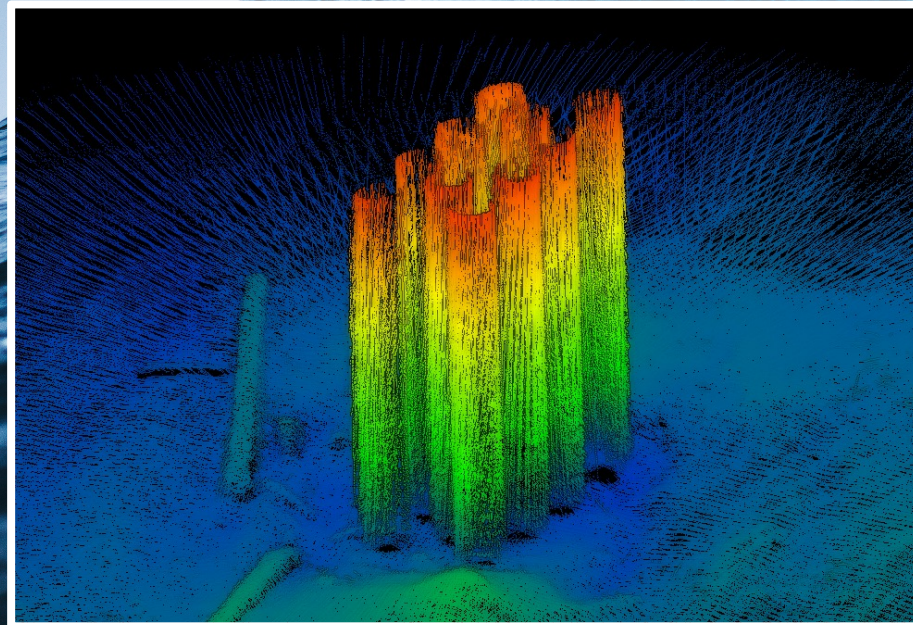


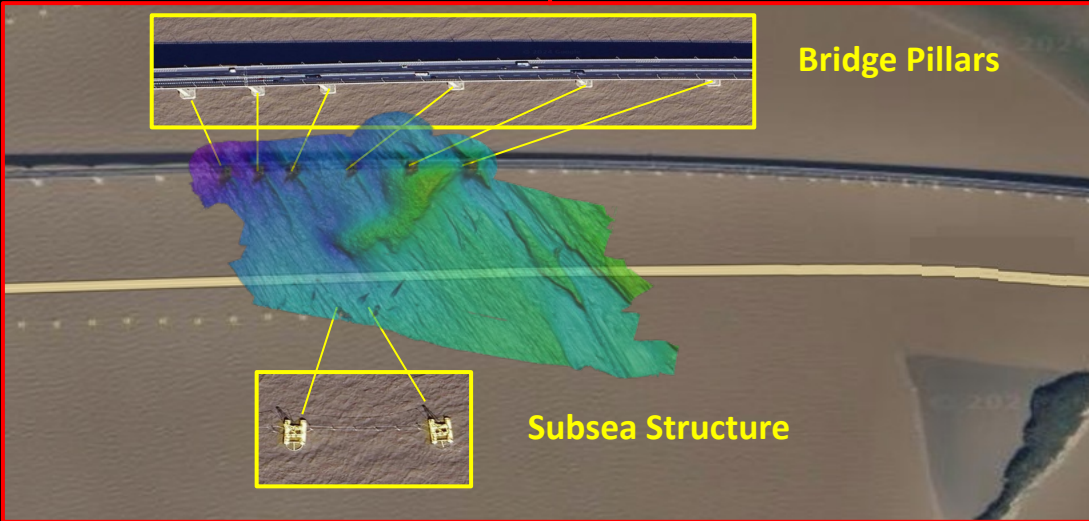
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## Underwater Bridge Pillar Survey Using NORBIT WINGHEAD i80S







On July 11, 2024, a bathymetry survey was carried out near Zhou Shan Island, China (舟山岛) using the NORBIT WINGHEAD i80S multibeam sonar system equipped with STX (Steerable Transmit) technology. This state-of-the-art sonar was deployed specifically to scan and map the underwater bridge pillars, providing highly detailed bathymetric data. The combination of the WINGHEAD sonar's precision and the steerable transmit feature ensured thorough coverage even in challenging underwater environments.

The survey environment presented significant challenges due to water quality, which was extremely muddy and turbid (as visible in the Google Map image). Additionally, an underwater current of approximately 2-3 knots made steering the vessel particularly difficult.

