Nice Amphibious Drilling, In situ monitoring & Risk analysis (NADIR)

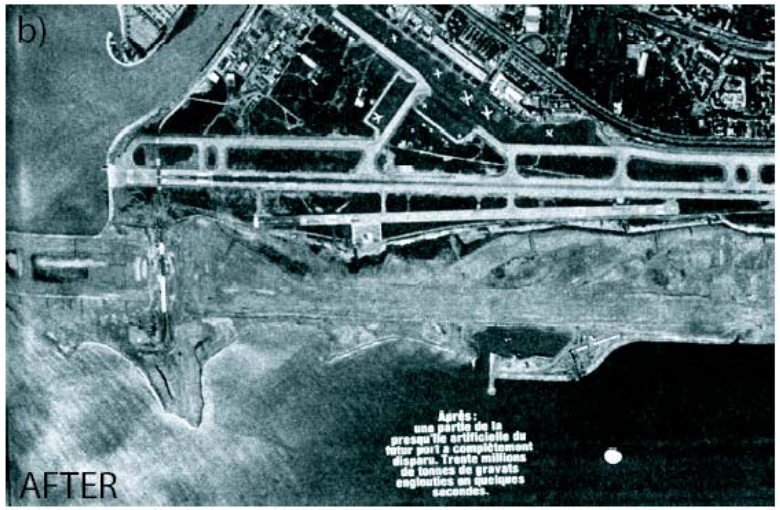
A. Kopf, P. Henry, S. Garziglia, P. Pezard, G. Unterseh, C. Mangan, V. Spiess, S. Davies, S. Stegmann, J. Rolin, A. Camerlenghi, Y. Yamada, A. Solheim, A. Deschamps

IODP Mission Specific Platform Proposal 796 Full

NADIR addresses subaquatic landslides, one of the most prominent geohazards, in a cost-effective onshore-offshore drilling approach in an area where multiple landslide trigger mechanisms prevail simultaneously, but can easily distinguished based on:

- the wealth of existing data by the international proponents group
- amphibious drilling and state-of-the-art instrumentation

