



## **A New Concept for Multidisciplinary Cabled Ocean Bottom Systems: the Marmara Sea Network**

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Probably the single most limiting factor in deploying multidisciplinary cabled ocean bottom systems is cost. The current layouts and designs of existing and future networks call for the use of manned submarine vessels or ROV to deploy the various sensors and connect them to the network. These networks also include multiple nodes on the sea floor, at each of which single sensors or clusters of instruments are connected to the network cables. These nodes add to the cost and the complexity of installations, because they usually require wet connections. Here we present a novel concept and design for a cabled ocean bottom observatory network system. We will also show data from its first deployment in the Marmara Sea (Turkey). Although our system is much simpler to install and to retrieve than current designs and it does not need nodes on the sea floor, it is fully capable of collecting and telemetering multidisciplinary data from the ocean floor in real-time at substantially lower costs.

The core of our concept is that each ocean bottom sensor or each cluster of instruments has its own designated cable and its own shore station. We thereby eliminate the need for costly nodes. This also allows for easy integration into existing land based networks, as each shore station transmits its data similar to its counterparts on land. We do not need especially designed data centers at the shore, to receive the flood of data arriving from a single cable from the ocean floor. The concept of "one sensor - one cable" also increases the reliability of the network as a whole, because the data of only one station are compromised, if a cable is cut or damaged.

In addition, all connections of the sensors to their respective cables are made before deployment on land or on deck of the deployment vessel, thus eliminating completely the need to use underwater vehicles during deployment. The cables used in our design do not only carry power and data, but are also load bearing, allowing the sensors to be deployed without the help of extra lift cables. These cables are also strong enough to retrieve a sensor from the sea floor, should it fail.

We installed the first network based on this concept in the fall and winter of 2010 in the Marmara Sea. It consists of 5 ocean bottom stations. Because the primary function of the network is to monitor the seismic activity along the segment of the North Anatolian Fault which crosses the Marmara Sea, each station is equipped with a seismic broadband velocity sensor (CMG-3T), an accelerometer (CMG-5T) as well as a digitizer and flash memory. In addition, we added a hydrophone, a differential pressure gauge, an acoustic doppler profiler, a sensitive thermometer and a camera. More equipment can be added if necessary. The stations are deployed up to 20 km from the shore in water depth of up to 1300 m. Their data are added in real-time to the existing land based seismic networks in Turkey.