USING SPERM WHALE CLICKS TO DETECT SILENT WHALES

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In the Canaries, although all cetacean species are prone to collisions with fast vessels, the Sperm Whale (Physeter macrocephalus) is of highest concern. Sperm Whales are highly vocal and hence can be localised with passive sonar. However, when at or near the surface, Sperm Whales tend to stop vocalising, i.e. when they are most at risk. Localising them could in principle be carried out by a bi-static sonar system, which uses vocalising whales at depth as the acoustic sources and detects silent whales by their echoes. A simulation tool for 3D acoustic propagation is presented where a wideband 3D curved ray solution of the wave equation is implemented. This tool was designed to simulate a bi-static system formed of an active acoustic source, an illuminated object, and a receiver all positioned in 3D space with arbitrary bathymetry. The software recreates the resulting sound mixture of direct, reverberated and echoed signals arriving at the array sensors for any array configuration and any number of sources. One object can be placed in the water column and its impact on the acoustic field at the receiver is resolved. This tool is used to evaluate possible solutions for the Whale Anti-Collision System (WACS) project. WACS aims at preventing collisions between whales and fast maritime vessels. The software simulations demonstrate the concept viability but highlight the necessity of advanced space-time signal processing to resolve and identify the distant echoes produced by silent whales.

DO PORPOISE DETECTORS DETECT PORPOISES?

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A porpoise detector (POD) is a hydrophone that logs porpoise echolocation clicks (Tregenza, UK). PODs are recommended for use in Environtmental Impact Assessments (EIAs) concerning offshore wind farms in the german North Sea. At present there are no standards for deploying, setting and analaysing POD data in order to obtain reliable and comparable data. In summer 2002, we carried out a pilot study in the North Sea west of Sylt to investigate to what extent PODs can be employed to evaluate the impact of offshore wind farms on harbour porpoises within an area. The PODs were moored two metres up from the bottom of the sea floor and marked by a small buoy on the surface. The best indicator for porpoise activity is the daily click frequency. This is the number of minutes with porpoise activity in relation to all minutes recorded during a day. We observed a strong positive correlation between the click frequency despite experiencing a large variation in detection probability between the different PODs. We could subsequently produce a correction factor for every POD based on the most sensitive POD. Between July and October 2002, five PODs recorded 5.528 hours data. The results show a clear activity pattern both over the study period as well as over a 24 hour cycle with up to 40 click events per day and a mean click frequency of 8 %. The diurnal pattern in click activity was low during the night and high between early morning and afternoon. We cannot confirm the strong phenology observed by aerial observations. Although further studies are needed to better our understanding of echolocation patterns, PODs are considered to be a useful tool not only in detecting harbour porpoises but also in studying the potential effects of wind turbines on this species.