
Marine mammals along the Mid-Atlantic Ridge between Iceland and the Azores: What do the whales tell us about this ecosystem?

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Distribution, abundance and aggregations of marine mammals were observed during the MAR-ECO expedition onboard R/V "G.O.Sars" in June 2004 along the Mid-Atlantic ridge (MAR) between Iceland and the Azores (www.mar-eco.no). A total of 1433 individuals and 17 species were observed during the cruise. The most important hot spot area for marine mammals was by far the Charlie Gibbs Fracture Zone (CGFZ) with 282 individuals, constituting 80% of the aggregated hot spot sightings. The highest aggregations of sperm whales (*Physeter macrocephalus*) were observed north of the CGFZ. Sei whales were most common over the slopes of seamounts and rises in waters with depths between 1500 and 3000 m, while sperm whales were common in waters shallower than 2000 m and often above underwater seamount peaks. All three major hot spot areas were found in cold ($5^{\circ}\text{C} < t < 9^{\circ}\text{C}$) and low saline ($S < 35.0$) Sub Arctic Intermediate Water (SAIW), while the outside reference areas were characterised by warmer ($t > 7^{\circ}\text{C}$) and more saline ($S > 35.0$) North Atlantic Central Water (NACW). The currents from ADCP measurements showed a tidal current pattern with low average speed of 5 cm/s to the east and a maximum speed of 50 cm/s. Acoustic recordings with Simrad EK-60 echosounder data of possible prey species in the water column using five different frequencies were applied simultaneously with our visual observations from above the bridge (15,5 m). The acoustic densities were significantly higher within the hot spot areas compared to surrounding areas. Zooplankton concentrations were significantly higher in SAIW water masses compared to NACW water. The cephalopods swimming at great depths (> 500 m) could not be detected acoustically due to their extremely low acoustic properties and contrast. Instead, biological data from different deep-water trawl stations catching cephalopods down to 3500 m were used and correlated with the hot-spot areas of concern. Significantly higher concentrations of *Gonatus fabricii* and related cephalopod species were collected close to our sperm whale hot-spot areas compared to surrounding areas. Thus, sperm whales probably aggregated in these areas due to increased feeding opportunities. Sei whales aggregated in areas with the highest biomass of zooplankton prey in the upper 100-200 m of the water column as documented from meso-zooplankton net hauls in geographically related areas. Favourable topographic features, cold and productive SAIW combined with elevated zooplankton and cephalopod concentrations, probably explain why baleen and toothed whales aggregated in these hot spot areas along the MAR.