Archeological Survey of the Qian Dao Lake

Hang Zhou, China

June 2024

INTRODUCTION

A survey was performed at Qian Dao Lake on June 18, 2024, using the NORBIT WINGHEAD i77h.

The ancient underwater city of Shī Chéng (Chinese: 狮城, literally ‘Lion City’) is located in the lake.

The city of Shī Chéng is believed to have been built during the Tang Dynasty in 621 AD, making it nearly 1,400 years old. Based on records of the region’s history, it is thought to have been quite large, possibly over 60 football fields.

Due to the modernisation of Zhejiang province, a hydroelectric dam was built in 1959, flooding the valley where the ancient city was located.

MULTIBEAM ECHO SOUNDER

A case study was conducted at Qian Dao Lake using the NORBIT WINGHEAD i77h. The NORBIT WINGHEAD i77h is a compact ultra-high resolution curved array broadband multibeam. It offers tight integration with GNSS/INS (Applanix OceanMaster) and is designed for use in demanding operational environments.

The WINGHEAD i77h was the first cylindrical ultra-high resolution bathymetry sonar on the market

WINGHEAD
sonar Family

- 0.5 x 0.9° beam width at 400kHz
- HD beamformer providing 1024 beams per ping
- High-performance integrated GNSS/INS systems
- Integrated sound velocity probe
- Small form factor and low power consumption
- Designed for rapid mobilisation on *any* platform
- Available with optional LiDAR

WINGHEAD i77h

INSTALLATION AND SURVEY INFO

- Survey location: Qian Dao Lake, China
- Frequency set to Auto Mode
- Speed: 3-4 knots
- Survey depth: 45m-70m
- Sonar mounted on the starboard side of the vessel, with both antenna 1 and antenna 2 set up on the upper deck.

AD HOC VESSEL

Vessel Spec:

- Length Overall (LOA): 33.80m
- Breadth Overall (BOA): 7.76m
- Gross Tonnage: 228 tons
- Net Tonnage: 136 tons
- Height: 9.28m
- Draft: 1.20m

