A miniature broadband system for ocean floor seismology

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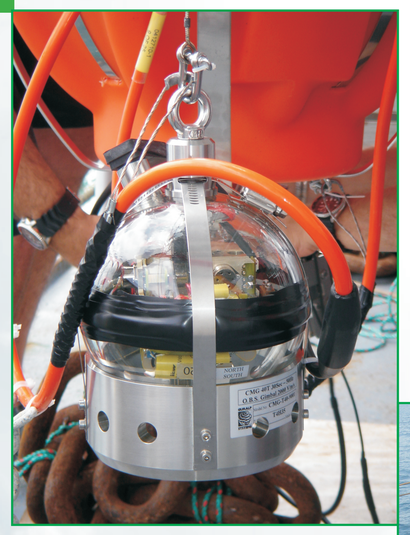
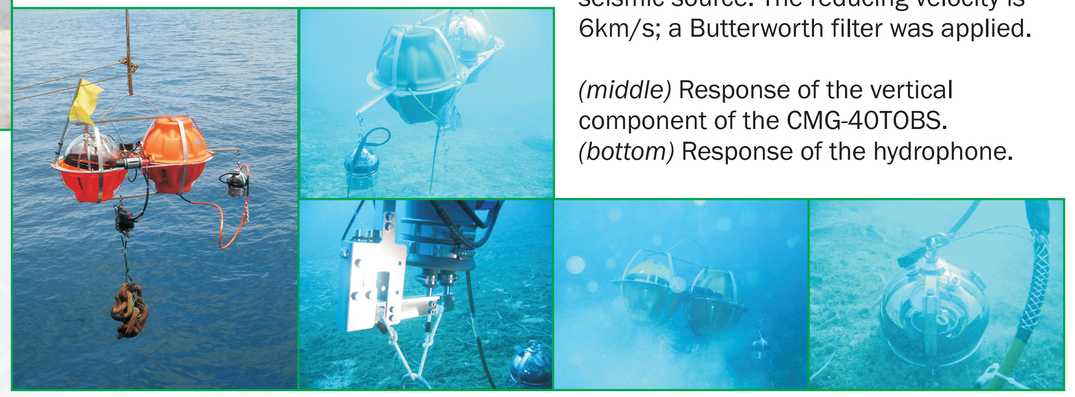
Introduction

Géosciences Azur and Güralp Systems have developed a low-power, true broadband ocean bottom seismometer (OBS) system with sensors housed within a glass sphere only 150 mm in diameter. This new system allows broadband instruments to be deployed in situations where geophone-based systems would previously have been the only option. It does not require specialised equipment for deployment, reducing costs, and includes a reliable acoustic release mechanism for recovery.

The broadband sensors provide a stable and realisable transfer function, with lower noise, higher linearity, and substantially higher cross-axis rejection in comparison with geophone equipment. A novel ±80 ° gimbal ensures a stable platform for the broadband sensors. Ocean bottom current effects are minimized through efficient coupling to the sea floor.





The CMG-40TOBS under test

The traces *(right, top)* show a M_r 6.7 earthquake in southern Sumatra (2005-04-10) as recorded by the vertical components of instruments under test in Güralp Systems' vault.

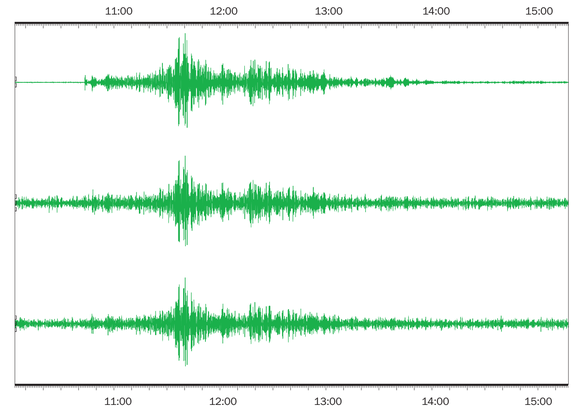
The topmost trace is from a CMG-3T instrument; the lower two are recorded from CMG-40TOBS sensors. All three traces are referenced to ground motion.

The CMG-40TOBS in the field

These graphs are produced from the first dataset to allow comparison of the CMG-40 system with previous short period OBS under experimental conditions.

The wide-angle data was obtained along the south Colombian convergent margin during the Esmeralda experiment (March 2005). 15 broadband OBS instruments of this type were deployed with 10 short period hydrophone OBS for passive and active recording. A 8 × 16 l bolt airgun was used as the seismic source. The reducing velocity is 6km/s; a Butterworth filter was applied.

(middle) Response of the vertical component of the CMG-40TOBS.
(bottom) Response of the hydrophone.



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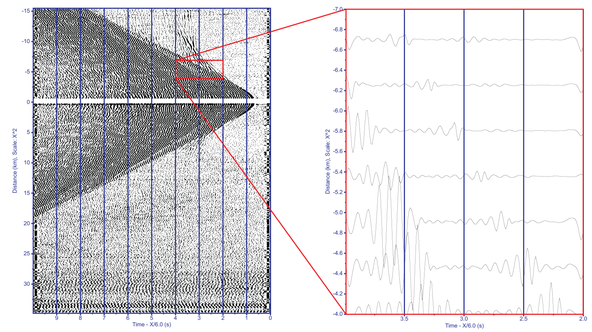

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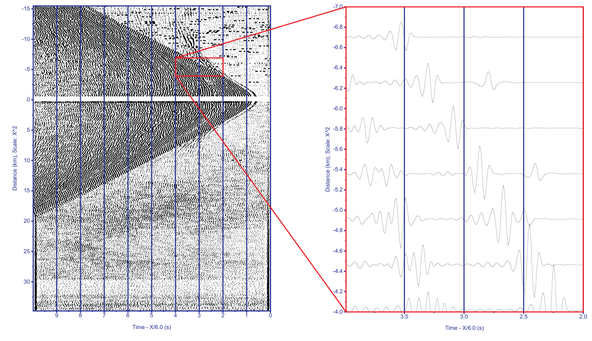

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