Mooring Communications System

Off the coast of the islands of Morea, an innovation provided by MacArtney Underwater Technology Group, Denmark, transfers data via wireless modem. This technology opens up areas otherwise unavailable by mobile networks and unsuitable for conventional radio transmission systems. Traditionally, moorings have had to rely on the mobile telephone network or radio to transmit data to onshore bases.

In the drive to understand the mechanics and effects of global warming on our planet, oceanographic institutes are installing buoys in various areas to map the water conditions and wildlife and to chart any changes over time that relate to an increase in global temperatures. The sites of such buoys vary greatly and one of the more recent installations has taken place In the coastal waters of the volcanic island of Morea, 15km North West of Tahiti in French Polynesia. Chosen for its well-established coral reef and its abundance of life, this location is expected to provide valuable information about changes in a range of underwater parameters, including water temperature, changes in current speed and water levels. Yet placing moorings and designing buoys requires expertise and cooperation between scientists, engineers and underwater experts.

Of the many considerations in designing and building a mooring system is the communications system. Information gathered from the range of instruments on the mooring needs to be transferred in some way onshore. Typically, data from buoys is relayed to onshore information centres via mobile telephone networks, by radio transfer or by cable.

When the Coastal Research Centre of the Marine Science Institute at the University of California, Santa Barbara (UCSB) commissioned their monitoring buoy system in the shallow coastal waters off the islands of Morea, they needed a communications system that would take into account the unsuitability of radio and satellite data transfer and avoid cable along the seafloor. Radio transfer demands high power levels, satellite transfer using mobile telephone networks is not available in all areas and running a cable along the sea bed could damage the coral reefs. The resulting system was a breakthrough in buoy communication technology, combining for the first time inductive moorings - including inductive measuring of current profiles - and high speed wireless Ethernet connection.

The MacArtney Underwater Group developed and delivered an innovative, real-time full communication package to the Marine Science Institute at the UCSB. The communication system collects data from 9 underwater instruments on the mooring that measure temperature, conductivity and pressure, temperature and pressure and a tide recorder. It sends the data at preset intervals to the onshore base through a high speed wireless Ethernet data link. The data link is 2.4 GHz with data speed up to 11Mb/s. Data from each instrument is gathered at preset intervals and sent through the wireless connection to a wireless Ethernet action point at the shore station every 20 minutes. Real time data can be accessed through the internet and this communication is 2-way, allowing not only for access to data but also allowing operators to directly access various testing and sending parameters.

"MacArtney's innovative mooring solution combines inductive telemetry and wireless Ethernet connectivity for adaptive sampling and near real time data transmission to shore. The communication system makes it feasible to collect data at this valuable site that will help scientists to understand the effect and mechanics of global warming," explained Systems Sales Manager for Ocean Science at MacArtney A/S, Andrew Ziegwied, who helped to design the mooring and communications system. "The Morea project is one of many mooring solutions that we are delighted to be involved in. Systems that we have provided in areas ranging from shallow waters to deep sea, from the tropics to the Arctic, help to provide data we need to understand what is happening to our environment."

MacArtney supplied the complete communications system, including data loggers, Ethernet connection and solar charged batteries; a range of sensors, including for temperature, conductivity and pressure sensors, temperature and pressure sensors, water temperature, tide and pressure gauges; and a special manta ray anchor, designed for shallow waters.