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INMARTECH 2023
BARCELONA 20TH-22ND JUNE 2023

Development of a Low-Cost Deep-Sea Advanced High Autonomy Time-Lapse Camera

C.N. INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO)

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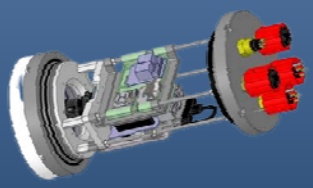
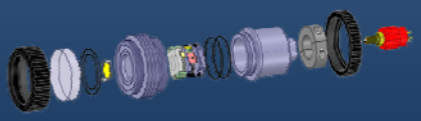
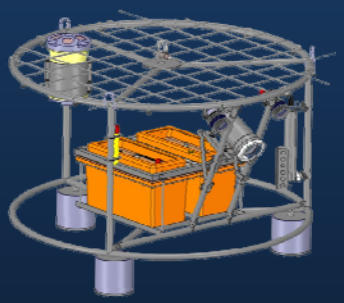
The deep-sea environment remains one of the least explored and understood ecosystems on our planet. In this work, we present an underwater multiparametric observing platform, or lander, with a time-lapse camera designed to study the dynamics and behaviour of deep-sea species and its interactions with the environment variables over long time periods. Achieving this objective involves a technological challenge as it requires the development systems with numerous synchronized sensors that work at great depths and remain in operation for long periods. Moreover, reducing the costs will make it possible to have more sampling sites and increase our observation capability.



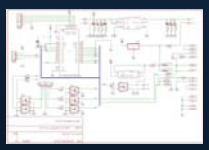
3D design: All electronics are integrated into a single stainless steel container for use at a depth of 2000 metres (200 bar).



Custom Led Light: 100W COB chip LED, variable DC power supply, 0..5 V input light control and current limit circuit. Anodised aluminium container for heat dissipation.

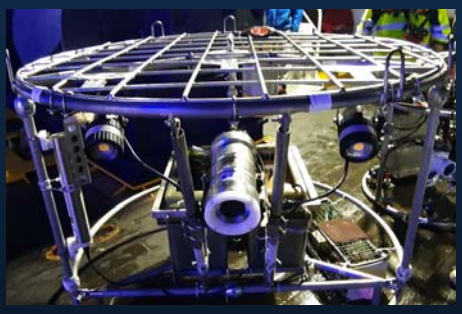


Lander 3D design: Two AGM (12V 150 A/h) batteries immersed in dielectric oil are mounted in a fibreglass container.



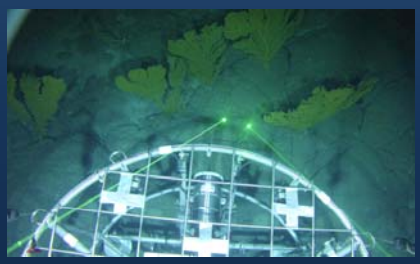
Arduino PLC and DC/DC converters: Programmable Time interval from 5 min to 48 hr.

The camera system is based on a Raspberry Pi 4 computer with a HQ Sony IM477 12.3 megapixels sensor. For data storage an external USB 3.0 250 Gb SSD was chosen. The time-lapse controller is based on an Arduino Pro Mini. CSV Log files synchronised by RTC and CTD. This programmable module maintains the low-cost concept. The programming language is Python for the Raspberry Pi 4 and C for the Arduino based time-lapse PLC controller.



Full Lander system mounted on deck ready for deploy.

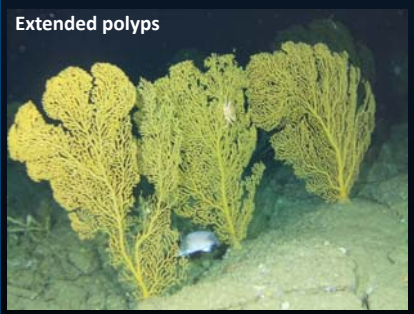
Lander deploy and recovery using the LanderPick system.



Precise position using DP and LanderPick thrusters.

Illuminated area at the sea floor (550 m depth).

Extended polyps



The camera was placed 1.5 m away from a group of colonies of gorgonians *Placogorgia sp*. The three complete specimens selected for this study are recorded in the camera's field of view (FOV). From 6 to 29 May 2022, photographs were taken every 30 min, generating a dataset of 1074 images. For more details:

remote sensing

MDPI

Article

Describing Polyps Behavior of a Deep-Sea Gorgonian, *Placogorgia* sp., Using a Deep-Learning Approach

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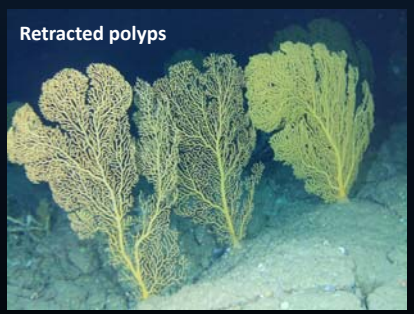
Retracted polyps



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