



## **Modular Subsea Monitoring Network (MSM) – Realizing Integrated Environmental Monitoring Solutions**

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In a variety of scientific and industrial application areas, ranging i.e. from the supervision of hydrate fields over the detection and localization of fugitive emissions from subsea oil and gas production to fish farming, fixed point observatories are useful and applied means. They monitor the water column and/or are placed at the sea floor over long periods of time. They are essential oceanographic platforms for providing valuable long-term time series data and multi-parameter measurements. Various mooring and observatory endeavors world-wide contribute valuable data needed for understanding our planet's ocean systems and biogeochemical processes. Continuously powered cabled observatories enable real-time data transmission from spots of interest close to the shore or to ocean infrastructures.

Independent of the design of the observatories they all rely on sensors which demands for regular maintenance. This work is in most cases associated with cost-intensive maintenance on a regular time basis for the entire sensor carrying fixed platform. It is mandatory to encounter this asset for long-term monitoring by enhancing hardware efficiency.

On the basis of two examples of use from the area of hydrate monitoring (off Norway and Japan) we will present the concept of the Modular Subsea Monitoring Network (MSM). The modular, scalable and networking capabilities of the MSM allow for an easy adaptation to different monitoring tasks. Providing intelligent power management, combining chemical and acoustical sensors, adaptation of the payload according to the monitoring tasks, autonomous powering, modular design for easy transportation, storage and mobilization, Vessel of Opportunity-borne launching and recovery capability with a video-guided launcher system and a rope recovery system are key facts addressed during the development of the MSM. Step by step the MSM concept applied to the observatory hardware will also be extended towards the gathered data to maximize the efficiency of subsea monitoring in a variety of applications.