

## Marine Robotics @ VLIZ

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VLIZ already possesses a remotely operated vehicle (ROV) called "Genesis", an underwater robot that can dive down to depths of 1300 m. The robot is controlled through a tether management system and a cable connected to a control room onboard of a research vessel. In this configuration, the operators and scientists can take pictures, make recordings and sample precise targets on the ocean floor. The ROV is equipped with a high-definition stills camera, a high-resolution color camera, a black & white camera and a sonar for obstacle avoidance. A hydraulic arm allows point-precision sampling of specific targets (e.g. cold-water corals). The ROV Genesis is as such well suited for research of ship wrecks, benthic organisms, cold-water corals, seafloor structures and many more.

In December 2017, the Flemish government approved a 3-million-euro investment into the development of a Marine Robotics Centre at VLIZ. The robotics centre will house, next to the ROV Genesis, two additional robotic devices: an autonomous underwater vehicle (AUV) and an unmanned surface vehicle (USV). In order to maintain the robotic devices and keep them operational at all times, a technical workspace including a seawater pipeline will be constructed, allowing us to test the performance of the robotics with seawater in the lab.

These innovative platforms will be available for Belgian marine scientists and their (international) collaborators and will greatly enhance the capacity of performing research in difficult accessible areas and/or during prolonged timeframes. They will enable Belgian scientist to remain at the forefront of ocean sciences.

The AUV will be able to dive down to depths of at least 1000 meters and perform measurements of the water column, the seafloor and the subsurface for at least 8 hours. The AUV must be operational with side currents ranging up to 1.5 m/s and will be deployable from a rugged hull inflatable boat. The required sensor list includes a multibeam sonar, a sub-bottom profiler, a sidescan sonar, a CTD (conductivity temperature depth) and a HD camera with triggered LED lightning. The specifications of the AUV and the list of sensors will allow detailed analysis of the seafloor.

The USV must be deployable in nearshore settings and be operational with side currents ranging up to 1.5 m/s and/or waves associated to seastate 6. Given the multitude of vessels in the Southern Bight of the North Sea, the USV must have an excellent obstacle avoidance system and live monitoring during the campaigns must be possible. The required sensor list includes optical sensors, an ADCP (acoustic Doppler current profiler), acoustic receivers, a CTD and a webcam. The specifications of the USV and the list of sensors will allow measurements of the atmosphere and water column during prolonged periods of time (up till several months), allowing scientists to analyze changes in the environment.