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incorporated with optical SMA of the Landsat ETM+, the SRTM analysis should improve the capacity for mapping and identifying DSGSD in specific landscapes.
The preliminary key results of this research are:
1) the identification of areas potentially affected by DSGSD still not detected,
2) the division of central Apennines in areas with an increasing DSGSD degree value,
3) the correlation of the identified areas with geologic and geomorphometric parameters characteristic of the phenomena.

T35-8 Orale Moro, Marco

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SETTING NEW TOOLS TO QUANTIFY THE TECTONIC AND GRAVITY CONTRIBUTION IN SEISMOGENIC AREAS.

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Key terms: DSGSD; DInSAR-SBAS; paleoseismologic techniques; central Apennines; active tectonic

A multidisciplinary approach to study surficial effects generated by large scale tectonic and gravitational deformations through DInSAR-SBAS tecnique, photogeology and ground based data is proposed. The morphostructural elements inherited by tectonics and by DSGSD (Deep Seated Gravitative Slope Deformations) have been analyzed to understand their single contribution in the landscape morphologic evolution. The multidisciplinary approach allowed to recognize geomorphologic pattern of deformation and to quantify the surface movement, integrating qualitative observations with quantitative data. This approach will provide the input parameters for the static/dynamic numeric models of the phenomena. The investigated areas, selected on the base of their geological-structural setting, the presence of active faults and considering the distribution of the instrumental and historic seismicity, are located in the central Apennines: the east sector of the Fucino plain (Serrone-Parasano structure) and the east sector of the Colfiorito plain (Prefoglio structure).
A detailed photogeological analysis on the Volo Italia (1987-1988) dataset, supported by SPOT images, 20m pixel-size DEM and paleoseismologic techniques, have been performed in these areas. The aim of this approach is to detect and to quantify soil deformation patterns related to tectonic and gravitational causes. The investigated areas clearly pointed out DSGSD coinciding with active faults. The displacement patterns derived from DInSAR-SBAS have been compared with results from abovementioned data. Therefore the proposed approach allowed to characterize the kinematic features of active deformations following their temporal evolution.
In particular, in the eastern portion of the Fucino plain DInSAR-SBAS technique allowed to measure in the last ten years topographic deformations with 2 mm/yr uncertainty and a spatial resolution of 80 m per pixel. Average movements detected in these areas are of about 5 mm/yr. Furthermore, paleoseismologic trenches performed along the main sliding surface and along the antithetic one of the Serrone DSGSD, probably indicated instantaneous movements which may have been triggered by paleoearthquakes related to the seismogenic structure responsible for the 1915 Avezzano earthquake.
The second sector represented by the eastern portion of the Colfiorito plain shows the reactivation during the 1997 Umbria-Marche earthquake of DSGSD located close to its eastern edge, verifying the seismic triggering of DSGSD previously hypothesized by many authors.

T35-9 Orale Pambianchi, Gilberto

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DEEP-SEATED GRAVITATIONAL SLOPE DEFORMATION IN THE GEOMORPHOLOGICAL EVOLUTION OF THE CENTRAL APENNINES, ITALY.

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Key terms: deep-seated gravitational slope deformations (DGSD); geomorphological evolution; Central Apennines

The role played in the evolution of the relief by deep-seated gravitational deformations along slopes, has been pointed out by several authors who analysed their typology and distribution in different geological and geomorphological conditions.
These phenomena are particularly frequent in Italy, where they have been favoured by the high relief, the complex geologic structure, the tectonic and seismical activity, and the frequence of extreme rainfall characterising its territory. Some of them evolved into huge landslides of different type, frequently associated to elevated hazard conditions.
The present work investigates a portion of the central Apennines. This is formed prevalently of calcareous, marly and arenaceous terrains, characterized by a complex folds and thrusts arcuate belt with north-east vergence, as a consequence of the Neogene compressional tectonics which involved the thick sedimentary sequence.
Extensional tectonics and generalized uplift affected most of the area in Pliocene-Quaternary times, dissecting the ancient summital surface and producing high fault slopes, deep cut valleys, tilting phenomena and flexures. Today the extensional tectonics is still active in the apenninic area; whereas the compressional activity is located along the Adriatic coast as testified by both geological evidence and the focal mechanism of earthquakes.
Along fault scarps and steep erosional slopes, deep-seated gravitational deformations of different types and large-scale landslides (up to several square kilometres wide) were activated.
The distribution and typology of the gravitational phenomena are correlated with the lithostratigraphic, structural and hydrogeological features of the terrains, and above all with the Quaternary tectonic and geomorphological evolution of the area, the main factors responsables for the evolution of the landscape.
These phenomena are very frequent in the axial part of the Apennines, which underwent the maximum uplift and extensional tectonics. In this area, at present day characterized by important anthropic works and infrastructures (roads, dams, aqueducts, gas pipeline, etc□), the interpretation of gravitational deformations have sometimes permit to point out some complex geological setting and to clarify relevant geomorphological features of the landscape.

