

# VSO II

## Redeployable Full-wave Seabed Acquisition System



### FULL-WAVE SEABED IMAGING

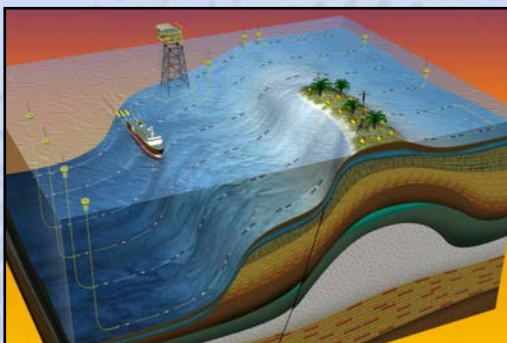
VectorSeis® Ocean II (VSO II) is ION's full-wave redeployable ocean bottom cable (OBC) acquisition system. VSO II has a buoy-based architecture that eliminates the need for a dedicated recording vessel. Key system elements include VectorSeis digital accelerometer sensors, cable-generated noise reduction technology and robust armored cabling.

System command and control is provided by Gator® II for simplified and automated vessel navigation, spread positioning, data management and QC across the acquisition workflow. Designed to provide the highest resolution imaging, new enhancements further reduce cycle time and health, safety and environmental (HSE) exposure.

### PROPRIETARY TECHNOLOGY DELIVERS SUPERIOR IMAGING

VSO II records the full seismic wavefield with unsurpassed vector fidelity and coupling to bring broad bandwidth, high signal-to-noise (S/N) ratio data to seabed acquisition.

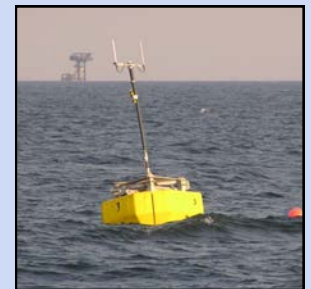
- VectorSeis tilt-insensitive, MEMS-based 3C sensors record p-wave and s-wave energy with superior vector fidelity and an enhanced high and low frequency response
- Proprietary derivative pressure hydrophone enables proper, more accurate P-Z summation during data processing
- Patented cable de-tensioning technology isolates the cable from the sensor package and enables superior coupling for higher S/N data
- Buoy-based recording eliminates the operational expense of dedicated recording vessel(s) used by conventional OBC systems. It also eliminates the limit conventional systems impose on the number of receiver lines. Consequently, surveys can be acquired with much bigger recording spreads, improving survey efficiency, azimuth and offset coverage.



VSO II provides a step-change in OBC technology and is designed to operate in water depths exceeding 1,000m with suitable handling equipment.

### Acquisition Technique of Choice for Development and Production Objectives

With its ability to record broad bandwidth, high signal-to-noise ratio data, VSO has a proven track record for delivering the highest resolution imaging in the marine environment.



VSO II enhancements further improve crew productivity and reduce HSE exposure, resulting in a safer, more economic full-wave solution. It provides oil and gas companies the opportunity to make OBC their preferred acquisition technique — not only for obstructed areas, but also for surveys traditionally shot with towed streamer technology.

## SHORTER CYCLE TIME THROUGH IMPROVED ACQUISITION PRODUCTIVITY

With its buoy-based architecture, VSO was designed to overcome operational inefficiencies inherent in conventional re-deployable OBC systems that rely on a dedicated recording vessel. New features in VSO II build on this productivity advantage.

- Buoy-based recording reduces operational complexity and ensures that no time is wasted moving a recording vessel and hooking up jumper or transverse cables
- Inter-array jumper cables enable receiver line snaking for short line segments and obstacle avoidance
- Continuous recording capability overcomes interruptions in data acquisition due to intermittent radio transmission in obstructed or congested areas and permits continuous shooting into large spreads and long offsets even when typical radio range is exceeded
- Advanced diagnostic measurements and consolidated reporting tools maximize productivity by streamlining maintenance and fault isolation of cables and sensor nodes
- Back deck testing verifies system functionality before entering the water
- Integrated navigation and seismic control is provided by Gator II for efficient spread and positioning management



## REDUCED HSE EXPOSURE BY DESIGN

VSO II enhancements are part of ION's commitment to continually improve the safety and efficiency seismic recording systems.

- Buoy-based design eliminates the recording vessel found on conventional OBC crews, thus reducing the number of personnel and vessels in the survey area, eliminating the HSE risk associated with hooking up and dragging on board transverse and jumper cables, and providing operational flexibility to avoid hazardous or no-entry safety zones
- Elimination of the recording vessel also results in a lower OBC crew carbon footprint and reduced marine life disturbance
- Gator II command and control system mitigates the risk associated with distributed, multi-vessel operations
- Low-bend radius, steel-armored cable enables the use of fully automated, reel-based handling systems and eliminates the risk of manual cable handling found on conventional OBC systems that are dependent on "squirters" and cable bins
- Advanced diagnostic measurements reduce the need to retrieve the cable to troubleshoot problems

