ACOUSTICS2008/593
The acoustic field on the melon of echolocating Atlantic bottlenose dolphin (Tursiops truncatus)

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An array of five broadband suction cup hydrophones were placed on the melon of two bottlenose dolphins to determine where on the melon the echolocation beam emerges and to examine how signals in the acoustic near-field relate to signals in the far-field at 1m. Four different array geometries were used: a linear one with hydrophones arranged along the midline of the melon between 2.8 and 3.7 cm apart, and two around the front of the melon at 1.4 and 4.2 cm above the melon-rostrum crease and one across the melon in certain locations not measured by other configurations. The beam axis was found to be close to the mid-line of the melon, approximately 5.4 cm above the melon-rostrum crease for both animals. The signal path coincided with the low-density, low-velocity core of the melon supporting the melon hypothesis postulated many years ago by Kenneth Norris. Slight asymmetry in the signal was found with higher amplitudes on the starboard side of the melon. Although the signal waveform measured on the melon appeared distorted, when they were mathematically summed in the far-field while preserving the relative time of arrival, the resultant waveform matched that measured by the hydrophone located at 1 m.