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## A MULTIDISCIPLINARY APPROACH TO THE STUDY AND CONSERVATION OF CETACEANS IN THE MEDITERRANEAN SEA

Since the deployment of the first test structures for underwater neutrino detector (NEMO - OnDE) in 2005 and the beginning of the collaboration between INFN and INGV, the scientific community has shown deep interest in biological underwater acoustic signals detected by the EMSO and KM3NeT infrastructures placed on the seafloor of the Western Ionian Sea. Sounds from marine mammals were recognized and scientist took advantages of such a powerful tool to study better and more deeply the life of these animals in the Mediterranean Sea. Most of the cetaceans is located at the top of the food chain and their study helps to understand the state of health of the elements that constitute this chain. For this role in the ecosystem they are also called "umbrella species". They also constitute a "flagship species" for their ability to exert a strong emotional influence on the public to raise its awareness on conservation of biodiversity. Biologists and physicists from different academic and scientific institutions gathered to realize a common project, according to their own competences, to investigate the behaviour, the hunting methods, the social life and other aspects regarding the sperm whales (*Physeter macrocephalus*). This is a protected specie, classified as 'Endangered' from the IUCN (International Union for Conservation of Nature) in the Mediterranean sea and 'Vulnerable' at world level. Starting point is the recognition of the sounds emitted by the animals. They emit sounds called "click", with up to 190 dB and a duration of 10-20 ms, used for hunting, echolocation and for intraspecific communication. The Time Difference of Arrival (TDoA) on the four NEMO-OnDE hydrophones and the click reflections on sea surface allows the determination of sperm whale position. A comparison of the data collected in the years 2005, 2006 and 2012, shows that the activity of sperm whales (measured by the number of clicks emitted) is highest during the daytime. There was a decline in attendance with the increase in vessel traffic, probably due to the increase of environmental noise. Different combinations of clicks represent different ways of socialization. The collection of sound recordings of cetaceans from submarine infrastructure suggests that this part of the sea is a major point of aggregation and transit for cetaceans, and the status of environmental impact is crucial for the conservation of Mediterranean population of the sperm whale.