ACOUSTICS2008/1151
Detection of beaked whales using near surface towed hydrophones: prospects for survey and mitigation

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Beaked whales are extremely difficult to sight at sea and this hampers attempts to study them, and makes real time mitigation difficult. Passive acoustic monitoring could improve detection efficiency. Blainville's beaked whales, (Mesoplodon densirostris) are known to produce most of their vocalizations at depth. They are routinely detected on bottom mounted hydrophones arrays but the extent to which they can be detected using near-surface hydrophones is not known.
Continuous recordings were made at a sampling rate of 192 kHz from towed hydrophone arrays during line transect surveys in the Bahamas in conjunction with teams monitoring bottom-mounted hydrophones at the AUTEC Tongue of the Ocean navy range. A beaked whale click detector and classifier was developed within Rainbow Click and PAMGUARD and this was both run in real time and used to analyze recordings to pick out beaked whale click trains. Detected click trains correlated well with detection of beaked whales on bottom-mounted hydrophones. Three species of beaked whale were encountered visually and detected acoustically: Mesoplodon densirostris, Ziphius cavirostris and Mesoplodon europaeus. Target motion analysis of bearings to sequences of clicks suggests a maximum detection range of approximately three kilometers and preliminary results indicate that clicks can be identified to species.