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3D Seismic geomorphology to understand relations between turbidite systems and tectonically induced seafloor morphology in the Plio-Pleistocene fill of the Po Plain (Northern Italy)

Mauro Galbiati (1), Vincenzo Pozzovivo (2), Massimiliano Barchi (3), and Patrizia Rocchini (4)

(1) eni UK, London, UK (mauro.galbiati@eni.com), (2) STOGIT S.p.A., Crema, Italy, (3) Universita' di Perugia, Dip. di Scienze della Terra, Perugia, Italy., (4) eni e&p, S. Donato milanese, Italy

Seismic geomorphology, the application of geomorphological analysis to seismic images seen in a map view and extracted along time conformable surfaces, has been widely used in the oil industry as a tool to analyze potential prospects and reservoir bodies. In this study, we used a seismic geomorphologic approach to analyze the evolution of a turbidite system in the subsurface of the Po Plain (northern Italy) and to understand the relationship between depositional systems and underlying tectonic structures in the Plio-Pleistocene. The recent acquisition of a set of high quality 3D seismic surveys sheds a new light on an area whose depositional systems were known mostly through 2D seismic and well data. The new data provide a spectacular and extensive view of sedimentary bodies and their evolution, revealing the complexity of known depositional systems. The Po Plain section of the Periadriatic foredeep was filled by an episutural sequence of Plio-Pleistocene age, mostly comprising turbiditic systems that were deposited over a tectonically mobile floor. Our study area is located in the mid-western section of the Plain, within a structurally complex region where the diachronous, opposite-verging South-Alpine and Norhern Appennines thrust belts come into contact. In its subsurface, three anticlines related to the upward propagation of blind thrusts conditioned the deposition of a turbidite system sourced by a set of entry points located to its North West. The turbidite systems evolved through five main stages, from a syn-tectonic, fill-and-spill ponded basin environment, to an unconfined basin environment filled by the progradation of a slope turbidite system. We also detail and discuss the subtle control exerted by the basin topography on the depositional systems, showing a constant competition between turbidite infill, compaction and tectonic activity.