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Morpho-structural evidences of active faulting in the Lunigiana Plio-Quaternary Graben (Northern Tuscany, Italy).

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We report on the preliminary results of an experiment aimed at exploiting aerial photographs interpretation (API) techniques, DTM analysis, and field surveys to prepare morpho-structural maps along active faults. The area selected for the experiment extends for 400 square kilometres in Lunigiana, Tuscany, northern Italy. The Lunigiana Plio-Quaternary graben is the northernmost section of the Etrurian Fault system (EFS), a NW-SE trending arrangement of active extensional faults and intra-mountain basins, Late Pliocene to Holocene in age, that develops for nearly 300 km along the inner side of the Apennines mountain chain. Through the interpretation of seismic lines, it has been determined that normal faults belonging to EFS root at shallow depth on a low-angle (mean dip $<30^\circ$ with local $<10^\circ$ flat), E-dipping detachment plane that gradually deepens under the Apennines, down to a depth of approximately 12 to 14 km. Where seismological data, the geometry of the EFS and the associated deformation are well constrained (e.g., in northern Umbria), a direct correlation between the extensional fault system and seismicity has been established. Based on this information, the Lunigiana Plio-Quaternary basin represents an interesting case study. In the area, the geometry of the extensional fault systems is well ascertained on the surface and at depth, and it is coherent with the described structural setting. Nevertheless, the location of the main seismogenic faults, their degree of activity, the associated strain rates, and the maximum seismic potential remain largely undetermined. Furthermore, lack of reliable instrumental seismological data, very low slip rates, and poor exposures in the Plio-Quaternary sediments, make the identification of active and possibly seismogenic faults problematic. We have attempted to bridge this gap by integrating the results of a geological and geomorphological survey with the analy-

sis of a medium resolution DTM available for the study area. Field geology, API and DTM analysis allowed mapping the surface expression of several high-angle, NW-SE trending extensional faults and faults sets (FS), some of which were not previously recognized. Faults and faults sets dip differently in the study area. Along the western side of the Lunigiana basin (i.e., M. Picchiara-M. Grosso FS; Arzelato-Tresana-Aulla FS, and Mulazzo-Villafranca-Olivola FS) individual faults and FS dip towards E, whereas along the eastern side of the basin (i.e., Arzengio-Serravalle, Mocrone-Bagnone FS, and Groppodalosio-Compione-Comano FS) faults and FS dip towards W. East-dipping faults show generally higher displacements and lower dip-angles than the antithetical west-dipping ones. Care was given to the identification and mapping of geomorphological features indicating (or suggesting) very recent fault activity, including fresh scarps, trenches, triangular facets, deflected streams, and other drainage network anomalies. Comparison between fault-displacement variation, reconstructed through closely spaced geological sections, and offset of the present topography across faults, provided further information on the activity and timing of the considered structures. A summary scheme of the Quaternary, possibly active normal faults reproducing their segmentation pattern is proposed.