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Offshore suspensions plume deposit as a stratigraphic signature of catastrophic river floods during the last 500 years: the case of the Amalfi coast

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The Amalfi coast is a segment of the southern slope of the Sorrento Peninsula, a narrow and elevated mountain range (up to 1444 m) along the SW coastal zone of Italy. The Peninsula is deeply cut by a complex of bedrock rivers and channels characterized by relatively high energy of the relief, small catchment areas and pronounced disequilibrium of the stream profiles. There is evidence suggesting that the dynamic regime of the alluvial fans and associated fan-deltas of the Amalfi coast are controlled by episodic, but often catastrophic sediment and water discharges that have caused repeated flooding of the fans and accumulation of large volumes of sediment in the fan-deltas over last centuries. Documentary source materials show that, since the 16th century, at least 106 severe floods occurred over the Amalfi coast. The most dramatic episodes occurred between XVI and XX centuries (1581, 1588, 1773, 1899, 1954 events), caused severe geomorphologic change, damage to buildings and a high number of victims. The flood events triggered landslide, mud flow, debris flow and rock falls phenomena as well as denudation and erosion upstream.
This research is based on the of stratigraphic study of marine gravity cores, and high-resolution seismic profiles acquired in the fan-delta deposits that develop at the mouth of the hydrographic system of the Amalfi coast. Particularly, the integrated stratigraphic analysis of prodelta deposits, shows that there is a consistent correlation between documental evidence of historical catastrophic floodings and the occurrence of individual layers or claster of (2-3 cm thick) layers of suspension deposit associated with sustained hyperpycnal plumes (underflows) within the fan-delta sequence. The identification of suspension plume deposits, within fan-delta deposits off the cliffed Amalfi coasts, may thus be regarded as a useful tool in order to explore the occurrence of major flooding episodes back to stratigraphic record of the Late Holocene.