A Versatile and Complete Technology Platform for Autonomous Ocean Bottom Seismometry

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Ocean Bottom Seismometry has more constraints than terrestrial seismometry due to the challenging environment, complex logistics and high costs associated with operating on the seafloor. However, the scientific objectives of a station are the same: to reliably record high-quality ground motion signals with sufficient fidelity to discern phenomena of interest that manifest above the baseline background earth noise at any given site. To better address the specific needs and challenges of ocean bottom seismology, Nanometrics in conjunction with Scripps Institute of Oceanography, is developing a comprehensive OBS solution that comprises versatile but compact instrument platforms, ultra-low power high-performance seismometers and datalogger, and an end-to-end workflow that spans the entire process from on-shore campaign design to shipboard operation, delivering ready-to-use complete datasets. Recent SWaP (Size, Weight and Power) breakthroughs in seismometer and datalogger technology realize more than 50% power reduction and 40% size/weight reduction for broadband and very broadband sensors, and high precision low-power digitizing technology, which together offer very low noise OBS stations with extremely low power consumption. This next-generation seismometer technology is based on proven intermediate and very broadband sensors that have been deployed widely by oceanographic institutes globally. Key benefits of the complete OBS ecosystem and end-to-end workflow include significantly extended deployment durations, the same seismic sensor performance options for OBS as on land,from geophones to the newest generation of ultra broadband seismometers, optimal operational cost resulting from greatly improved ease-of-use and low SWaP, and high outcome certainty due in part to integrated simple workflows designed specifically for the autonomous OBS use case. Ultra-fast harvesting of data produces a ready-to-use dataset including automatically generated StationXML response metadata and automatic time correction, and facilitates rapid recovery and redeployment of OBS stations.

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