



## The awkward distribution of fossil whales

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Evolution and ecology of living and extinct cetaceans, including the largest animals of all times, are widely studied. The nature and distribution of their fossil record, key factors to make macroevolutionary and ecological inferences, are however less explored. We carried out a survey of global literature to fill this gap and check for facies control in the taphonomy and distribution of Neogene and Quaternary cetaceans. We built a dataset matching each specimen with sedimentary facies (N = 393) and time interval (N = 511), ranging from the Aquitanian to the Calabrian. We found a strongly skewed distribution of findings, both along a depth gradient (seven facies) and time (five time bins). The majority of fossils are found in offshore facies (mainly mudstones), whereas lowest abundances are associated with shoreface sandstones and bathyal mudstones. To the exclusion of South American specimens, associated with a hypoxic or anoxic setting and high sedimentation rates which stop or dampen carcass degradation, Miocene specimens are preferentially associated with condensed deposits and are more fragmentary in nature. Pliocene specimens are mostly found in offshore sediments. When plotting number of findings per time interval a slight increase is recorded during the Miocene (large increase if including South American specimens), followed by a Pliocene peak of abundances and an awkward drop at the passage to the Pleistocene. A general model is proposed: at offshore depths, carcasses sink, remain on the seafloor due to higher water pressure and are thus preferentially preserved, whereas at shallow depths they resurface and are preferentially destroyed. The poor record of the Pleistocene, already recognized by authors, cannot be attributed to a lack of the proper facies. Instead, we propose that the dramatic size increase of mysticeti triggered a radiation of the bone-eating fauna, typified by polychetes of genus *Osedax*. Whale-fall communities, today capable of destroying a large carcass in oceanic bottoms in a matter of months, were less efficient and confined to deeper settings before the late Piacenzian radiation of gigantic whales.