Human impact (construction activity) – the Nice Airport slide in October 1979

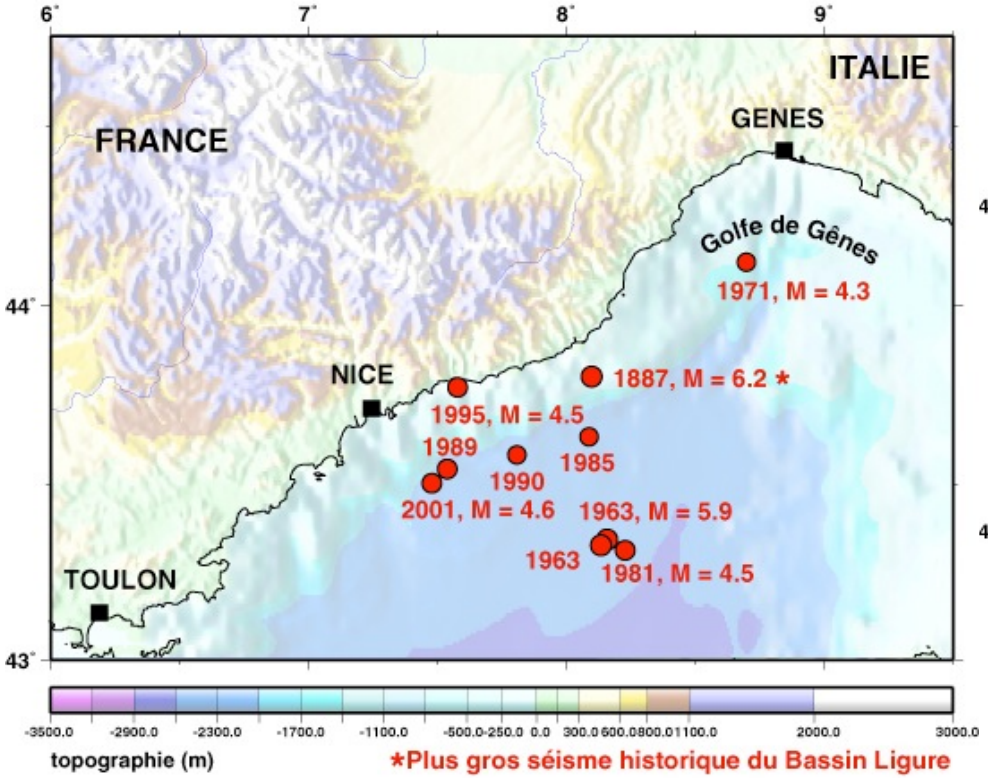


Cracks in the Airport runway related to the landslide event

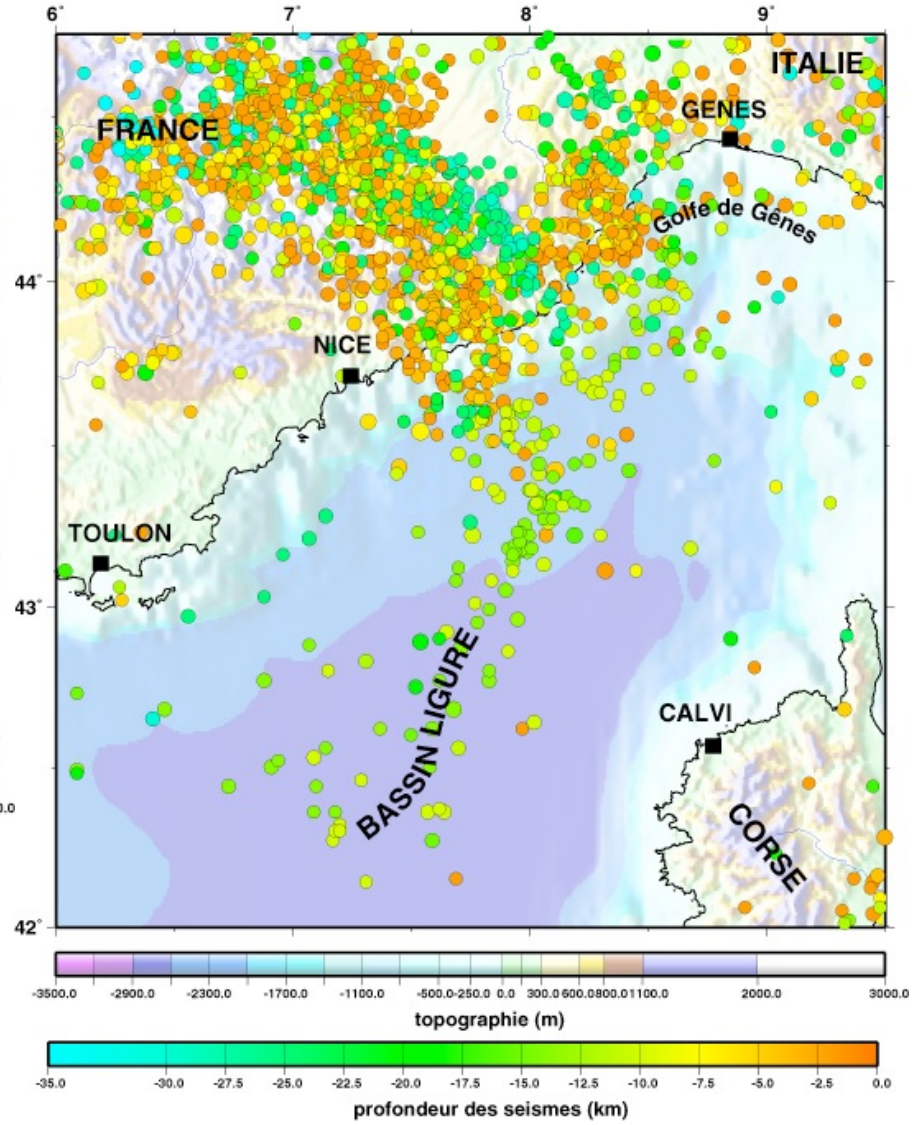
Damage in Antibes by 2-3m high tsunami waves

