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In situ cone penetrometer measurements identify excess pore pressure regimes in subbottom sediments: A further piece in the puzzle the Nice 1979 Airport Slide (French Rivera)

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On the 16th of October 1979, a part of the recently extended Nice Airport (French Rivera) collapsed into the Ligurian Sea. The failure of this construction, where $\sim$ 8.7 x $10^6 m^3$ material was mobilised and transformed into a debris flow cutting two submarine cables tens of kilometres away from the sliding area, was accompanied by a tsunami wave of 2-3 m. To this day, the exact trigger mechanism for the Nice Airport Slide is not completely understood, whereas three hypotheses were proposed:

1. The initial failure occurred on the deeper slope and generated retrogressively the failure of the airport construction (Dan et al., 2007).
2. The construction of the embankment loaded the sub-bottom strata until the additional stress could not be supported by the shear strength so that mass wasting occurred (Dan et al. et al., 2007).
3. Due to a sea level drop of 2.5 m related to a tsunami, which had been generated before by a slide 15 km away from the coastline the slope was destabilised by overloading of the harbour construction itself and additionally by its emersion (Seed, 1983).

For that reason a multi-disciplinary expedition M73 with the RV METEOR in the Ligurian Sea was carried out including high-resolution seismics and mapping, ROV dives, *in situ* measurements of surficial sedimentary strength and pore pressure with a marine free-fall CPTU lance, and coring. *In situ* pore pressure measurements along four N-S-oriented CPTU transects with up to nine individual CPTU deployments were located south of the airport in the slide scar from the headwall downwards, and also in undisturbed sediments east and west of the slide (for reference). The CPTU probe, which reached an absolute penetration depth between 1 and 3.5 m, spanned 20-360 minutes to observe the pore pressure evolution after the impact. A permeable sandy layer was hit in a depth of less than 1 m in the headwall area, reflected by a cone resistance of > 1 MPa, whereas the muddy sediments above and below showed values of up to 500 kPa. CPTU measurements reveal different pore pressure regimes, characterised by overpressuring in sandy layers (ca. 15 kPa above hydrostatic) where the pore pressure increased continuously over a period of 360 minutes after the impact, and pore pressure dissipation in the fine-grained, muddy sediments.