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Very high-resolution reflection seismics as a tool for the study of mixed siliciclastic-volcaniclastic environments

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In the last decades high resolution seismic stratigraphy and sequence stratigraphic analysis have been increasingly utilized for the study of continental margins. Although sequence stratigraphic concepts have been applied mainly to marine siliciclastic environments, a general consensus has emerged in the last years regarding the application of modern sequence stratigraphy to mixed siliciclastic-volcaniclastic environments. Concepts originally developed in the outcrop are now being successfully applied to subsurface data sets and are providing a greatly improved understanding of facies geometries and stratigraphic architecture.
In this study we present selected results from the interpretation of a series of high resolution seismic grids recently acquired off the Campania volcanic margin (SW Italy). Seismic data consist of single-channel and multichannel reflection records from the Naples bay, off the volcanic district of Campi Flegrei and from the Northern Salerno Bay, off the Amalfi cliffed coasts.
The results of the research off the Campi Flegrei include the recognition of the main offshore segments of the ring fault system associated with the development of the Neapolitan Yellow Tuff (NYT) caldera (ca. 15 ka BP), the identification of recent shallow magmatic intrusions, and the evidence of dramatic deformation and uplift of sub-seafloor strata offshore Pozzuoli as an expression of the late stage inner caldera resurgence that occurred over the last 6 kyrs.
Seismic interpretation off the Amalfi coast documents the stratigraphic architecture of a series of small fan-deltas that postdate the Plinian eruption of the Vesuvius of AD 79. Deltaic bodies displays various phases of development that were ostensibly associated with periods of high sediment supply from the adjacent river basins. During these periods landscape-mantling loose pyroclastic deposits (mostly air-fall tephra erupted by the Vesuvius) were quickly eroded and delivered to the continental shelf by sheet wash and flash floods events. Depositional processes on the foresets were dominated by sediment gravity flows originating from hyperpycnal river flow and pyroclastic fall deposits. This created, in turn, favourable conditions for seafloor instability, soft sediment failure, slumping and sliding that characterize the deltaic stratigraphic architecture.