

# OCEANSCIENCE

INNOVATIVE TOOLS FOR OCEANOGRAPHERS AND HYDROLOGISTS

## UnderwaySV Application Note #1 (Courtesy of C&C Technologies)

### C&C Technologies Install UnderwaySV on High Specification Survey Vessel

#### Summary



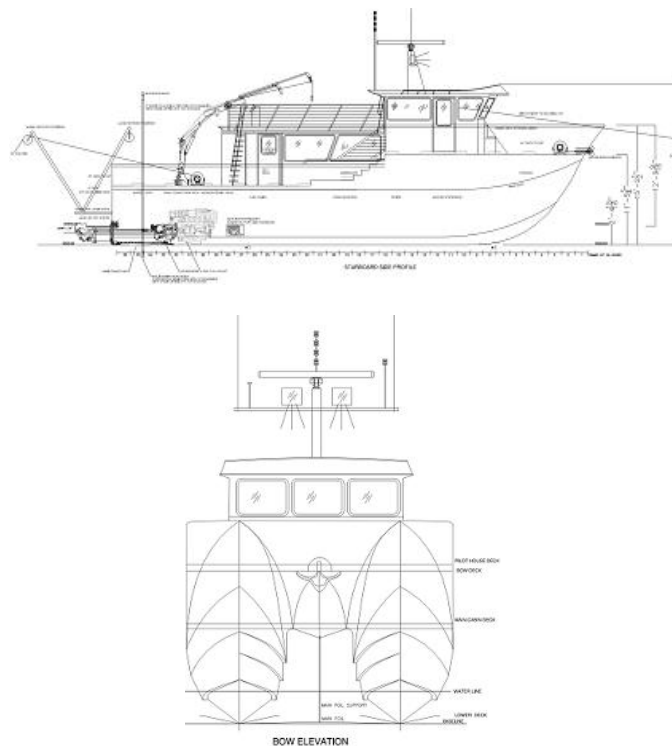
The UnderwaySV was installed on the R/V Thunder for a cable route survey off Alaska in July 2011. Local sound speed variability from freshwater runoff and surface heating could potentially wreak havoc on the wide swath multibeam data without adequate sound velocity (SV) profiles. To avoid survey downtime while gathering the required SV profiles, all casts were completed while underway using the innovative Oceanscience system. The small footprint winch system and simple installation procedure was ideal for the cramped deck. The Bluetooth wireless data management system made operations simple and efficient. The system also prevented the need to recover the sidescan towfish during SV casts.

#### Background

C&C Technologies and NTC Inc. have united resources to integrate one of the most technically advanced, productive, and efficient hydrographic survey platforms in Alaska. Modern ship design and survey system technologies combine to offer new capabilities and cost-effective solutions for multibeam sonar, sidescan sonar and sub-bottom profiling requirements.

The Research Vessel Thunder is an 18meter (60') by 6.1meter (20'), re-enforced construction, lightweight aluminum catamaran. The modern design of the R/V Thunder provides many advantages for marine construction, cable/pipeline route, hydrographic and oceanographic survey operations, including excellent stability, shallow draft, high transit

speeds, and improved efficiency. Twin Hamilton jet propulsion drives allow unlimited maneuverability and are not susceptible to collision and steerage accidents commonly associated with traditional propeller and shaft driven vessels. Shallow draft, extended endurance and high transit speeds give the R/V Thunder unique capabilities for complex, remote coastal environments and variable weather conditions of Alaska.



**Figure 1. R/V Thunder**

The R/V Thunder is equipped with a Kongsberg Simrad EM3002D dual head, wide swath MBES system as well as

towed sub-bottom profile and sidescan sonar tow vehicles. The dual, tilted EM3002D transducers provide high-density multibeam soundings (up to 512 beams) and calibrated backscatter data for swaths that can exceed 75 degrees per side. Wide swath coverage increases the productivity and efficiency of multibeam echosounder survey operations; however accurate sound speed measurements are critical for sounding accuracy in the outer beams.

Frequent sound speed measurements are required to measure the complex sound velocity profiles encountered in Alaska waters; possibly the most challenging environment for multibeam echosounder sound speed corrections. Fresh water input is prevalent for shallow water surveys in Alaska, often in areas of glacier-fed fjords, rivers and streams. Differential water temperatures, surface heating, complex basin geometries, high tidal ranges and strong, variable currents combine to create problematic sound speed conditions. 4-hour sample periods are not adequate to measure sound speed in these complex environments.

Traditional CTD measurements require stopping the vessel on station for static casts. The time required to deploy the CTD necessitates recovering towed sensors, and interruption of data acquisition can be up to an hour per cast. This can translate into at least 20% of a work day for standard sound speed data acquisition requirements; even more for complex environments. It's obvious that a continuous sound speed profiler would increase operations efficiency, however continuous data is not necessary and the initial cost of continuous profilers is difficult to justify for shallow water survey vessel operations. Fortunately, C&C discovered a low-cost, effective alternative solution for rapid and frequent sound speed profiling from Oceanscience and Valeport.

C&C Technologies purchased an Oceanscience / Valeport UnderwaySV rapid deployment underway sound speed and temperature profiler (USST) and it has proven to be a valuable addition to the R/V Thunder this year. The USST provides rapid and frequent sound speed profile measurements without interrupting survey data acquisition. The USST is a cost-effective solution for improved data quality, increased survey productivity, and enhanced efficiency.



**Figure 2. UnderwaySV in position on R/V Thunder**

Installation of the USST profiler took minutes, and it has a minimal footprint on the gunwale of the vessel. The high-speed Oceanscience winch is compact, powerful and easy to operate. For shallow-water surveys, the USVT is operated in "Tow-Yo" mode to acquire sound speed casts while surveying as often as 6 times per hour in depths of up to 300 meters, and at speeds of up to 15 knots. Deeper casts (up to 1000m) can be acquired with an integrated spool winder and freefall configuration. The Valeport ruggedized titanium RapidSVT probe collects high-resolution profiles and transfers data seamlessly via Bluetooth communications directly to the operation station after it reaches the surface. The probe does not need to be recovered on deck between casts. Valeport's RapidSVLog program automatically transfers profile data and prepares the probe for the next cast within seconds. The ASCII text output is easily converted to Caris, Simrad and Hypack profile formats. A new RapidSVLog version has now been released which will integrate GPS position data with the profiles.

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The USST has eliminated survey acquisition downtime due to traditional CTD profile methods and it has improved our multibeam data quality with frequent, high resolution sound speed profiles. We expect that the high-quality multibeam data, additional productivity and reduced ship time will quickly offset the initial expense of the system and help to generate additional profits with multibeam echosounder survey operations.

#### **Future UnderwaySV Activities**

The UnderwaySV was immediately shipped from Alaska to the gulf coast for work on board another survey vessel. The portability of the system maximizes the return on investment when multiple vessels can be outfitted with the same profiler.



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