

Holocene benthic baseline communities in the northern Adriatic Sea and their collapse due to anthropogenic impact

*Zuschin, Martin (Institut für Paläontologie, Wien, AUT);
Gallmetzer, Ivo (Universität Wien, Wien, AUT);
Haselmair, Alexandra (Universität Wien, Wien, AUT);
Tomašových, Adam (Earth Science Institute, Bratislava, SVK)*

The shallow northern Adriatic Sea has a long history of anthropogenic impact that reaches back many centuries. While the effects of human impact over the past decades were extensively studied, the major ecological turnovers during the entire Holocene remain poorly explored. In this study, we reconstruct ecological baselines defining benthic ecosystem composition prior to major anthropogenic changes. For this purpose we study benthic communities from four 1.5 m long sediment cores, which cover the whole Holocene succession of the northern Adriatic Sea. We discriminate between natural and anthropogenic drivers based on 1) temporal changes in the composition of molluscan communities observed in sediment cores; and 2) changes in concentrations of heavy metals, pollutants, and organic enrichment. The sediment cores cover a broad range of low-sedimentation settings and reach back to the Pleistocene-Holocene boundary allowing for a stratigraphic distinction of the major phases of the Holocene. During the transgressive phase and the maximum flooding zone, sea-level rise, the establishment of the modern circulation pattern, and climatic fluctuations determined the development of benthic communities in shallow-water, vegetated habitats. After sea-level stabilisation, the communities remained relatively unchanged and can be considered as baseline communities that started to change markedly only with the intensification of human impacts in the late high-stand leading to a dominance of infauna and a decline of epifauna at all sites. The trend is paralleled by an increase of suspension-feeding species at the expense of grazers and deposit-feeders. This profound ecological change affects species diversity, life habits and habitat conditions and shows that modern soft-bottom benthic communities, in the northern Adriatic Sea, hardly reflect the high geographic heterogeneity of the pre-anthropogenic benthos.