



**MH370**

# Mapping the ocean floor— Bathymetric survey

26 May 2014

## Background

The Australian Transport Safety Bureau (ATSB) is leading the underwater search for missing Malaysia Airlines flight MH370. All the available data indicates the aircraft entered the sea close to a long but narrow arc of the southern Indian Ocean.

The search is a complex operation that will involve a range of vessels, equipment and expertise to cover 60,000 square kilometres of ocean floor.

## Bathymetric survey

During the first stage of the search, the ATSB is tasking a Chinese PLA-Navy ship to undertake a bathymetric survey of the 60,000 square kilometre search area. A contracted commercial vessel will join the survey in early June. The bathymetric survey will provide a map of the underwater search zone, charting the contours, depths and hardness of the ocean floor.

While the ocean depth of the search zone is understood to be between 1000 m and 6000 m, we currently have very limited knowledge of the sea floor terrain facing the underwater search operation. The information we receive from the bathymetric survey will give us crucial data to plan and conduct the intensified underwater search.

## How the survey's done

The operation will involve a ship surveying the ocean floor using multi beam sonar, which is capable of collecting high quality data to water depths of up to 6,000 m.

Multibeam sonar is a common offshore surveying tool that uses multiple sound signals to detect the seafloor. Due to its multiple beams it is able to map a swath of the seabed under the ship, in contrast to a single beam sonar which only maps a point below the ship. Different frequencies are used to map different water depths, with higher frequencies (>100kHz) used for shallow water and low frequencies (<30 kHz) for deep water.

Generally, the multibeam sonar transducer is mounted rigidly to the hull of the survey vessel and its position can be calculated very accurately. Other parts of the multibeam system include auxiliary sensors such as motion-sensing systems and Global Positioning Systems (GPS) to ensure accurate positioning, motion sensing and sound speed measurement system.

A modern multibeam sonar transducer typically uses the Mills Cross telescope array. The sound is transmitted from transducers that are perpendicular to the survey track. Consequently, the sound pulses form a transmit swath that is wide across-track and narrow along-track. The returning sound pulses, which are mainly recording the impedance contrast and seafloor topography, are received by the receivers which are mounted parallel to the survey track. These return beams are narrow across-track. Unlike the sidescan sonar which commonly produces only acoustic backscatter data (i.e. hardness), the multibeam sonar generates both water depth and seafloor hardness data concurrently.<sup>1</sup>

## How many vessels will be involved in the survey

The Chinese PLA-Navy ship Zhu Kezhen (872) is already in the search area conducting a bathymetric survey of an area provided by the ATSB. A contracted survey vessel will arrive in the search area in June.

## How long it will take

It is expected that the bathymetric survey will take around three months to complete, but this will depend on a number of factors, such as weather conditions, during the survey operations.

The underwater search will begin when we have enough data from the bathymetric survey to start searching. This means that the underwater search will begin while the survey is still being completed.

## More information

More information on bathymetric surveys can be found on the Geoscience Australia website at [www.ga.gov.au](http://www.ga.gov.au)

The ATSB's website [www.atsb.gov](http://www.atsb.gov) and the Joint Agency Coordination Centre website [www.jacc.gov.au](http://www.jacc.gov.au) also provide information about the overall search effort for MH370.

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<sup>1</sup> Multibeam Sonar, Geoscience Australia