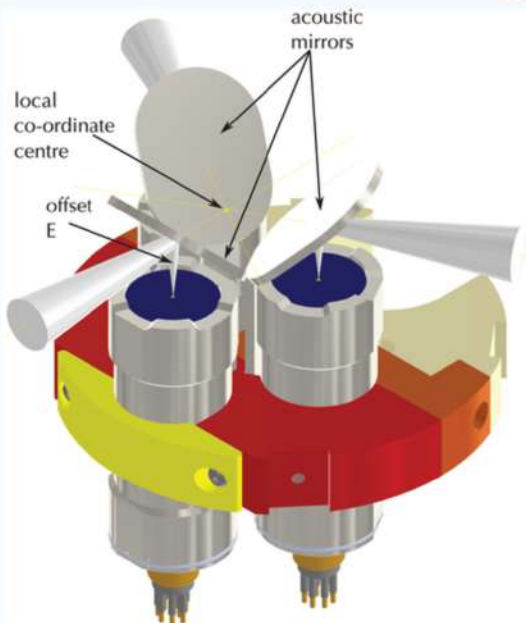


# Case Study:

## BRITISH ANTARCTIC SURVEY UTILISES THE ISA500, ISD4000 & ISP1 IN BOREHOLE RESEARCH



3 x ISA500 Altimeters mounted on system

The use of Impact Subsea technology in two-kilometre-deep hot water-drilled ice boreholes has been detailed in the paper “Non-contact Measurement System for Hot Water Drilled Ice Boreholes.”

Developed and deployed by the British Antarctic Survey, this programmable borehole measurement system was utilised during the ‘Bed Access and Monitoring of Ice Sheet History’ (BEAMISH) project, which drilled 2054 m to the bed of the Rutford Ice Stream in West Antarctica.

## FEATURES & BENEFITS

### ISA500

- **120+ METER RANGE**  
Proven long range measurement.
- **1MM ACCURACY**  
Proven millimetre accuracy.
- **INTEGRATED AHRS\***  
Provides Magnetic Heading to  $\pm 1^\circ$   
Pitch & Roll to  $0.2^\circ$  accuracy.
- **ECHOGRAM\***  
Visualise sonar backscatter data.  
Up to 2,000 samples per ping.

\*Optional

### ISA500 APPLICATIONS INCLUDE:

Scour Monitoring | Touchdown Monitoring | Hydro-graphic Survey | Motion Reference |  
Wave Height Measurement | Equipment Deployment | Under Ice Measurement |  
Underwater Positioning | ROV & AUV Altitude, Heading & Attitude |

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Article

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### Non-contact measurement system for hot water drilled ice boreholes

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#### Abstract

A programmable borehole measurement system was deployed in hot water drilled ice holes during the ‘Bed Access and Monitoring of Ice Sheet History’ (BEAMISH) project to drill to the bed of the Rutford Ice Stream in West Antarctica. This system operates autonomously (no live data) after deployment, and records borehole diameter (non-contact measurement), water column pressure, heading and inclination. Three cameras, two sideways looking and one vertical, are also included for visual inspection of hole integrity and sediments. The system is small, lightweight (~35.5 kg) and low power using only 6 D<sup>+</sup> cell sized lithium batteries, making it ideal for transport and use in remote field sites. The system is 2.81 m long and 165 mm in diameter, and can be deployed attached to the drill hose for measurements during drilling or on its own deployment line afterwards. The full system is discussed in detail, highlighting design strengths and weaknesses. Data from the BEAMISH project are also presented in the form of camera images showing hole integrity, and sensor data used to calculate borehole diameter through the full lengths of the hole. These data are used to show confidence in hole verticality and subsurface cavity development and connection.

Introduction

### British Antarctic Survey paper

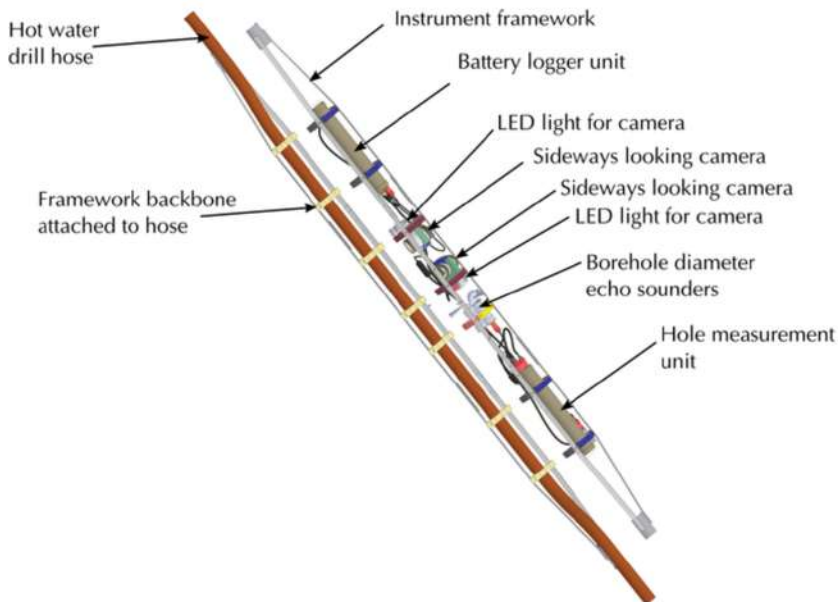


British Antarctic  
Survey paper

## BRITISH ANTARCTIC SURVEY UTILISES THE ISA500, ISD4000 & ISPI IN BOREHOLE RESEARCH



The hot water drilling BMS operates autonomously after deployment, obtaining non-contact measurements of the borehole diameter as well as the water column pressure, heading and inclination.



**Mechanical assembly of the measurement system.**

This application utilised three of Impact Subsea's ISA500 Altimeters to obtain high accuracy non-contact measurements of the borehole diameter.

An OEM version of the Impact Subsea ISD4000 Depth sensor was used to provide high accuracy depth and pressure readings together with secondary AHRS functions (Heading, Pitch & Roll).



**Borehole measurement system on the BEAMISH Project**

In addition to the sensor technology, Impact Subsea designed and supplied the housings for the Battery Logger Unit, Hole Measurement Unit and Sideways Looking Cameras used in this project.

### Designed & Built For Harsh Environments:

Both the ISA500 and ISD4000 are depth rated to 6,000 meters as standard and are provided in Titanium housings.

The design and housing material of each sensor ensures that exceptional performance is coupled with high reliability.

This makes the ISA500 and ISD4000 ideal for this project or any other such demanding application.