SURVEY AREA

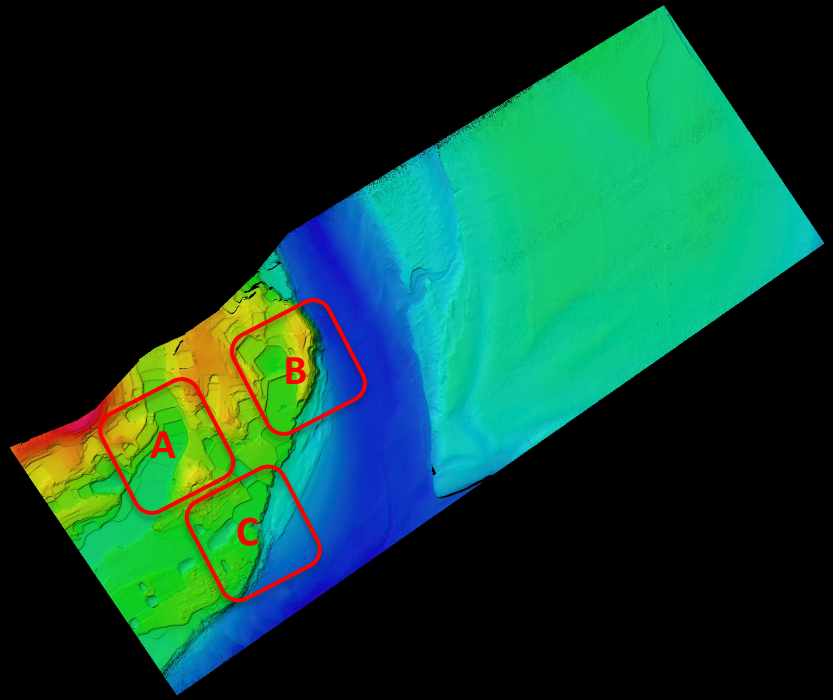

Figure 1: Overall Survey Area in Qian Dao Lake

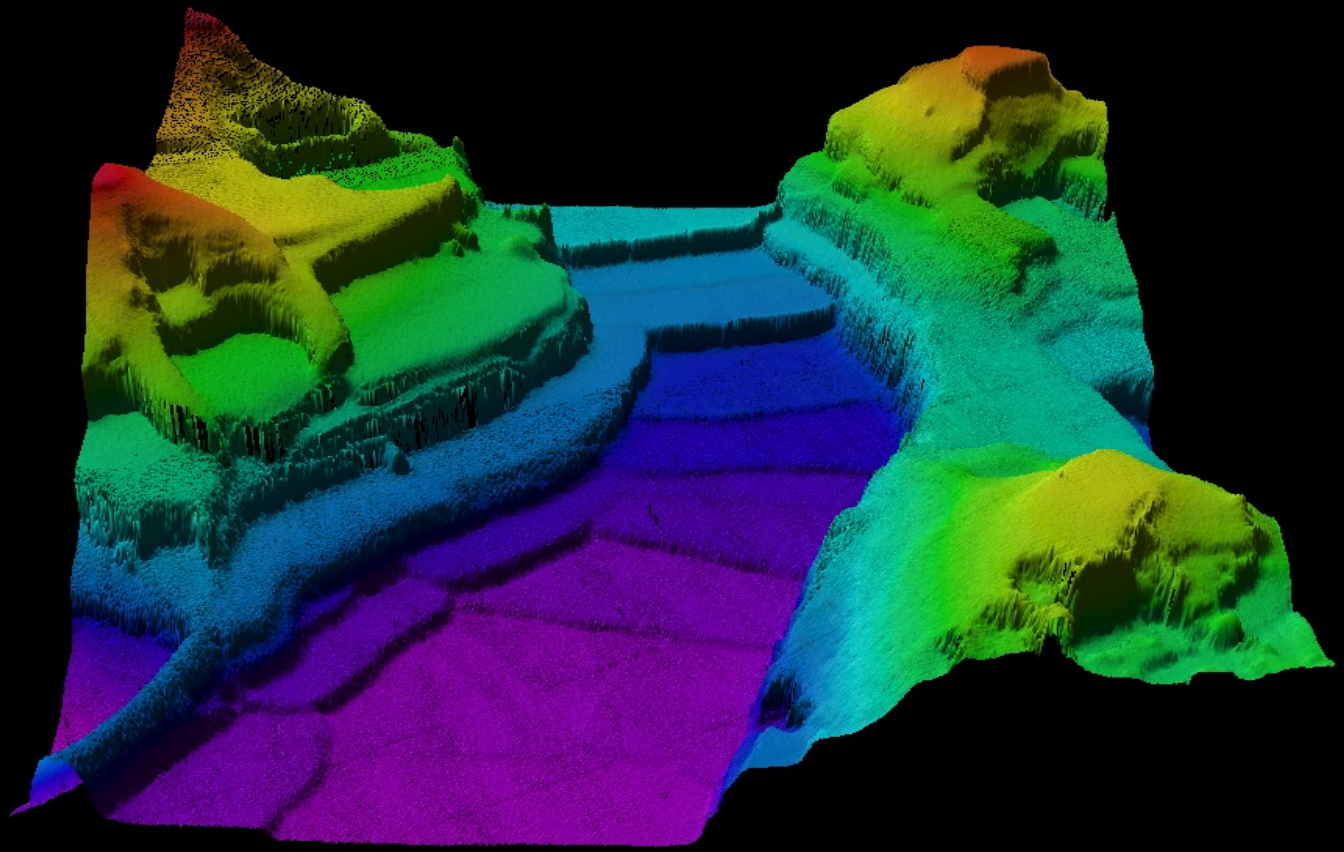

Figure 2: Results at Area A, observed likely terrace paddy fields

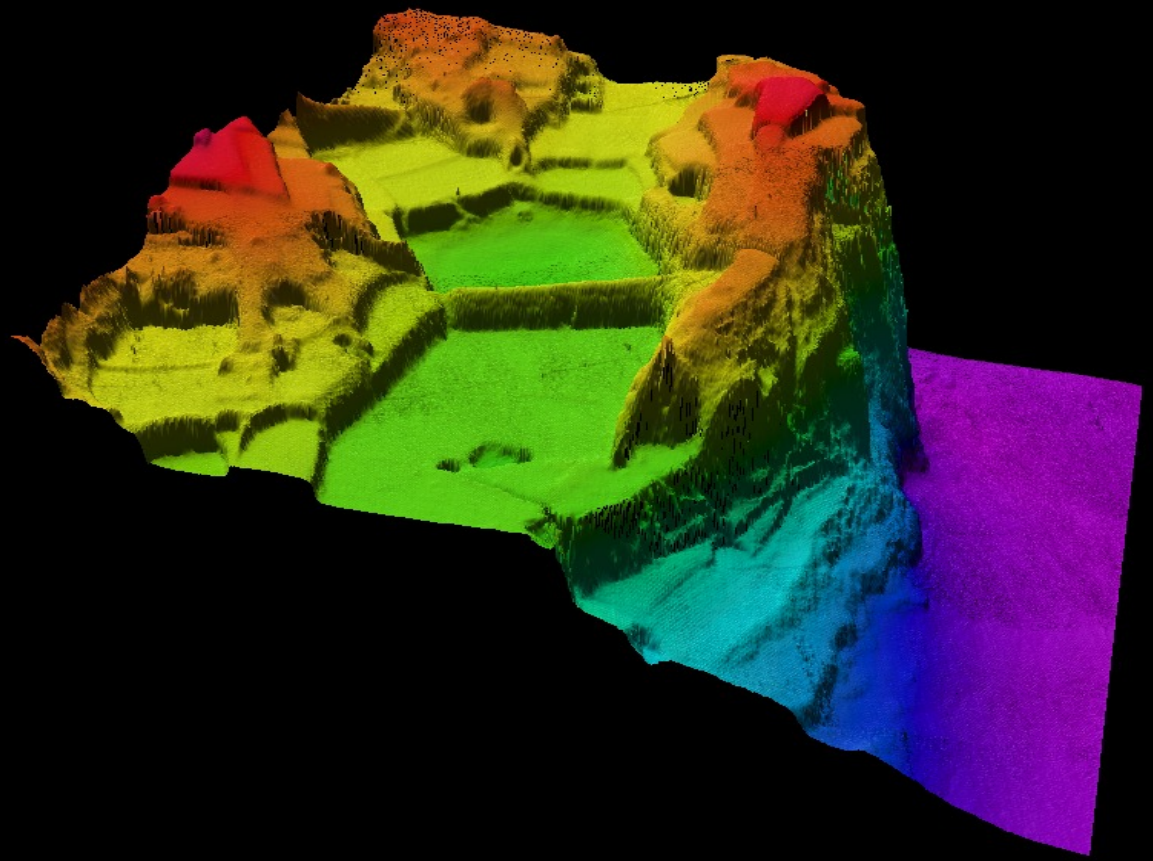

Figure 3: Results at Area B, observed terrace paddy fields next to a steep riverbank

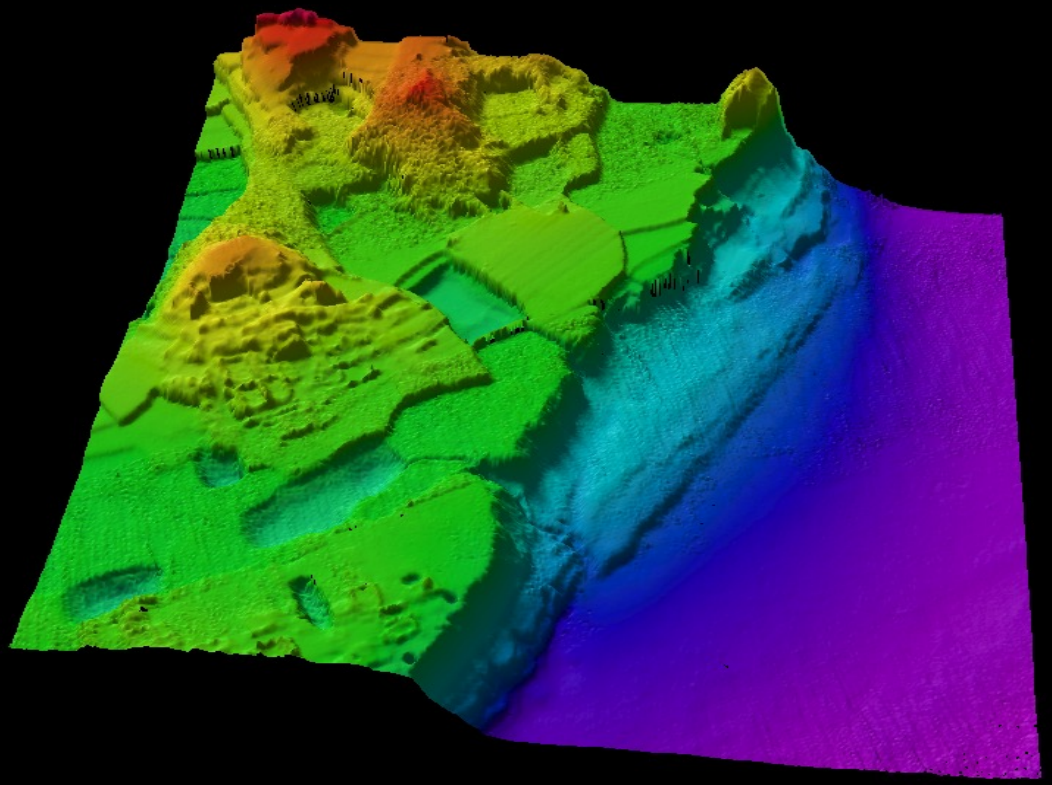

Figure 4: Results at Area C, observed likely ponds or rectangular depression next to a steep riverbank

SUMMARY

- The ultra-high-resolution WINGHEAD i77h bathymetry sonar insonified the underwater city structures in high-resolution details, with observed terrace paddy fields around the city structures.
- In Areas B and C, a river creek with high riverbanks was observed.
- In Area C, likely ponds or rectangular depressions next to a steep riverbank were observed.
- The high-performance integrated POSMV OceanMaster GNSS/INS system, with its precision, significantly reduced the chance of installation errors compared to a traditional setup with standalone sensors, ensuring the accuracy of our survey.
- The WINGHEAD Sonar is designed for rapid mobilisation anywhere in the world. Thus, we were able to commence our survey within an hour of installation.

Explore More:

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