



Large landslide along the Adriatic coastline in Southern Italy

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The Adriatic coast of Italy between Pescara and Termoli is affected by several historical large and deep landslides located in Fossacesia, Torino di Sangro, Casalbordino and Petacciato that apparently show similar geological and morphological features (Cancelli et al., 1984; Esu & Grisolia, 1991; Guerricchio & Melidoro, 1996). Their reactivation damaged strategic national infrastructures linking north and south Italy, like the Adriatic motorway and railway. Therefore, these landslide events can severely affect the national and regional economy, blocking the main transport infrastructures.

These landslides involve Plio-Pleistocene marine blue-grey silty-clay deposits filling the foredeep system of the Apennines outcrops (Patacca & Scandone, 2004). These deposits were subject to tectonic uplift, causing a typical regressive sequence, whereas sands and conglomerates constitute the topping layers of the marine sequence. Deposits are overconsolidated clays interbedded with silty-sandy layers, one to ten centimeters thick, sometimes filled with high pressurized flowing water. These landslides are activated by prolonged rainfall periods, but an interesting common feature to all these landslides is that they seem not to be solely triggered by particular rainfall events, i.e. high return period precipitation. In fact, reactivations do not necessarily follow abundant rainfall periods, which can be considered one triggering factor among others (Fiorillo, 2003).

It is noteworthy that the Adriatic sea is not deep, therefore potential erosive actions are very secondary triggering factors of coastal landslides. For this reason, a geomorphological analysis of the coast is here linked with structural analysis. In particular the position of these landslides is investigated, looking at the buried front of the Apennines (Patacca e Scandone, 2007). This analysis shows that these landslides may be conditioned by the advanced thrust of allochthonous deposits of the Apennine chain (Patacca & Scandone 2007). In fact the landslides are located just where the buried front of the allochthonous thrust are more advanced. So these thrust with their horizontal stress deform and uplift the foredeep deposit favouring their collapse (Guerricchio, 1988; 1990) toward the coast. The presence of this complex of tectonic stresses affects the stability of these slopes, in particular whereas other factors occur, i.e. abundant rainfall.

Cancelli A., Pellegrini M., Tonnetti G. (1984) Geological features of landslides along the Adriatic coast (Central Italy). In Proc. Int. Symp. on Landslides, Toronto, 2:7-17.

Esu F., Grisolia M., (1991) La stabilità dei pendii costieri adriatici tra Ancona e Vasto. In "Frane costiere", University of Rome "La Sapienza", Pubbl. n.464 of G.N.D.C.I. - CNR, 51-79.

Fiorillo F. (2003) Geological features and landslide mechanisms of an unstable coastal slope (Petacciato, Italy), Eng. Geol., 67(3-4): 255-267. doi:10.1016/S0013-7952(02)00184-9.

Guerricchio A., (1988) Aspetti geologici dell'erosione dei litorali e loro influenza nel campo applicativo. Geol. Appl. E Idrog., XXIII, Bari, Italy, pp. 29-78.

Guerricchio A., (1990) Cause tettoniche nella deviazione dei fiumi adriatici. In proceedings of the XXII National Conference of Hydraulics and Hydraulic Engineering, 4-7th October 1990, Cosenza, Italy, pp. 1-19.

Guerricchio A., Melidoro G. (1996) Rischi da grandi frane nella fascia costiera adriatica (Large Landslide Hazard along the Adriatic coastline). In Proc. of Prevention of Hydrogeological Hazard: the role of Scientific Research, Italian National Research Council (CNR,) 5-7th November 1996, Alba (Italy), 1, 317-330.

Guerricchio A., Melidoro G., Simeone V. (1996) Le grandi frane di Petacciato sul versante costiero adriatico (The large landslides of Petacciato on the Adriatic coastline). Mem. Soc. Geol. It., 51(2):607-632.

Patacca E., Scandone P. (2004) The Plio-Pleistocene thrust belt – foredeep system in the Southern Apennines and Sicily (Italy) – 32° Int. Geol. Conf., Florence, Special Volume of the Italian Geological Society; Crescenti, D'Offizi, Merlino, Sacchi eds., Rome.

Patacca E., Scandone P. (2007) Geology of the Southern Apennines. In Mazzotti A., Patacca E., P. (Eds), "Results of the CROP Project, Sub-project CROP-04 So, Spec. Issue 7(2007), 75-119.