For the survey the NORBIT WINGHEAD i80S was used, this sonar is a superior performance ultra high-resolution integrated 3D & 4D medium range motion stabilised bathymetric system. Designed to perform in extreme operational environments with high vessel motion, this cylindrical ultra-high resolution curved array bathymetric system, allows for rapid anywhere anytime mobilization.

- ✦ Active Roll & Pitch Stabilisation
- ✦ Backscatter Outputs (Intensity, Sidescan, Snippets, Water Column)
- ✦ Pipeline Mode
- ✦ Multidetect
- ✦ Integrated Sound Velocity Probe
- ✦ 1024 Dynamically Focused Beams
- ✦ FM & CW Processing
- ✦ Exceeds IHO Exclusive Order & USACE New York



**WINGHEAD i80S**

Installation at Ligang Jetty

- Sonar was mounted at the starboard side of the vessel with both Antenna 1 & Antenna 2
- Installation took about an hour
- Utilising the WINGHEAD i80S fully stabilised system
- GNSS RTK NTRIP corrections were interfaced to the system in real time, using the NORBIT GUI integrated NTRIP client







**Vessel Spec:**

Length Overall (LOA): 15.2m

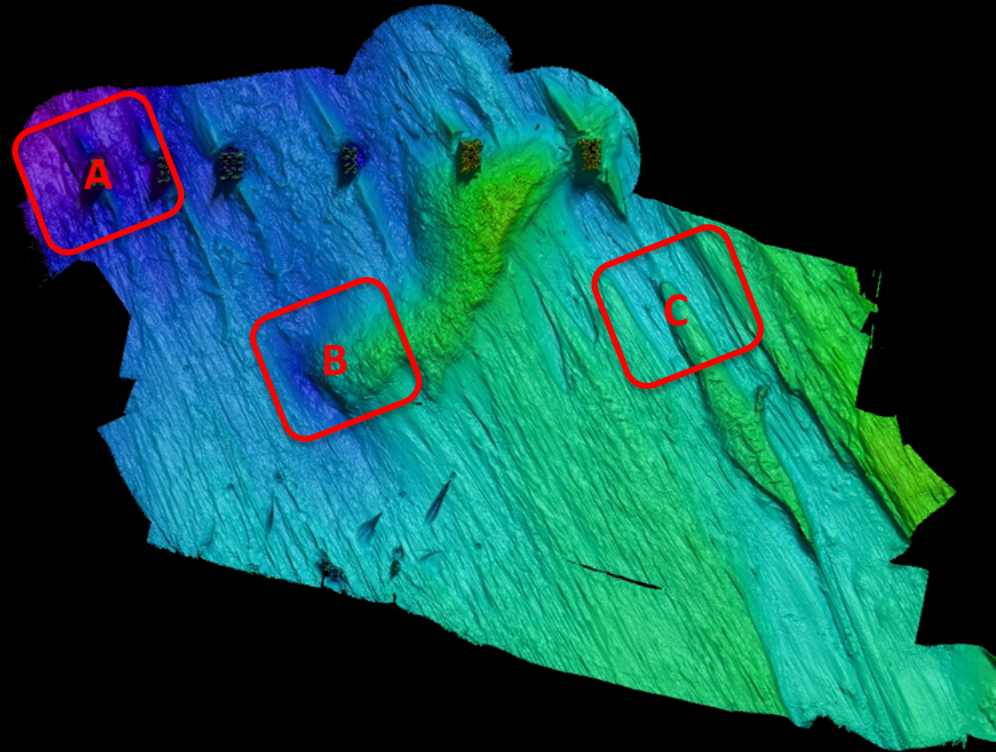
Breadth Overall (BOA): 3.1m

Gross Tonnage: 100 tons

Net Tonnage: 80 tons

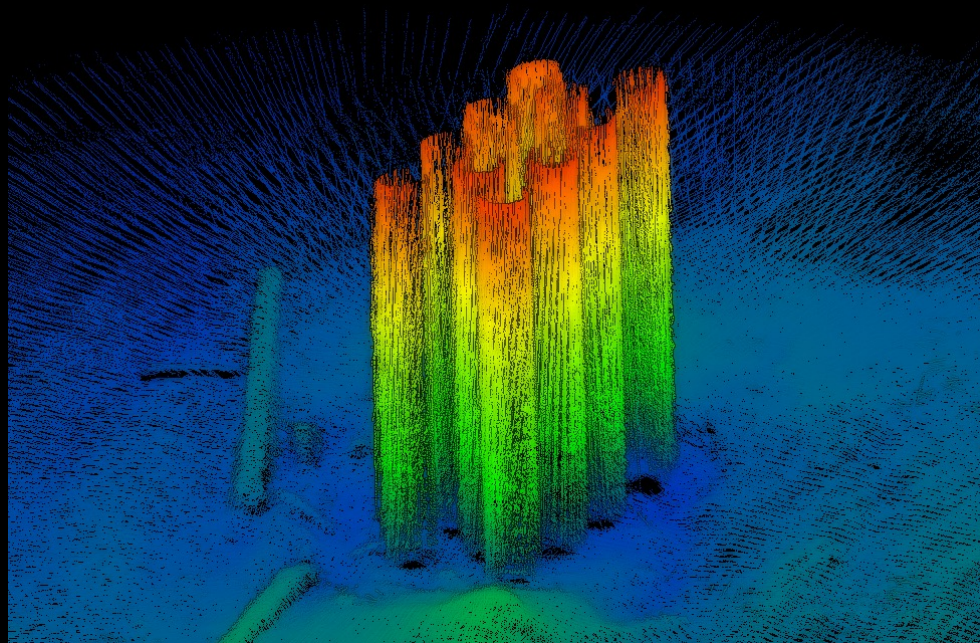
Height: 5.3m

Draft: 1.20m



**Figure 1: Overall Survey Area Surrounding Zhou Shan Island**





**Figure 2: Results of Area A survey area.**  
**The WINGHEAD i80S scanning capability was able to clearly map out 10 individual bridge support pillars, without any sounding gaps at the base of the pillars.**

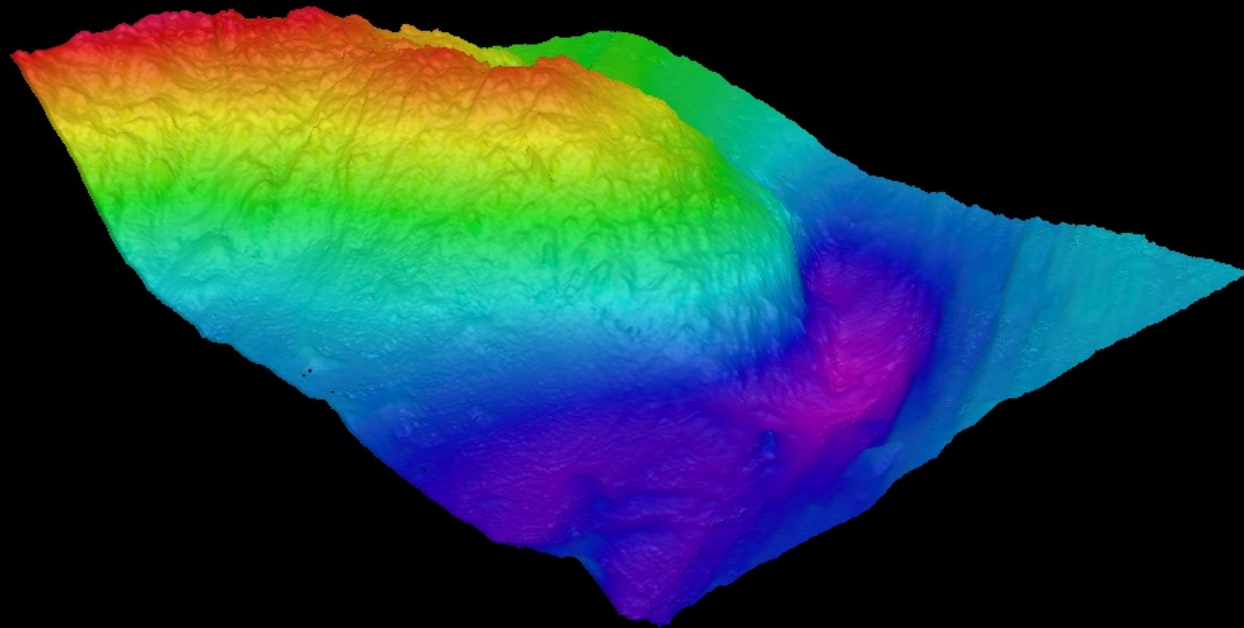
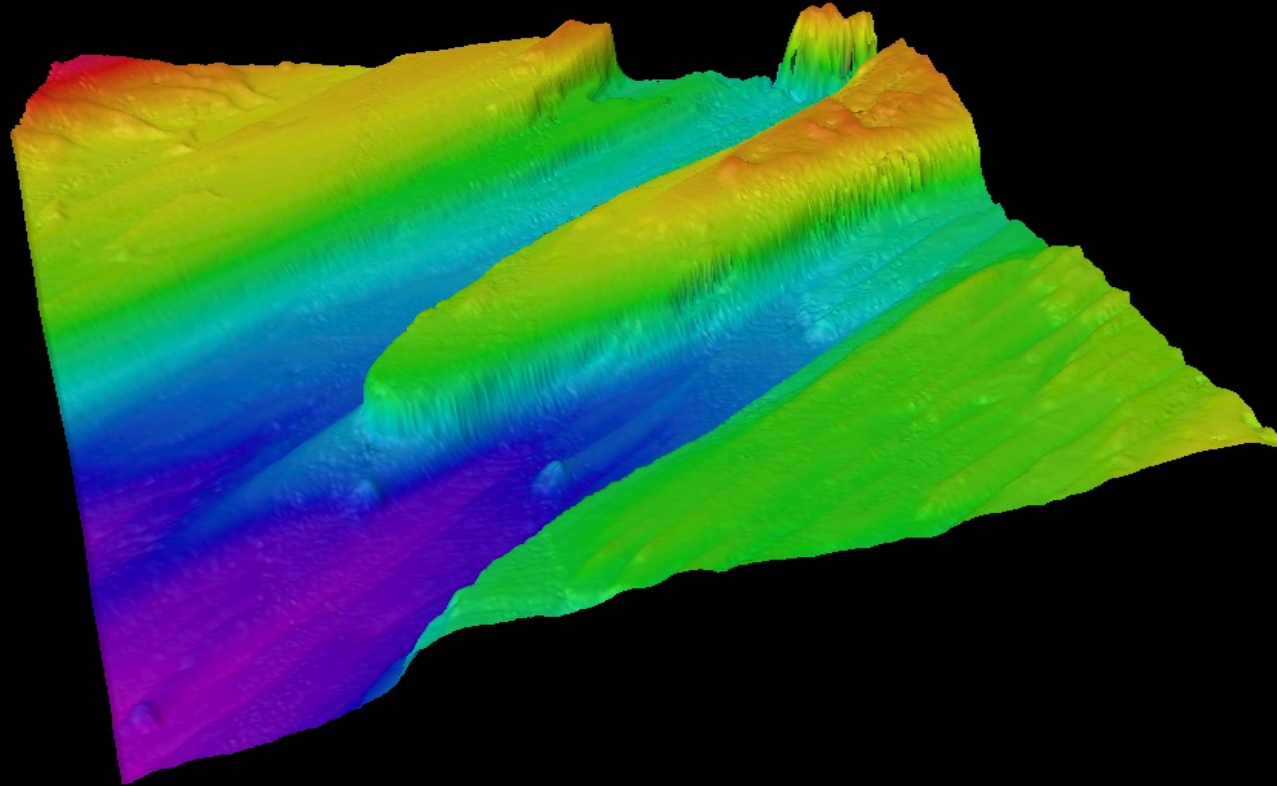


