

nEXOS



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Multifunctional Web Enabled Ocean Sensor Systems for the Monitoring of a Changing Ocean



Objectives

The objective of the NeXOS project is to develop **cost-effective, innovative and compact, integrated multifunctional sensor systems** deployable from mobile and fixed ocean observing platforms. An integrative concept is pursued, that allows for easy integration and reconfiguration of sensor packages. This ultimately facilitates the development of downstream services for the Global Ocean Observing System, Good Environmental Status of European marine waters and the Common Fisheries Policy.

NeXOS Developments



Compact, cost-efficient and integrated passive acoustic sensors. Improved transducer integration and processing will reduce size and cost while increasing functionality. Sensors are: A1 - low-power multi-functional hydrophone and A2 - real time waveform streaming and pre-processing hydrophone array.



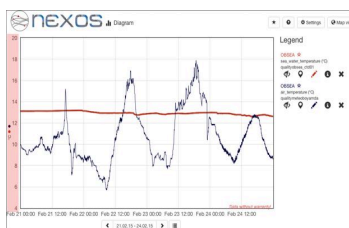
Sensor Observation Service

Automated geo-discovery of all deployed NeXOS sensors, on-line configuration, data access and presentation from any browser, independent from the sensor or platform manufacturer.

Compact and cost-efficient multifunctional optical sensors for monitoring dissolved marine hydrocarbons and other components of the carbon cycle. O1 multi-wavelength fluorescent sensor; O2: hyperspectral absorption sensor; O3: multifunction carbon sensor.



Low-cost sensor system for an Ecosystem Approach to Fisheries management for monitoring stock and ecosystem-relevant parameters, such as oxygen and chlorophyll-a, as well as physical parameters (T, S, Depth).



PROJECT ACRONYM: NEXOS

PROJECT TITLE: Next generation Low-Cost Multifunctional Web Enabled Ocean Sensor Systems Empowering Marine, Maritime and Fisheries Management

FUNDING: European Commission, 7th Framework Programme, the Ocean of Tomorrow 2013

EU Financial contribution: 5.9 million Euros

START DATE: October 1, 2013

DURATION: 48 months

PARTNERS: 21 partners from 6 countries

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Benefits and Impacts

NeXOS addresses fundamental issues to improve current ocean sensor systems; expanded operational capabilities with regard to ease of integration and deployment duration; increased modularity through standardization; and greater cost efficiency by understanding total lifecycle costs and investments required.

New interfacing capabilities allow real-time data to be collected and new instruments to be installed without the need for specialist intervention.

Lifecycle assessments look at long term viability, user perspectives and market performance.



Sensor-based innovation preventing biofouling

Innovative scheme combines biofilm-sensing and active protection to control biocide generation. The scheme involves the application of a conductive coating on the transducing interface of the sensors. This coating allows micro-surface electrolysis.

This innovative technology detects the earliest stage of biological growth on sensor surfaces so that biofouling can be effectively prevented. This reduces power consumption and avoids unnecessary introduction of potentially harmful chemicals in the environment.

Smart sensor interface and sensor web components

Hardware and software interface based on new CORTEX architectures for a miniaturized low-power modular design with variable frequency clocks ensuring low power consumption or high performance as needed.

Implementation of OGC PUCK standard protocol for seamless instrument identification and network discovery in single stream or networks communications.

Implementation of Precision Time Protocol (IEEE Std. 1588) for time synchronization.

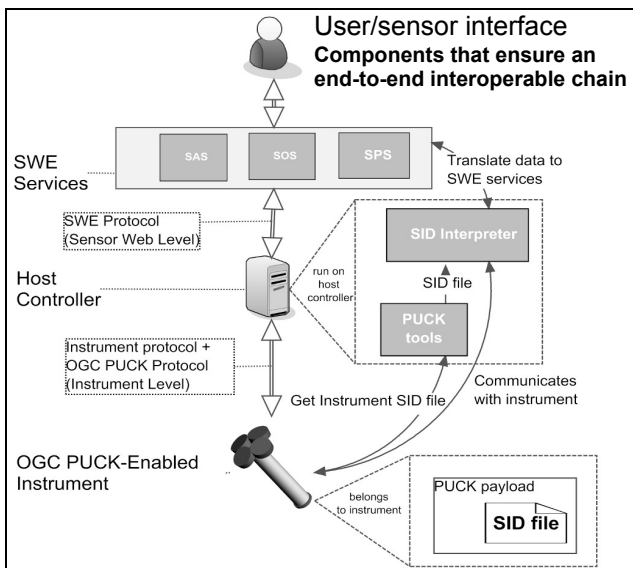
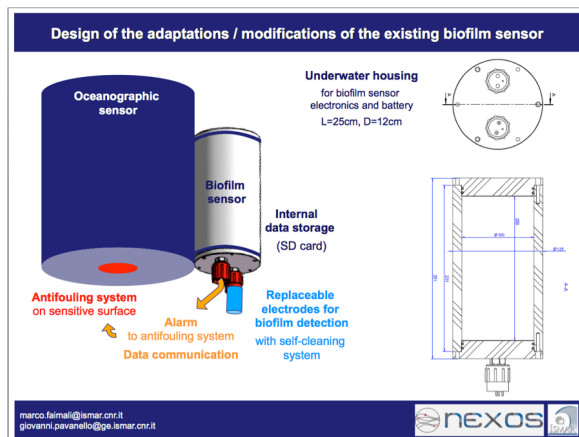
Open-source software development tools facilitate reprogramming or reconfiguring sensor interfacing and processing functionality.

Open Data access based on Sensor Web Enablement framework.

Application of standards enable: standard mechanisms at instrument level for instrument detection, identification, configuration and measurements reading; and at sensor web level the capacity to discover and access sensors and available measurements independently of the manufacturer or infrastructure operator.

Sensor-Platform Integration

Platform types	O1	O2	O3	A1	A2	EAF
Gliders	X	X		X		
Drifter/profiler				X		
Cabled observatory	X	X	X		X	
Stand-alone	X	X	X	X		
Ferries, fixed routes	X	X	X			
Other/leisure	X	X	X			
Trawlers					X	X
Long lines/nets					X	X



These scenarios are to support planning, test and validation.

Scenario 1: Hydrocarbon observations with gliders; detection and quantification of leakage by a combination of sensors on a mobile platform

Scenario 2: Carbon cycle and carbon sequestration monitoring with ferry-boxes; quantification of the complete carbon system in seawater (e.g. pH, inorganic carbon, carbonate ions, partial pressure CO₂), and methane.

Scenario 3: Cost-effective passive acoustic monitoring with automated characterization of underwater sounds and noise from mobile or fixed platforms.

Scenario 4: Observations for sustainable fisheries equip selected fishing vessels with EAF sensors and observe ocean variables in a low-cost participative approach

Scenario 5: Detection and characterization of algal blooms and the identification of phytoplankton groups

Key Project Milestones

Laboratory test Jan 2016
Field validation test Nov 2016
Demonstrations Jun 2017

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