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data show areas affected by two peculiar geomorphological settings: 1) where flat thrust surfaces outcrop, complex slopes affected by trenches, doubled ridges, great and small scarps, large counterslopes, rotated and disjointed carbonate blocks rafted on a clayey-marly substratum, are situated; 2) but where carbonate units come into lateral contact with clayey-marly units through high-angle faults, broad fault/fault-line scarps hundred meters high bound carbonate top areas affected by doubled ridged, depression alignments, river valleys truncated at their head, open or filled tension cracks and small trenches or more deep trenches from which great carbonate blocks are isolated. Anyway, bulging and a number of surface landslides at the foot slope involve the clayey-marly outcroppings.
In the first case, the recognized forms indicate the existing of topples, lateral spreads in brittle rock overlying ductile rock, differential settlements and block-movements; in the second case, the geomorphological data show the presence of collapsed areas and lateral spreads in brittle homogenous rocks. Finally, data analysis suggests two different morphoevolutive models. Where the tectonic superposition of carbonate bodies above clayey-marly rocks is, the triggering of the DSGSD phenomena is subsequent to the outcropping of the flat thrust planes and to the exhumation of the underlying clayey-marly rocks due to block-faulting and/or stream incision, accompanied by selective erosion; so, in marginal areas, (a) a strong denudation of clayey-marly slopes and a consequent undercutting of the carbonate slope foot are developed, (b) subsequent falls, topples and lateral spreads evolving to block-movements, affect the carbonate bodies and (c) bulging and a lot of flows and slides involve the clayey-marly substratum; while, in the inner areas, (d) differential settlements are produced. Where some hundred of meters thick of only carbonate rocks are, the development of the DSGSD phenomena is conditioned to high relative altitude produced by the concurrent action of Quaternary tectonic dislocations and river deepening, associated with selective erosion; so, in marginal areas, (a) falls, topples and lateral spreads on great carbonate scarps are developed and (b) bulging and a number of flows and slides affect the clayey-marly slopes below; while, in the inner areas, (c) the collapse of top areas occurs.

T35-5 Orale Disperati, Leonardo

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THE CORNIGLIO LANDSLIDE AREA (PARMA, ITALY): EVIDENCES FOR A DEEP SEATED GRAVITATIONAL SLOPE DEFORMATION

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Key terms: photogeology; Deep-seated Gravitational Slope Deformation; trench; multitemporal analysis

The Corniglio landslide (CL) is one of the most significant landslides in the Northern Apennines spreading over an area of about 3 km x 1 km close to the Corniglio village (Pr, Italy). It is an active composite retrogressive landslide where deep-seated sliding deformation develops together with shallower earth slumps. Geophysical surveys from the literature suggested the occurrence of high deformation phenomena up to the depth of about 120 m.
A geomorphologic survey and photogeologic interpretation were performed along with ground displacement monitoring related to the last 30 years in order to study reasonable relationships among the CL and other large scale gravitational processes within the study area.
The state of activity from 1978 to 2005 was analysed by evaluating the displacement of homologous ground targets on multitemporal orthophotographs related to 1988, 1994, 1996, 1998, 2005 and a Quickbird satellite imagery related to 2003. This set of remote sensing data was registered to the Regione Emila Romagna topographic map of year 1978, at the scale of 1:5,000. Periods of little or no activity separated by rapid and occasionally dramatic sliding (e.g. the October-November 1996 event with ground displacements of more than 30 m) were recognized.
These investigations allowed us to suppose the main triggering factors for reactivation of the CL. Heavy rainfalls of October-November 1994 and October 1998 occurred before reactivations of the end of 1994 and 1998. Moreover, low - medium intensity (from 2.2 to 5.4 Richter magnitude) seismic events were recorded within the Emilia Apennines before reactivations of January and October 1996.
The CL has been referred to as a complex landslide. However, the fieldwork and photogeologic interpretation suggested an alternative model for the gravitational evolution of the study area.
The hill among the Bratica river (east), the CL (west) and the Parma river (north), where is located the Corniglio village, is made up, from the bottom, of the "Argille e Calcari" and the "Arenarie del Bratica" formations (Canetolo Unit, Eocene-Oligocene), tectonically covered by the marly limestones flysch of the Mt. Caio Unit (Late Cretaceous).
The local occurrence of the rigid behaviour lithotypes of Mt. Caio flysch and "Arenarie del Bratica" (sandstones) over the plastic low - shear strength "Argille e Calcari" (marly clays, outcropping close to the Parma river valley), may represent a critical configuration for the stability of the area.
Moreover, the above considered hill is affected by relevant east-west trending lineaments, involving also the Corniglio village, which toward south originate a near-vertical trench where the Mt. Caio flysch is thrown down to the north of the trench. This trench is bounded to the east by the Bratica river, while to the west by the CL main scarp area, where also the Mt. Caio flysch thrust converges.
This framework suggests that the CL may be part of a larger deep seated gravitational slope deformation also including the hill among the Bratica river, the CL main body and the Parma river.

