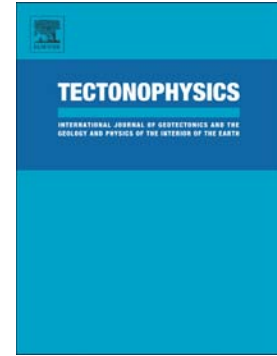


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Earthquake-triggered soft-sediment deformation structures (seismites) in travertine deposits

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Abstract

Earthquakes-related soft-sediment deformations (seismites) are relevant structures to help reconstructing the palaeoseismicity in a region. Nevertheless, although seismites have been described for a large variety of palaeo-environments and stratigraphic settings, they are rare and, in some cases, ambiguous structures. In this paper, we document, for the first time, impressive seismites affecting a latest Quaternary travertine deposit located in southern Tuscany (Serre di Rapolano, Italy). These structures are extremely relevant, as seismites have been never described for this kind of terrestrial deposits. The seismites developed within a 2.5 m thick stratigraphic succession made of alternating terrigenous and carbonate sediments, embedded within the travertine deposits. Earthquake produced liquefaction and fluidization of some terrigenous levels and the injection of fluidized silty sediments (dykes and sills) into carbonate and terrigenous levels; slumped levels and associated decollement surfaces produced highly non-cylindrical folds, overall induced by the loss of brittle shear strength along the basin slopes. The occurrence of these soft-sediment deformations implies an important seismic event that took place in a time span encompassed between 84 ± 8 and 48.92 ± 5.08 ka, in an area characterized by low seismicity and scarce knowledge of its seismotectonic setting. Their spectacular exposition and preservation in saw-cuts of an abandoned quarry (Cava Oliviera quarry) highlights their relevance and importance.

Key words

Soft-sediment deformation, travertine, seismites, earthquake, neotectonics

1. Introduction

It is known that soft-sediment deformation is a process affecting water-saturated, poorly consolidated sediments, induced by the loss, or drastic decrease, of shear strength (Owen, 1987). Shear strength decreasing is, in turn, consequence of the sudden increase of pore-water pressure and, at the same time, triggers liquefaction and fluidization processes within sediments. Such a processes are common in several

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