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SeaExplorer *Glider* Makes World History

The SeaExplorer glider, developed by ACSA in partnership with ACRI, CNRS and IFREMER, successfully completed a two-month mission in collaboration with the Laboratoire d'Océanographie de Villefranche (LOV) of National Center for Scientific Research (CNRS) and Pierre and Marie Curie University (UPMC). The glider was launched on 5 September 2013 and recovered by LOV scientists on 5 November at 11:30 at Bay of Angels on the French Riviera. The SeaExplorer glider is the world's first multi-sensor Unmanned Underwater Vehicle (UUV) with rechargeable batteries to complete such a long mission successfully.



With this achievement, the SeaExplorer glider is the first glider to break a double world record for multi-sensor UUVs with rechargeable batteries. Dr. Hervé Claustre of the CNRS LOV said that the mission objective was to evaluate the endurance of the first glider equipped with rechargeable batteries while performing several round trips between France and Corsica Island. ACSA is the first glider's manufacturer to introduce rechargeable Li-Ion batteries.

The SeaExplorer glider has also acquired a wealth of high-resolution data along its transects whose results will be presented by LOV at the Ocean Science Meeting in Honolulu Hawaiï in February 2014. The LOV team is now planning in the coming weeks the next deployment of this new sensing platform with additional biogeochemical sensors (e.g. chlorophyll fluorescence, backscattering).

Reaching the mythic milestone of 60 days and a total of 1,183 kilometres on a single battery charge, the SeaExplorer glider has successfully set a duration and distance record. Launched south of Nice, SeaExplorer averaged 0.5 knots and provided over 1,168 profiles of the water column from near surface to 500 metres depth with 100% communications even in high sea-states. Supervised by satellite telemetry from onshore office using ACSA's IRIS software, the performance was manually stopped whereas internal parameters indicated 18% of its battery energy remaining.

The success of this world's longest and record-breaking mission performed by a rechargeable powered UUV highlights the reliability of the SeaExplorer glider. Besides the platform's endurance record, the scientific payload was equipped with SeaBird pumped CTD (Conductivity/Temperature/Depth) and Dissolved Oxygen sensors recording continuously at 4 seconds inter-sample time (metric resolution) for a total of 90 million. First comparisons of the SeaExplorer dataset with simultaneous profiles from a ship-borne CTD-rosette show very good data quality, even across strong temperature gradients.

On the other hand, this technology also heralds a new era for scientists concerned about the environmental effectiveness of their activity. The SeaExplorer needs replacement batteries every 10 years according to ACSA.

From the French Operating Gliders Center (CNRS [DT/INSU](#)), Laurent Beguery, expert consultant for ACSA, said that this rechargeable [glider](#) is mature enough to represent a reliable alternative to alkaline and primary lithium-powered gliders. This type of [glider](#) avoids operations of battery replacement every 2 to 4 months and reduces, to 20 hours, immobilisation time for refuelling at the workshop. For scientists, it makes savings in materials replacement, technician man hours as well as for ballasting time and hopefully increases the Mean Time Between Failures (MTBF).

Finally, since operating cost optimisation concerns all fields including oceanographic research institutes, fewer technicians being required to maintain a fleet definitely goes in the right direction. Patrice Pla, sales & marketing director, comments that out of 10 months of at-sea operations per year, rechargeable batteries grant a higher availability rate and reduce operating costs between 75,000 to 150,000 Euros per [glider](#) over 5 years compared to alkaline and primary lithium batteries traditionally used by scientists.

In conclusion, with this endurance record, scientists can, from now on and for certain, have access to an affordable and sea-proven rechargeable [glider](#) with high performance to accomplish cost-effective missions of up to two months.

By Patrice Pla, sales & marketing director, ACSA, Alcen Group; Hervé Claustre, CNRS senior scientist, LOV and Laurent Beguery, marine instrumentation engineer, CNRS, France.

Image: Deployment of an ACSA SeaExplorer [glider](#).

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