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Geological modeling of a potential site suitable for CO_2 geological storage

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Among the activities that OGS is carrying out on the CO_2 geological storage, the geological modeling of potential sites plays a leading role. Since several years OGS studies are addressed to the Northern Adriatic sea, since it represents one of the most suitable areas in the Italian subsoil for the application of the CCS techniques.
The study area lies in front of the Apennine foredeep, a large and elongated basin stretching parallel to the structural axes of the Apennines. The sedimentary succession is constituted by Miocene to Pleistocene turbidite deposits, whose total thickness varies from hundred to thousands of meters.
The potential reservoir is represented by a Pliocene geological formation, well known in the hydrocarbon exploration, since it commonly hosts natural gas fields. From the structural point of view, the structure is a gentle anticline, located in correspondence to the outermost front of the Northern Apennine accretionary prism. It is suggested that it formed as a consequence of a compressional event which have involved the entire Miocene-Pliocene succession: the top of the Miocene sequence acted as the major decollement surface. In the selected structure, the reservoir formation is about 2000 m thick and is formed by banks of fine sands, each of them being up to 50 m thick, with some clay intercalations. Porosities can reach 30%, in places. The caprock is constituted by 1100 m of almost pure, undeformed, clays. The seismo-stratigraphic and structural analysis of multichannel seismic profiles, through the correlation of boreholes drilled in the area, led to the building of 3D geological model of the structure. The potential reservoir is totally (landward) or partially (toward the foredeep) bounded by major thrust faults. Its internal structure does not reveal any fault-bounded compartment, suggesting that no major overpressure conditions would be reached after CO_2 injection.