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Abstract: The spatial and temporal variations of deep-sea megafaunal assemblages from the western Mediterranean are analysed in the present paper. The assemblages from two locations of the Balearic Islands situated 120 km apart were compared using data collected seasonally on a bathymetric stratum covering the 150–750 m depth range during six bottom-trawl surveys. The assemblage structure, in terms of species composition, species dominance and population sizes, was differentially affected by the spatio-temporal variables analysed (depth, location and fishing period). Although depth was the main factor determining the assemblage composition, the differences obtained between the two locations were also relevant. On the upper slope these between-location differences in the dynamics of megafaunal assemblages were found to be related to the effect of fishing exploitation. Population size-based metrics and biomass spectra were good predictors of meso-scale fishing effects, and were mainly reflected by elasmobranchs and demersal teleosts. Nevertheless, the effects of fishing depended on the species considered. Two dominant large-sized fish species found on the upper slope in both localities, *Galeus melastomus* and *Phycis blennoides*, had higher biomass values associated with lower fishing effort. Although the mean body weight (MBW) of both species and also the mean maximum body weight (MMBW) of *G. melastomus* agreed with this pattern, the *P. blennoides* MMBW did not. This last case could be indicative of natural size-trends such as the bigger–deeper phenomenon which refers to the displacement of large individuals towards the deeper limit of their bathymetric distribution, beyond the maximum depth sampled in this study for this species. By contrast, the target species of the upper slope fishery, the red shrimp *Aristeus antennatus*, was not negatively affected by the direct impact of fishing activity and other environmental factors, such as the presence of specific water masses could also be important.

Keywords: Megafaunal communities; Demersal species; Spatial distribution; Fishing impact; Biomass spectra; Deep-sea; Western Mediterranean