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# The 25-26 October 1954 hyperpycnal flow at Bonea stream mouth (Amalfi Coast, Southern Italy): new data from ultra-high resolution acoustic surveys

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The 25-26 October 1954 storm was one of the most intense and catastrophic meteorological events ever recorded in the Campania region. Heavy rainfall hit Salerno and the southern rocky flank of the Sorrento peninsula (the Amalfi Coast) lasting about 16 h, from 13:00 h on 25 October, to 05:00 h on 26 October. The maximum value of precipitation was recorded in Salerno with a total of 504 mm, and a maximum intensity of 150 mm/h. Extensive displacement of the sedimentary covers occurred on the steep carbonate hillsides which released large amounts of material straight into the stream beds, raising it to augment the effect of the flood. The Bonea stream was the place where most of the displaced material was delivered. The high-gradient steep-sided stream profile prevented deposition, so that the material was transported all the way down to the coast, resulting in an ephemeral delta at the stream mouth followed by an high density submarine flow (hyperpycnal flow) at the sea. The flooding phenomena involved local obstruction (temporary dams) of the stream path where the water backed up, with the formation of destructive flood waves as the dams collapsed (Esposito et al., 2004a; 2004b). New data from ultra-high resolution acoustic surveys allowed for improvement and correction of previous interpretations (Budillon et al. 2005) of the 1954 Bonea hyperpycnal event. The geophysical surveys included seismic reflection investigations performed with a subbottom (boomer) source (SEISTEC system), submetric swath bathymetry with a 455 kHz multibeam sonar and backscatter mapping with a 100-500 kHz sidescan sonar. Sediment sampling by gravity cores and box cores provided ground-truth control. These data document a detailed seafloor topography and the persistence at sea of the 1954 stream Bonea flood. Main features are:

1. a flood-dominated river-mouth bar with large-scale bedforms, deposited by passing flows exiting the river mouth; 2. an initiation area (plunging area) with oriented shallow scars and sedimentary lineations, composed of a coarsening-up/fining-up sequence (hyperpycanl deposits), up to 60 cm thick, with small carbonate pebbles and erosional base contact, followed by 3. a delta front area composed of fine sand with low relief surface waves developed up to - 50 m.

These features develop along specific underwater trends starting from the stream Bonea mouth. The seafloor area contiguous to such a constrained flow is composed of a blanket of silt and sandy deposits including bioclasts, vegetal and man-made fragments. In this area the mean grain-size decrease with water depth. Sedimentologic analysis based on gravity core sampling revealed decimetric sandy layers, with sharp base contact, intercalated with muddy sediments. They consist of well sorted sandy horizons passing upward to parallel and cross-laminated fine sand, that contain locally man-made artefacts and vegetal debris. These levels, elsewhere interpreted as tempestite deposits, are better explained if assimilated to the flood units occurring at present in the delta front area (3) where the underwater flow lacks of the coarse fraction and residual deposits with turbiditic organization can develop. These hypothesis is also supported by seismic data presented in this paper, that document poor lateral continuity of these levels and lens shape geometries with internal cross laminations. This clearly suggest the occurrence of sandy lobes in the distal area of hyperpycnal flows.

References

Esposito E., Porfido S., Violante C. (Eds) (2004) Il Nubifragio dell'Ottobre 1954 a Vietri sul mare, Costa d'Amalfi, Salerno. Scenario ed effetti di una piena fluviale catastrofica in un'area di costa rocciosa. Pubblicazione GNDCI n. 2870, pp.382.

Esposito E., Porfido S., Violante C., Biscarini C., Alaia F., Esposito G., (2004) Water events and historical flood recurrences in the Vietri sul Mare coastal area (Costiera Amalfitana, southern Italy). Proc. of the UNESCO/IAHS/IWHA symp. on "The Basis of Civilization - Water Science?", Rome, IAHS Publ. 286, 1-12.

Budillon F., Violante C., Conforti A., Esposito E., Insinga D., Iorio M., Porfido S. (2005) Underflow fluxes in the recent prodelta stratigraphic record of a small flood-prone stream, the Bonea (Amalfi Coast, Southern Italy). Marine geology, 222-223, 419-441.