A DEEP-TOWED SIDESCAN SONAR AND SWATH BATHYMETRIC MAPPING SYSTEM BASED ON PASSIVE ISOPHASE INTERFEROMETRY

D L Mearns (1)

(1)Oceaneering Technologies, Inc., Upper Marlboro, Maryland, U.S.A.

ABSTRACT

The Ocean Explorer 6000 is an advanced sidescan sonar and swath bathymetric mapping system for the collection of high resolution acoustic image and swath bathymetry data used in geological characterisations of the seabed to a depth of 6000 meters. In a single towfish the system uniquely combines a wide swath (to 5 kilometers) acoustic imaging capability *via* a 33/36 kHz sonar array, a high resolution acoustic imaging and swath bathymetry capability *via* a 120 kHz sonar array, and a 4.5 kHz sub-bottom profiler. All acoustic image, swath bathymetric, and sub-bottom data are simultaneously collected and precisely correlated with the geodetic position of the towfish for the production of co-registered seafloor map products. Simultaneous swath bathymetric mapping and acoustic imaging of the seabed in swaths to 1 kilometer is achieved using a passive isophase interferometric technique. The interferometric signal is generated by electronically summing the receive signals on two vertically aligned 120 kHz arrays spaced 10 wavelengths apart and results in as many as 20 discrete depth readings per ping. The technique is considered passive as there is no generation of multiple beams during transmit. The single pair of arrays which do transmit provides real-time acoustic imagery of the highest quality which is invaluable in the interpretation of geologic features. Because the system is deep-towed, overall bathymetric accuracy is dependant on towfish altitude, rather than water depth, as with hull-mounted or shallow-towed systems. Typical bathymetric accuracy is better than 1% of towfish altitude, wuile resolution is better than 0.5%. A comprehensive suite of sensors on the towfish including heading, pitch, roll, pressure, and altitude are used to record any instability during towing and ultimately to correct the bathymetric data in post-processing. The 2-body tow system with decoupled neutrally buoyant towfish and motion compensated handling system contributes greatly to the collection of the high resolution data.