T35-10 Orale Simeone, Vincenzo

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LARGE SPREADING TRIGGERED BY LIQUEFACTION IN SANDS LENS IN ROSARNO (RC) AREA

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Key terms: Large spreading; Liquefaction; Earthquake; DGPV

In the area of Rosarno (RC, Italy), a wide tabular area is characterized by a peculiar morphology showing undulations perpendicular to the coast line. In literature (Guerrichio et Al. 2001) the cause of this morphology has been presumed to reside in deep lateral spreading phenomena, induced by sand liquefaction at great depths (more than 60-70 m). Even if the plain of Rosarno is characterized by the presence of potentially liquefiable sands (as reported in historical documentation of the earthquakes of Calabria 1783 when sand liquefaction phenomena took place), usually this phenomena occur at depths no greater than 10-15 m.
A study has been then developed by means of a numerical simulation. In particular a section was built that could represent the geo-structural assets in the area before the landslide. The area was indeed constituted by a wide plain terrace ending with a relatively gentle scarp and groundwater level at a depth of about 70 m. The study has been developed by means of software FLAC that allow to analyze the movements of the slope modeled as a quasi-continuous body obtain a deformed shape of the slope profile which can be compared against the real morphological soil profile. Also in this case it was possible to point out that the presence of the liquefied sandy layer was a necessary condition for the earthquake to trigger the instability. However the final slope profile obtained by the simulation was more similar to an earth flow than to the real topographic profile, characterized by a series of dunes that could be interpreted, from a morphological point of view, as a succession of horst and graben following an earth block slide. The good result was in having found the triggering conditions of a landslide movement with equivalent size to those theoretically estimated but with a striking dissimilarity in the slope profile deformation between simulation and real situation.
It was then conjectured that liquefaction occur in local lenses and not globally involving the entire sandy layer, and that the liquefied material in these lenses kept separated during the event. This last hypothesis is considered unlikely in literature (Seed 1968), where conjuction of lenses is theorized during the event right after their beginning. However only assuming that the lenses kept separated, it could be obtained in the simulation a type of motion resembling an earth block slide, characterized by a terrace translating and descending not uniformly and generating a number of horst and graben equal to the number of liquefied sand lenses. That was the situation that could be noticed on site.
At last attention was paid to the investigate how was it possible to have sand liquefaction phenomena at great depths where litho-static load are relevant. The explanation comes by observing some problems affecting earth dams. Whereas compaction is not sufficient (likely even in young and thick sand deposits, like those in the area) it is possible for wet seeks to form, that is wet cicatrices. The latter are zones of material having poor mechanical characteristics packed within stratified deposits. Their resistance is guaranteed by the set up of an arch effect that could occur when layers with good mechanical characteristics stratify over a poorer material. As a consequence of the formation of arch effects, litho-static burden does not load uniformly the underlying layer that could thus be characterized by a low tensional state. Under these hypothesis is thus possible that these lenses undergo liquefaction even if bounded at great depths and allow for activation of wide lateral spreading that develop along the ensamble of these lenses of liquefied material.

T35-11 Poster Aiello, Gemma

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DEEP GRAVITATIONAL PROCESSES IN THE MARATEA VALLEY (SOUTHERN ITALY): EVIDENCES FROM HIGH RESOLUTION SEISMIC REFLECTION PROFILES

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Key terms: Maratea Valley; deep gravitational processes; high resolution seismics

The Maratea valley (Calabria) is characterized by deep gravitational movements involving Mesozoic calcareous-dolomitic formations ("Alburno-Cervati" and "Bulgheria-Verbicaro" tectonic units), interpreted as sackung-type phenomena. The complex morphostructural setting of the area has been influenced by Pleistocene extensional tectonics, probably still active. Tectonic dislocations, probably characterized by regional strike-slip component, have allowed in the past the superimposition of the Bulgheria-Verbicaro unit on the "Crete Nere" Formation and the tectonic contact of the last formation with the Alburno-Cervati unit, cropping out at the right flank of the valley. Normal faulting, block rotations and structural widening of the valley are produced as