Figure 3: Results from survey area B, showing a slope with an adjacent trench



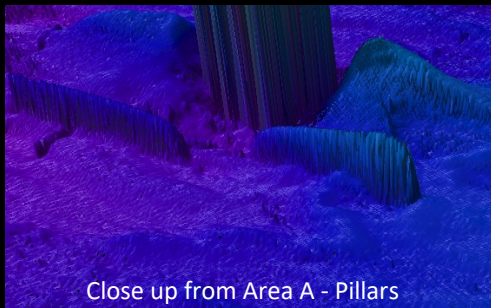


**Figure 4: Results from survey Area C show linear striations on both sides of an underwater peninsula**

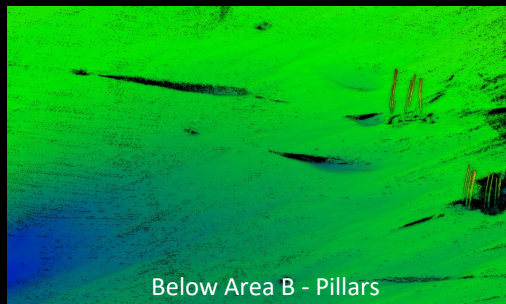
Although the water quality and environment around the site were challenging, the WINGHEAD i80S Echo Sounder successfully acquired excellent datasets, as demonstrated.

The WINGHEAD i80S's STX feature, when enabled, enhanced survey efficiency by utilizing its 3D scanning capability for the insonification of complex bridge pillar structures.

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Close up from Area A - Pillars



Below Area B - Pillars



Close up from Area C - Natural Trenches



Close-up from Area B - Sand Waves