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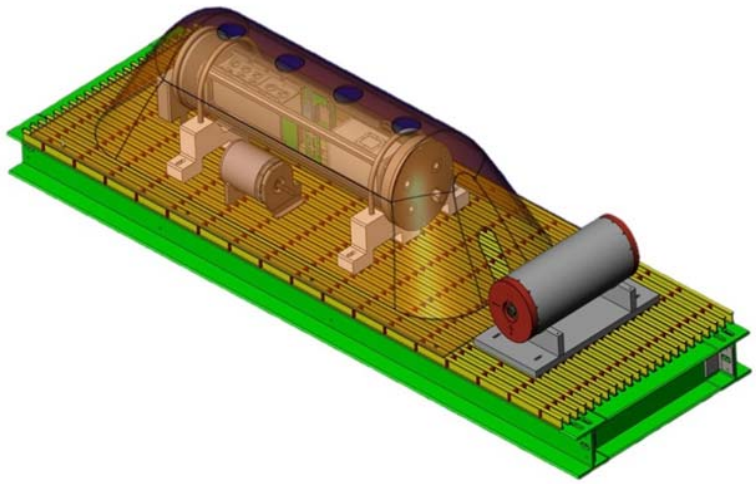


PROJECT BRIEF

OCEAN BOTTOM SEISMOGRAPHS

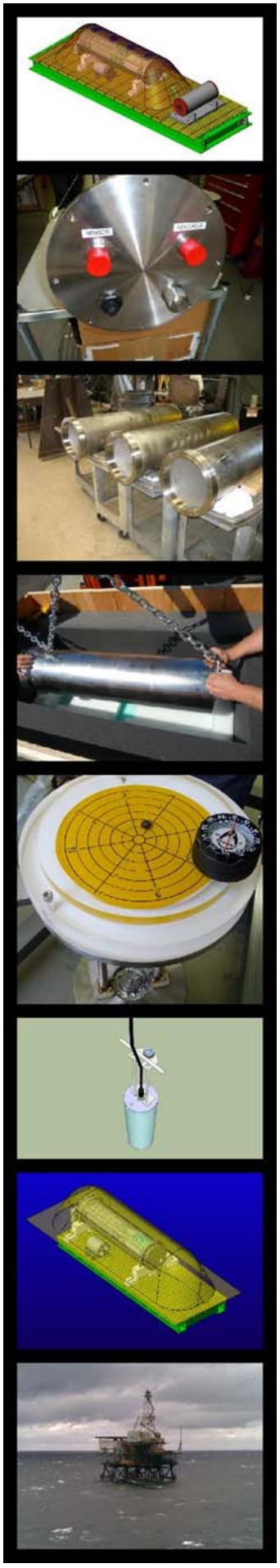
ISOPOD

PROJECT OBJECTIVE
Permanent seismic and tsunami monitoring station on the sea floor.

PROJECT ACHIEVMENTS
A cabled Ocean Bottom Seismograph (OBS) provides continuous monitoring presence underwater at the lowest total cost of ownership (TCO). Real-time seismic and pressure data can be obtained from the sea floor increasing seismic network aperture and providing input for tsunami warning.

OCEAN BOTTOM SEISMOGRAPHS

ISOPOD



The ISOPOD Ocean Bottom Seismograph (OBS) is a member of ASPEN Clients, part of Kinemetrics' ASPEN Open Systems, and is a modern approach to permanent sea floor seismic recording. The ISOPOD OBS system employs techniques that make permanent installation of a continuously operating sea floor network not only practical, but also convenient and cost effective, by powering and transferring data via sea cable.

