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Anthropogenic chemical pressure on coastlines over the last century: a European sediment study.

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Marine sediments have been identified as an optimal medium for the preservation of biological and chemical variations within coastal ecosystems. Sediment cores allow us to reconstruct and demonstrate the impact of human activities, both past and present, on a range of spatial and temporal scales. As part of the European BIOcean5D project and in parallel with the TREC (Traversing European Coastlines) expedition led by EMBL, sediment cores were obtained from fifteen contrasting ecosystems across ten European countries. Sites selection was driven by the overarching objective of addressing the broader issue of the impact of human activities on European coastal biological communities.

The study discloses the presence of chemical contamination, a consequence of the escalating human activity that has transpired over the past century. Metal concentrations (e.g. Hg, Pb, Cd, Cu, Zn, Ag and TCEs) demonstrate significant contamination in areas proximate to heavy industry (e.g. Bilbao and Athens), as well as considerable variations in concentrations in ports and semi-enclosed areas (e.g. the Thau lagoon and Barcelona). Conversely, French coastlines exhibit no or low alteration in concentrations associated with human activity. An in-depth analysis of stable Cu, Zn and Pb isotopes was carried out in certain areas to try to identify the sources of contamination. For the first time on a European scale, combining the information gathered on metal contamination with additional information on other anthropogenic pollutants, such as PFAS, together with multi-omic analyses, will make it possible to assess the impact of various human polluting activities (e.g. agriculture, urbanisation, industry...) on European coastal biological communities from the 19th-century industrial revolution to the present day.