T35-6 Orale Gori, Stefano

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THE INFLUENCE OF THE STRUCTURAL SETTING OF MOUNTAIN SLOPES ON THE EVOLUTION OF LARGE SCALE GRAVITATIONAL DEFORMATIONS

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Key terms: active tectonics; structural setting; large scale gravitational deformations

This work aims to add data useful to decipher the relationship between active normal faulting and the onset of large scale gravitational movements.
The genesis and the evolution of large scale gravitational slope deformations is the result of the interaction of several factors among which the structural setting, the local relief, the tectonic activity and the seismicity play a primary role.
We deal with the cases of the Mt. Morrone and the Mt. Porrara ridges, two of the outermost Neogene thrust-related anticlines of the central Apennines chain (Abruzzi Apennines), in order to define the influence on the onset of these gravitational phenomena of the structural setting of mountain slopes affected by active normal faults potentially responsible for high magnitude (6.5-7) seismic events.
Field surveys have been performed along the Mt. Morrone southwestern slope which is affected by a ~21 km long active normal fault system (MF) made of two parallel normal fault segments. Deep seated gravitational deformations affect the same slope. In particular, the southernmost sector of the relief displays a double crest which probably represents the gravitational response to the increase of the relief energy determined by the activity of the westernmost Mt. Morrone fault branch. The deformation is driven by a sliding plane which coincides at surface with two different, normal fault planes, i.e. the easternmost Mt. Morrone fault branch (~N150° trending, ~75° dipping) and a normal fault (~N130° trending, ~60° dipping) which represents a segment of a complex, ~20 km long active normal fault system (CGP), made of en-echelon arranged fault branches affecting the Campo di Giove plain, the southern slope of the Maiella Massif and the Mt. Porrara southwestern slope. Studies focused on the definition of the geometrical and kinematical characteristics of the CGP fault are in progress. A landslide scarp is superimposed on the central part of the double crest, where the breached tip zones of the two mentioned tectonic structures interact. The accumulation related to this scarp is represented by a huge landslide known as "Pacentro paleolandslide".
Our observations allow us to hypothesize that the paroxistic evolution the deformation, resulting in the Pacentro paleolandslide, was favoured by the intense fracturing of the rock mass comprised between the breached fault tip zones and probably triggered by an earthquake originated along one of the faults.
Further segments of the CGP fault system affect the western slope of Mt. Porrara. One of these branches can be detected at the base of the slope. The activity of this tectonic structure has been responsible for the increase of the local relief which triggered deep seated gravitational deformations along the Mt. Porrara western slope whose sliding surface coincides at surface with two en-echelon arranged fault of the CGP fault system.
These observations allow to hypothesize that the Campo di Giove and the Quarto Santa Chiara plains, the formation of which is probably due to the activity of the CGP fault system, might have originated as a single, narrow depression located between Mt. Porrara and Mt Pizzalto which may have been subsequently divided into two separated basins because of the onset of the Mt. Porrara slope deformations, determining the development of distinct drainage networks.
Hence, our results indicate that the mentioned normal fault systems played an active role in the genesis of large scale gravitational deformations and that the structural and geometrical characteristics of the active normal faults has influenced the gravitational phenomena evolution which, in agreement with the current views, may result in rapid, catastrophic mass movements.

T35-7 Orale Melelli, Laura

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NEW CRITERIA TO DEFINE A SUSCEPTIBILITY MAP IN CENTRAL ITALY OF DSGSD PHENOMENA

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Key terms: DSGSD; Spectral Mixing Analysis; Shuttle Radar Topography Mission; Central Apennines

Most of the DSGSD studied cases in Italy shows evidences related to a main activity in the Pliocene-Pleistocene age, characterized by an abrupt isostatic uplift. Actually, only during high seismic events, some DSGSD show evidences of reactivations.
In this context, the central Apennines, as the results of a very complex geologic and geomorphologic history, show high values of relief energy, making possible a widespread natural hazard related to DSGSD. Moreover the presence of DSGSD in central Apennines is well known in literature since '80s even if several lacking areas are present also in physiographic regions with typical triggering morphologic and geologic conditions.
In order to better characterize topography affected by DSGSD in the central Apennine, SRTM data combined with Spectral Mixing Analysis (SMA) of the Landsat ETM+ are used. The SMA uses a linear mixture model to provide a physical basis for a more detailed representation of land surface reflectance as mixture of endmembers. The topographic algorithm employed to derive these insights is not intended for use in site-specific analyses of DSGSD potential but instead identify slopes whose morphology is indicative of deep seated phenomena. The topographic DSGSD signature is determined by different topographic parameters such as slope, relief, aspect and curvature which can be used as a DSGSD index degree. To characterize important physical properties of the aforesaid signature was used the linear mixing model between the dark surface endmember and both the substrate and vegetation endmembers. That model highlights the extent to which shadowing and nonreflective surfaces, combined with illuminated substrate and vegetation at subpixel scale, can modulate spectrally mixed ETM+ reflectances in a ridge topography within the DSGSD signature. The final results indicate that when