

# **The Lighthouse Ocean Research Initiative: Sustained Cabled Ocean Observing Systems in the Sea of Oman and Arabian Sea**

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In 2003 Lighthouse R & D Enterprises, Inc. began developing an ocean observing system that would help the Sultanate of Oman better manage the health of their fisheries. The resulting cutting-edge, fiber-optic cabled ocean observatory was installed in the northern Sea of Oman and became operational in August of 2005; this summer the system surpassed the milestone of 2100 days of successful operation. A second, deepwater cabled observatory was installed farther to the south, where the Sea of Oman meets the Arabian Sea, in January, 2010. Both systems monitor physical properties throughout the water column including current velocity, temperature, pressure, conductivity, dissolved oxygen and turbidity. The entirely subsea nature of the fiber-optic cabled observatory capitalizes on several advantages over traditional buoyed systems including a lack of exposure to environmental wear and tear, collision, vandalism and theft. The systems are both cabled to nearby shore facilities, where the data are relayed instantly to Houston via satellite for processing, analysis and modeling – the data may also be used in making real time decisions.

Many challenges were encountered between the design / development stage and the operation a reliable, long-term, real-time observing system in a dynamic marine environment. Examples of obstacles we encountered and overcame include: maintaining upright mooring strings under differential current velocities; minimizing points of weakness in the system, especially the number of wet mates; recognizing the need for cathodic protection in unanticipated places; protecting vulnerable sensors from biofouling; developing a climate-controlled shore facility in a harsh and remote environment; ensuring an uninterrupted power supply and availability of additional power bursts when required; and lengthening the life of the system while reducing the need for maintenance. The design and obstacles and scientific questions being addressed by the Lighthouse systems will be covered in this presentation.

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