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Sea-trials of the Seaturns wave energy demonstrator during storm Ciarán

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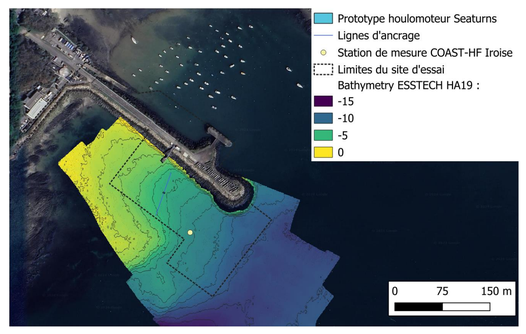
CONTEXT AND OBJECTIVES

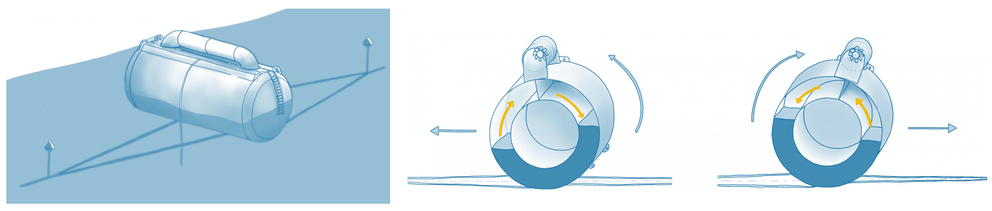
In October 2023, Seaturns started sea trials of a 1/4-scale wave energy converter. The demonstrator is installed on a sea test site at Sainte-Anne du Portzic, near Brest (Atlantic Ocean, France). On this site, tests related to offshore renewables are jointly piloted by Ifremer, site manager, and the OPEN-C Foundation.

These tests aim at validating the performance and reliability of the demonstrator in a marine and operational environment.



SEATURNS CONCEPT

Seaturn's wave energy convertor is made of a cylindrical floater and a water pendulum, anchored parallel to the swell.



Thanks to an innovative anchoring system, the swell creates a rotational movement of the cylinder around its axis.

The floater rotation and the water pendulum motion will induce an air flow through a turbine, directly coupled to a generator to produce electricity.

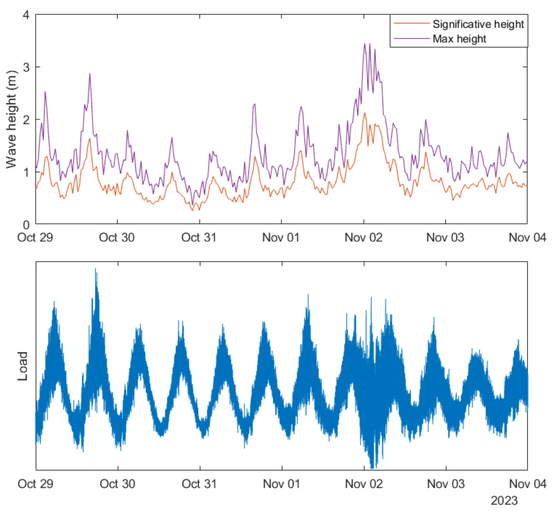
SEA TRIALS

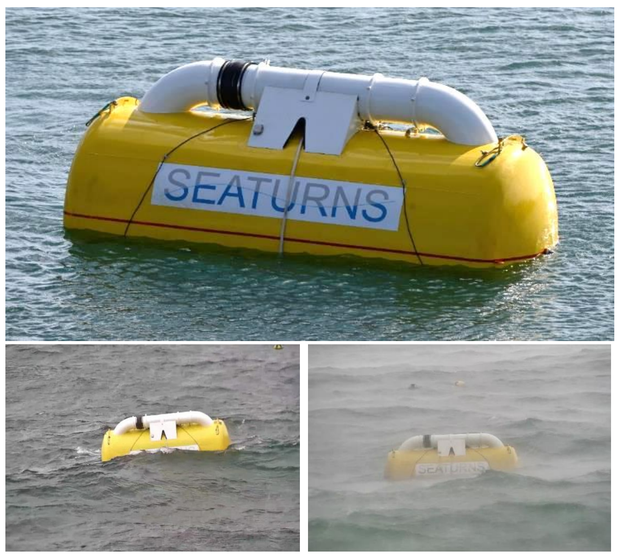
The test unit is a 3m long floater, anchored in 6m depth L.A.T. by two hybrid mooring lines. The floater is equipped with an integrated acquisition system linked to motion, pressure and electrical sensors. The mooring lines are fitted with load cells.

The site is monitored continuously by wave buoys and anemometer, and by the nearby COAST-HF Marel Iroise station.

On 1st and 2nd November 2023, storm Ciarán hit the sea test site, leading to winds up to 136 km/h, waves up to 3.7 m and 70cm surge. The demonstrator managed to withstand this extreme event without damage. Results of the mooring lines tension showed a significant increase in the load variations, at the response frequency of the floating system.

Waves and Mooring tension





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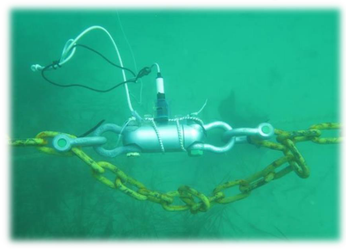
Monitoring devices

Wave buoy

Load cell on mooring line



CONCLUSIONS AND PERSPECTIVE

Ongoing test campaign at Sainte-Anne du Portzic will continue until Autumn 2024. Beside the demonstrator behavior during an extreme event like storm Ciarán, the ongoing tests provide significant data, validating Seaturns concept in a real offshore environment.

These tests are part of Seaturns I-Nov 2023 winning project. They precede the deployment of the technology at full-scale on another sea test site, in 2025.