Geophysical Research Abstracts
Vol. 20, EGU2018-17000, 2018
EGU General Assembly 2018

Landsliding Evolution of a Coastal Slope in Central Italy (Vasto, Ch) related to Climate changes from Middle – Pleistocene to the present

Daniele Taddei (1) and Rosamaria Trizzino (2)

(2) Italian National Research Council, IRPI, Bari, Italy (r.trizzino@ba.irpi.cnr.it), (1) University of Murcia, Murcia, Spain)

As stated in many issues, the climate a leading cause of triggering and evolution of mass movements. Differently from other triggering factors the climatic factors can be well defined for the past and forecasted in the short and medium term. Therefore, the recognition of the climatic trends related to geomorphological and hydrogeological modifications allows for a prevision of landslides and other impacts on human life.
The Fourth Assessment Report (AR4) on Climate Change (IPCC) predicts that the global sea level will rise of $\sim$ 60 cm by the year 2100 in response to the warming of the oceans and melting of glaciers. This could have a significant impact on the evolution of the environment if we take into account that coastal areas house approximately 10% of the world population.
This paper describes an example of how climate change, and all possible related effects, played a driving role on the triggering and evolution of a huge landslide.
The studied area is the coastal slope of the town of Vasto (Abruzzo, Central Italy) recently affected by numerous landslide reactivations. The landslide body extends for 2 km2 from the crown zone (at about 150 m a.s.l.) towards the coastal line. The deep-seated gravitational deformations and large landslides with submarine foots observed on the Vasto coastline are typical of mass movements occurring along the Adriatic coast, in the Plio-Pleistocene sequences represented by clays, sands and conglomerates with continental deposits covers.
This study shows that the historical reactivations of the landslide, as well as its scarp retrogression, are related to transients destabilizing factors such as rainfall or snow-melting whereas oldest and deeper mass movements were caused by various eustatic fluctuations in sea level, starting from the emergence of the slope in the middle Pleistocene, where the sub-aerial phase of the transgressive marine succession began.
A paleo-morphologic reconstruction of the slope enabled to correlate the numerous instabilities over time to the fluctuations in the level of the Adriatic Sea from the Middle Pleistocene to the present.
For a more complete study, it was necessary to reconstruct a "geological-evolutionary model of the slope" that could explain the current stratigraphic features and the actual landsliding framework. The evolutionary model has been useful to understand and explain how the variation in sea level due to climate changes and the simultaneous lifting of the area conditioned the present morphology of the hillside, predisposing the slope to a widespread landsliding. The results of geological-evolutionary model of the slope were validated using a Finite Elements stress-strain analysis carried out by means of the FLAC 6.0 calculation code. The stress-strain numerical simulations show that the first activation of the landslide Vasto would have taken about 200,000 years ago at a rapid rising of sea level.
In conclusion, the landslide mass currently observable reflects a phenomenon of instability which was fully activated approximately 200,000 years ago, in correspondence with a phase of high marine station. This instability continued to evolve with local events up to the present day.