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ROSE: development and demonstration of a "Mobile Response Observatory" prototype for subsea environmental monitoring.

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ROSE project was aimed at developing an underwater monitoring system deployable in situations of crisis such as wreck pollution or risky natural sea bottom events. The system is based on subsea stations integrated in an acoustic network and communicating with shore through a radio link.. The project was supported by the French Research Ministry.

Based on detailed functional and system specifications, a prototype system composed of two measuring stations and a relay buoy was built and tested during 2.5 months in coastal area.

Subsea stations developed and built by Ifremer are anchored some meters above sea bottom and make it possible to position sensors at a convenient height e.g. in accordance with pollutant emissions. Stations are structured in several areas dedicated to the various equipment pieces : electronics and energy containers, sensor area, floatation volumes, free area aimed at specific uses.
The buoy is derived from designs already experienced by Ifremer.

The bi-directional communication system was developed and implemented by Sercel UAD. The acoustic network is of MATS200 Net. Radio communication between the operating station onshore and the relay buoy consists of a radio link of cellular phone, VHF radio or satellite type depending on deployment site . Data registered by the stations are periodically transmitted onshore and stored in a data server. For the prototype demonstration, the radio link was of GPRS phone type.

NKE has developed the messengers, which are positively buoyant beacons enabling the retrieval of data in addition to or in absence of the acoustic-radio communication system. Up to 8 messengers can be stored on a station. Messengers successively receive summaries of registered data and can be released either at predefined time steps or on a command. Once at sea surface they transmit the data via Argos system.

Station design enables easy changing of sensor set. In case of pollution event the set is composed of pollutant and environmental parameter sensors. The prototype was fitted with the following ones : TRIOS EnviroFlu Hydrocarbon fluorometer; SBE 37-SMP microCAT CTD sensor; AANDERRA optode O2 sensor; WETLABS BBRTD-226R refractometer; RDI 300kHz ADCP profiler. Optical sensors requiring are protected against bio fouling by a process developed by Ifremer and based on chlorine generation on the sensor glass.

The paper will present the design requirements and subsequent system specifications and experience return on: at sea operations and system behaviour on site; data acquisition by the various sensors and bio fouling protection efficiency; operation of the communication system and messenger system.