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Linking macrobenthic fauna and seismic facies to improve stratigraphic reconstructions: the case of the Mid Adriatic Depression since the late glacial period (Central Adriatic Sea)

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Direct observations from the geologic record are commonly used in conjunction with indirect seismo-stratigraphic inferences to detail environmental settings and stratal architecture of sedimentary successions. However, examples of integration between seismic facies and macrobenthic insights are scarce and limited to the use of such a group as auxiliary to other proxies. This case study investigated mollusc and ostracod dynamics along an onshore-offshore profile that intersects the C₂ clinothem (15.6 – 14.4 ky BP) of the Po River Lowstand Wedge (PRLW) and the overlying transgressive deposits formed in the central Adriatic Sea. Multivariate analyses were applied to benthic data to assess to what extent mollusc and ostracod assemblages can improve the resolution of seismic-derived depositional environments and stratigraphic architecture of cored succession. Along the profile of the C₂ clinothem, seismic reflection facies correspond with three sedimentary environments. Specifically, i) High Amplitude Continuous reflections (HAC) are interpreted as delta plain/subaqueous shelf; ii) High Amplitude Continuous Wavy Dipping reflections (HACWDip) characterize prodelta deposits, and iii) Low Amplitude Continuous reflections (LAC) are associated with distal basin settings. The integration of quantitative palaeoecologic trends with the seismic-derived depositional environments allowed the subdivision of the HAC facies into a proximal (core LSD-26) and a distal (cores LSD-27 and -28) area. In particular, the proximal area with HAC seismic facies encompasses semi-barred lower delta plain with vegetated substrates that evolves to more open, nearshore settings. Conversely, the distal area with HAC seismic facies is distinguished by clusters reminiscent of ecological mixing due to strong bioturbation and gravity flows in offshore transition/inner shelf settings. The paucity of benthic fauna for the units with HACWDip (core LSD-05) and LAC (core LSD-04) seismic facies, hampered a complete reconstruction of the palaeoenvironmental dynamics. However, both benthic groups investigated support the seismic-derived interpretation of shelf and basinal settings respectively, both subjected to high sedimentation rates. Moreover, the integration of mollusc and ostracod multivariate-derived trends with grain-size data across the study profile reveals distinctive stratal stacking patterns useful in constraining the position of key stratigraphic surfaces such as the Maximum Regressive Surface that marks the initial phase of the

abandonment of the PRLW.