

SUNRISE re-deployable testing facilities

The SUNRISE re-deployable testing facility is a cable-less testbed composed by multiple nodes that can be easily deployed and recovered by SUNRISE users. It has been designed to be dynamic, easy to deploy and use and highly adaptable to different application scenarios. Each node of the testbed can be easily customized with additional hardware (e.g., sensor(s), battery pack(s), modem(s), external storage drives) based to the user's needs. Once the drivers for these new hardware are developed in the S-SDCS (SUNSET-SOFTWARE DEFINED COMMUNICATION STACK), they can be interfaced and controlled remotely and in real time by SUNRISE users. The approach is modular. Additional hardware devices (sensors, battery pack, modems) can be increased in number and they are interconnected to the core structure of the node via standard connectors. The configuration (in terms of integrated sensors, modems integrated to each node, number of battery packs) can be easily changed in a few minutes. System settings such as sensors to activate at each node, sampling rate, alarm thresholds, protocols to run, can also be changed remotely (via radio communications or through the acoustic network when the system is deployed at sea). Thanks to these features, and in particular its modularity, flexibility, lack of cables, and the fact it can be deployed by a low cost RHIB, the SUNRISE re-deployable testing facility significantly reduces the costs related to the deployment and maintenance of permanent testbeds in all those cases where information to transmit is compatible with acoustic/radio communication speeds.

The standard configuration deployed by SUNRISE partners is the following. Underwater sensor nodes are floating at a given depth or anchored at the sea bottom. Figure 1 and Figure 2 show an example of a deployment considering four floating nodes and a detail of a floating node, respectively. Each node of the SUNRISE re-deployable testbed integrates multi-parametric sensors, battery packs, Evologics acoustic modems and the SUNRISE S-SDCS, which provides networking capabilities. In particular, it allows nodes to autonomously discover each other to create a self-configurable multi-hop communication network for real time delivery of sensed data.



Figure 1: Example of the SUNRISE re-deployable testing facilities with four floating nodes.

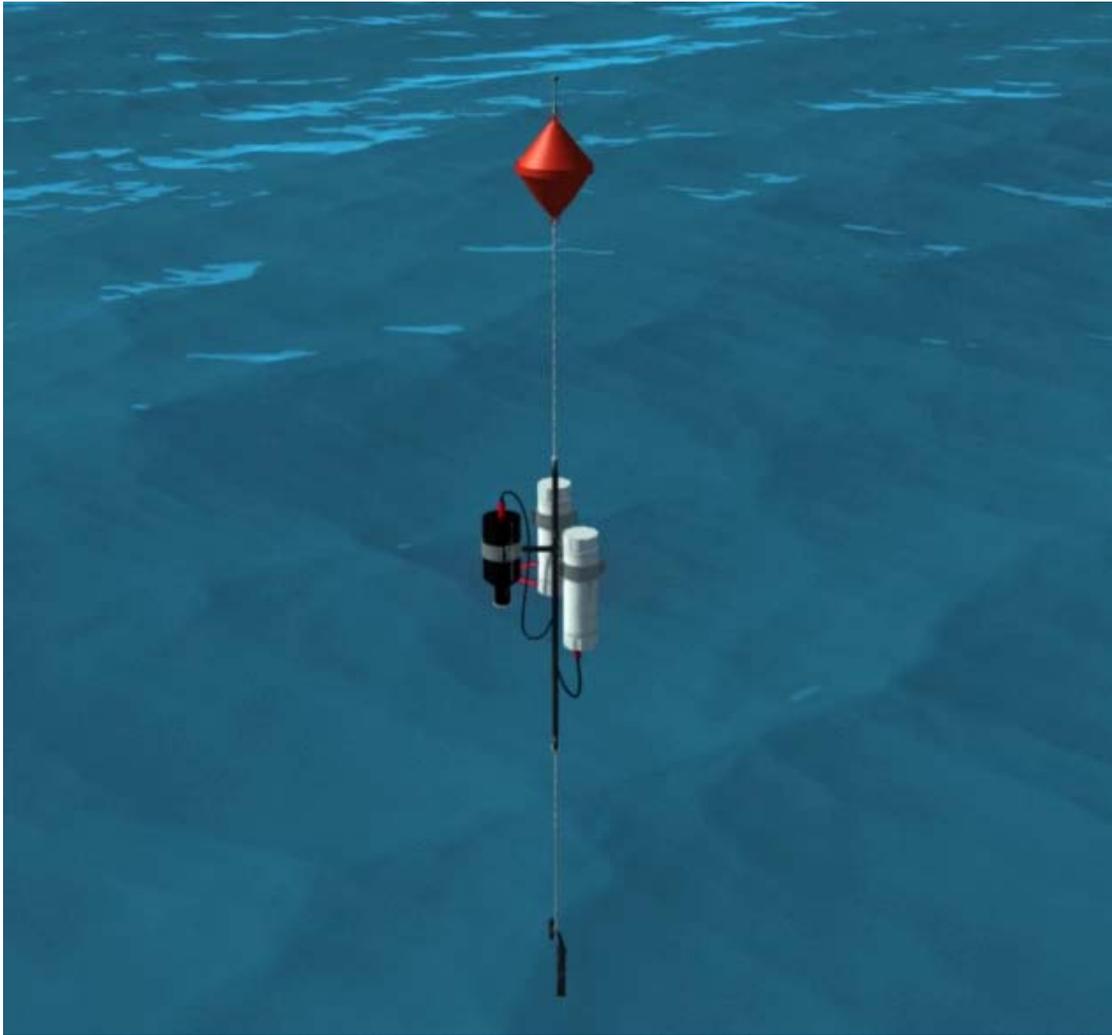


Figure 2: A SUNRISE underwater node in floating configuration (floating depth can be controlled, floating node is anchored to the seabottom).

All devices can be swiftly deployed and recovered in a few minutes from a RHIB. Nodes can be controlled and configured remotely in real-time. Examples of remote configuration include changing the sampling rate and the type of measurements collected by the nodes, as well as dynamically changing the protocol stack run by the network. Data collected by SUNSET nodes is forwarded in real time to the SUNRISE GATE (running remotely or on a PC on the RHIB) –see documentation on the SUNRISE GATE- via multi-hop acoustic networking. Data is then stored in a data-base for further processing and analysis. Figure 3 shows an example of remote control performed on a RHIB.



Figure 3: Example of remote control of the SUNRISE re-deployable testing facilities performed by on RHIB.

SUNRISE re-deployable testing facility has been used by SUNRISE core partners to evaluate performance of their solutions in applications and marine environments uncovered by current semi-permanent testing facilities. SUNRISE re-deployable testing facilities has also been designed to offer SUNRISE subprojects an easy, fast and cheap way to run their experiment with the same capability of permanent testbeds and with added flexibility in terms of testing location. The candidate projects can ask SUNRISE core partners to: 1) Integrate different sensors on the nodes depending on the application's needs, add battery packs, different types of modems; 2) Customize and expand SUNRISE technology to fulfill more specific needs of a given application; 3) Propose a temporary installation of a SUNRISE re-deployable testing facility at a given site to study a phenomenon of interest; 4) Integrate data analysis tools in the SUNRISE GATE to provide the needed application logic. Each end user subproject based on the re-deployable testing facility can have up to 4 nodes leased by core partners at no charge, thus reducing the costs of experimental activity to only shipping and insurance, and opening up the possibility to test use of SUNRISE technologies in a variety of application scenarios, customizing it to the needs of different applications and market sectors.