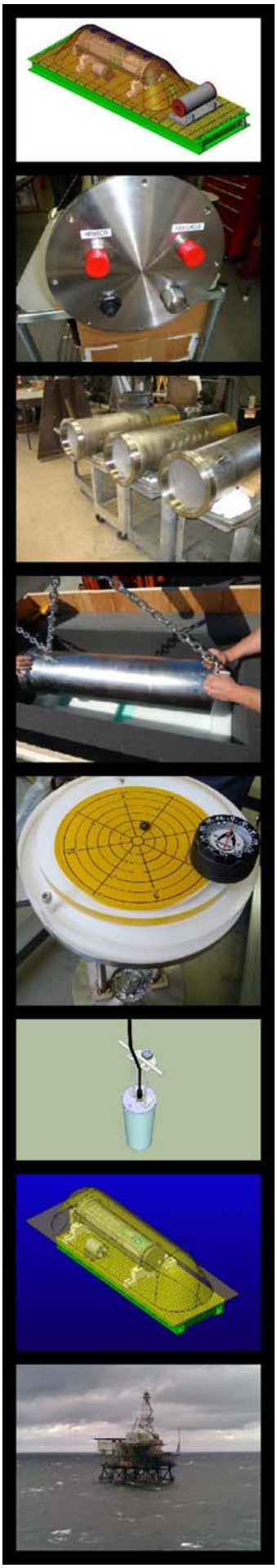
Components of the ISOPOD OBS System

The ISOPOD OBS system is comprised of two units; the sea floor components and the above surface components enclosed in a shelter. The sea-floor components of the ISOPOD system comprise the STS-4B broadband sensor that has self-leveling and orienting capabilities, a Quanterra Q330 digitizer, differential pressure gauge and an optional hydrophone. The system includes the capabilities to monitor the unit's Barometric pressure, temperature, and humidity within the containment vessel.

The above surface shelter or Communication & Power Cabinet (CPC) contains a Marmot datalogger running BRTT's Antelope Real-Time System, utilizing the ring buffer capabilities of the Marmot. An external GPS antenna provides precise timing to the digitizer by means of the sea cable. All data is telemetered in real-time via IP communication links (e.g., VSAT) to the data processing centers. The instruments both above and below the surface are powered by a battery back-up power system. Data retrieval from, and power supply to, the OBS is through an armored sea cable, with a maximum length of 25km.

Benefits of Cabled OBS Systems

The major advantage cabled systems have over traditional buoyed OBS systems is a one-time installation process. The system is powered and the data is retrieved through the cable, removing the need to retrieve the OBS to change batteries and/or obtain the acquired data. The data is immediately available for processing via the Antelope Real-Time software of the ASPEN System. State-of-health information is also available in real-time, allowing the operator to know instantly if the data is viable, as opposed to waiting weeks/ months for data retrieval to determine the quality of the data recorded. Command and control capabilities exist for the sea floor components through the cable, using the Antelope interface and/or Quanterra's Willard configuration program. Cabled systems also allow sea floor retrieved data to



be used in real-time monitoring systems and hazard mitigation, permitting a better gauge of shaking offshore and in the proximity of off- and near-shore critical structures. The differential pressure gauge will detect tsunamis well off the coast; since its data is obtained in real-time effective Tsunami warning is possible. Cabled permanent systems allow for the use of higher-end broadband sensors as opposed to accelerometers, providing the best quality data.

The ISOPOD OBS System in Action

Kinemetrics Open System & Services department is set to deploy three ISOPOD OBS systems at platforms in the Caspian Sea off shore Baku, Azerbaijan. Each ISOPOD OBS system will be deployed by a remote operated vehicle (ROV); the broadband sensors will be lowered into shallow boreholes to ensure the best coupling with the sea floor, in purpose designed vessels by MetroZet. A Streckeisen STS-4B broadband sensor will be used in conjunction with a Quanterra Q330 digitizer. A sea cable will run between the OBS and the CPC installed in a weather resistant shelter that will house the battery back-up power system, Marmot datalogger, the VSAT telemetry equipment, and GPS antenna. The sites will be between 28km and 71km off-shore Baku. All data will be acquired in real-time by the data acquisition center in Baku, Azerbaijan.

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