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Acoustic detection of beaked whales from autonomous recording buoys

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Beaked whales are among the least known cetaceans but may be especially vulnerable to mid-frequency sonars. Effective implementation of passive acoustic monitoring (PAM) of beaked whale vocalizations may help both to study the biology of these elusive species and to mitigate human impacts. Here we report results of a feasibility study of PAM performed off El Hierro (Canary Islands) where there are coastal resident populations of two species of beaked whales. An acoustic recording system, comprising a GPS-equipped buoy with an archival acoustic tag (Dtag) suspended 200m below, was deployed in an area with visual coverage from land. The DTAG recorded broadband acoustic data sampled at 96 kHz along with timing and position information from the GPS. The buoy was deployed on 6 days and clicks were clearly detectable in all recordings. A majority of these were confirmed to be beaked whale clicks by comparison against sounds previously recorded from the same species. Visual sightings were then compared against acoustic detections to develop a methodology for estimating the probability of detection as a function of distance and group size. Results demonstrate the effectiveness of sonobuoy-type PAM systems for beaked whales and the possibility for low-cost tests of acoustic detection models.