

Real Time In-Situ Data Acquisition Using Cabled Seabed Observatories

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We report on two types of fiber-optic cabled seabed observatories developed by Lighthouse R&D Enterprises. These are presently deployed and acquiring real-time in-situ data in the Arabian Sea and Gulf of Oman. The first system is the Lighthouse Oceanographic Research Initiative (LORI) which collects physical oceanographic data (temperature, salinity, current speeds and directions) and dissolved oxygen contents. The second system is the Seismic Tsunami Early Warning System (STEWs) which collects seismic event information using ocean bottom seismometers as well as wave height information. The practical advantages of these cabled systems over traditional buoy systems are many. Cabled systems are secure from weather considerations, virtually impervious to vandalism, able to maintain an unlimited and stable power supply, and ongoing maintenance requirements are minimal. Furthermore, cabled systems are not dependent on acoustic modems with inherent bandwidth limitations. Here, we report on the integrated system design and technologies that are used to collect the raw sensor data stream from the in-situ sensors, convert the data to optical signals, and transmit the data along fiber optic cable to a shore data storage facility. Once at the storage facility, data are archived to protect against loss and then telemetered via satellite to our home office in Houston where data are duplicated, backups are archived, and the data stream is readied for initial processing and returned to Oman. The entire process from data collection through data return takes a matter of seconds. Initial processing includes property range checking against realistic values and metadata scan for proper instrument operation. After initial processing and conversion to engineering units, data are subject to scientific quality assurance and quality control protocols designed to prepare data for scientific analysis as discussed by Stoessel et al. in a complementary abstract (this session).

S. Ingle, K. Du Vall, S. F. DiMarco, M. K. Howard. 2010. Real Time In-Situ Data Acquisition Using Cabled Seabed Observatories. EOS Transactions of AGU. Vol. 91 (26), Ocean Sciences Meeting Supplement, Abstract IT25L-11.