Tests of Acoustic Tomography in Lake Biwa, Japan

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We report results from early tests in a lake of Coastal Acoustic Tomography (CAT), a form of remote sensing that characterizes average sound velocity along the paths of sound transmission between acoustic transducers. The tests were perfomed at water depths of 12 m or less, near Nagahama in the North Basin of Lake Biwa, Japan. Two 5kHz omnidirectional transducers were deployed, with three acoustic cycles per bit of a randomized M-sequence of various order. A first successful test was achieved at a transducer separation of 7km under stratified conditions on Sept 24, 2014. Water depths were 8 and 6.3 m at the two transducers, which were positioned 2m above the bottom. SNR between 5 and 15 was observed for the first peak of the correlation waveform for "arrival time", and no clear secondary peak was observed. At this depth, the water temperature varied rapidly with depth at the tranducer positions. A second successful test was performed on Jan 30 2015 under unstratified conditions, at transducer separations of 3.8 and 6.2 km and water depths around 10m. The latter tests obtained SNR around 30 for the main correlation peak, with clear secondary and, sometimes, tertiary peaks. At the conference, we hope to present results from further tests that aim to characterize the minimum depth that permits an acceptable SNR. To our knowledge, these are the first reported tests to demonstrate the applicability of CAT in a Lake.

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