter made by CMI
Picture © CMR

CMR Unmanned Ocean Vessel

- The CMR Sailbuoy is a configurable offshore sensor platform designed to support a wide variety of instrumentation payloads. It can keep station or travel from point to point. Data is transmitted to and from shore in real time via satellite.

The CMR Sailbuoy

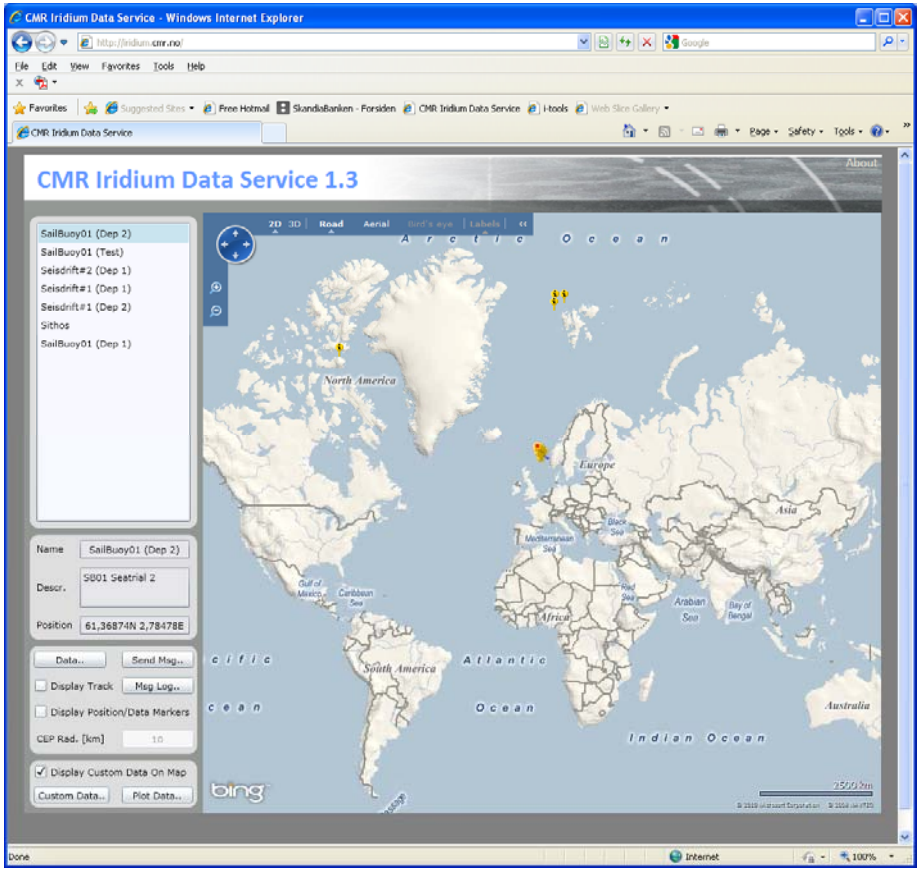
- Sailbuoy technology has been in development since 2005. The CMR SailBuoy is a unmanned ocean vessel initially designed for oceanographic and meteorological instrumentation. It is a sailing vessel designed for long term autonomous operation. Using its onboard computer and servos it automatically navigates a user defined track.
- It is designed for north sea weather conditions
- The CMR SailBuoy uses the Iridium satellite system for communicating measured parameters and diagnostics. Since Iridium is a 2 way communication system, commands such as new waypoints, tracks and sensor parameters can be sent to the vessel underway.
- The SailBuoy can be equipped with sensors and has a 10 kg payload for additional instruments.

Technical data

- LOA: 2m
- Maximum Displacement: 60 kg
- Payload: 10 kg / 60 dm^3
- Average speed: 1-2 knots
- Navigable wind speed range: 2 – 20 m/s
- Survivability in all weather conditions
- On board computer and control
- Operational lifetime: more than one year
- Global 2 way satelite communication

Iridium command center

- The Iridium data service is used to control and retrieve data from the Sailbuoy. It is accessed using a browser where all the information is presented.



CMR embedded computer

- Extremely low power consumption
- Temperature range from – 40 °C + 80 °C
- Small form factor (16 x 5 x 1 cm)
- Powerful 32 bit ARM controller
- Integrated 1 MB memory, Compact flash, temperature, 3-Axis Accelerometer.
- 8 x Serial, SPI, CAN, Digital IO, I2C interfaces
- Interfaces to: Iridium modem, GPS , Argos , 24 bit ADC, 4 -20 mA, Barometer, Temperature, Camera, Servoes, Load switch, Sparker, Echobox etc.

Field Tests

- West coast fjord (Os)
- North sea

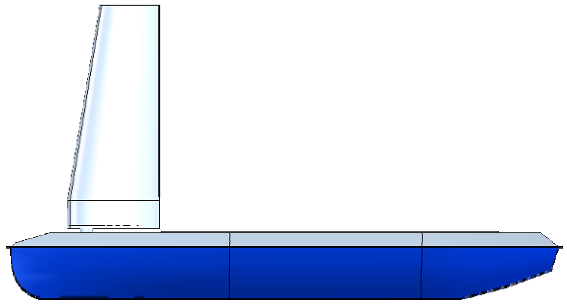
- Winds: 5 - 20 m/s
- Waves: 0 - 5m
- Average speed: 1.5 knots
- Distances: 300 nm
- Max speed: 5 knots
- CMR SailBuoy Seatrial

Operation

The Sailbuoy is shore deployable and retrievable. Using a dinghy it can be towed a few miles offshore before it starts sailing on its own. It can also be lowered directly on the sea using a larger vessel. It will then proceed to navigate towards its predefined start position.

Deployment and retrieval can be conducted with ease since the vessel is remotely controlled.

Instrument configuration



- The Sailbuoy can accommodate 10 kg of instrument payload. The instruments can either be completely self sufficient or can be connected and controlled by the Sailbuoys embedded computer.
- Power can be delivered from battery packs or in combination with solar panels.

Benefits

The Sailbuoy is a ocean vessel capable of covering large distances autonomously. It is easily deployed, retrieved and is controlled via a web site.

- **Continuous satellite coverage**
- **Long range**
- **10 kg payload**
- **Command, control, and telemetry in real time via satellite**
- **Mission durations limited by wear and tear**
- **Deployment ease**

Applications

- **Scientific** - Climate Science, Oceanography, Meteorology, Seismic Monitoring, Marine Mammal Monitoring, Algae tracking, Wave measurement
- **Industrial** - Emission Monitoring, Fisheries Management, Aquaculture, Visual Inspection, Subsea Communication ,Transportation

Pilot testing

The CMR Sailbuoy has been trough several sea trials, mainly in the North sea. Further testing and optimization is needed for the SailBuoy to become a successful product catering to need of meteorologists and oceanographers. The development of the Sailbuoy is at the stage where user input and operational feedback is required for design optimization.