Trigger 1: Seismicity in the western Mediterranean

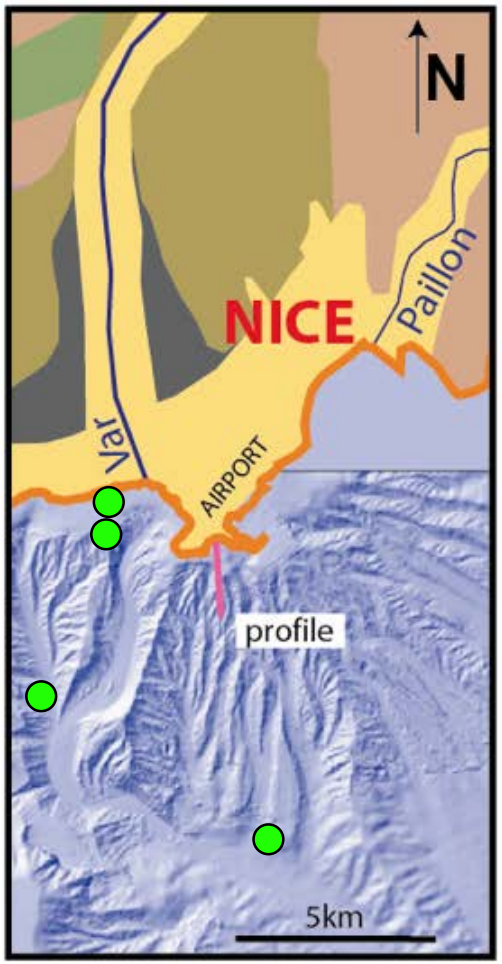
M > 4



M < 4

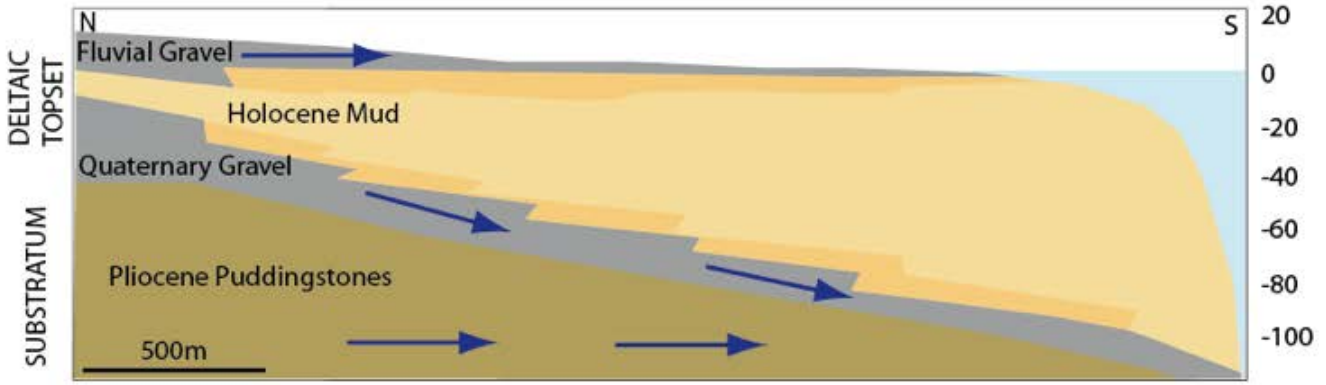


Trigger 2: Sedimentary loading on- and offshore of Nice



LEGEND

- Holocene Alluvium
- Quaternary/Fluvial Gravel
- Pliocene marl and conglomerates
- Mesocoic Provencal Limestones
- Mesocoic sub-Alpine Limestones
- Miocene molasse



Sedimentary loading, mass transfer and associated processes are monitored by regular coring as well as moorings with ADCPs, sediment traps, current meters, etc.

Trigger 3: Weak, sensitive clays favour shear zones

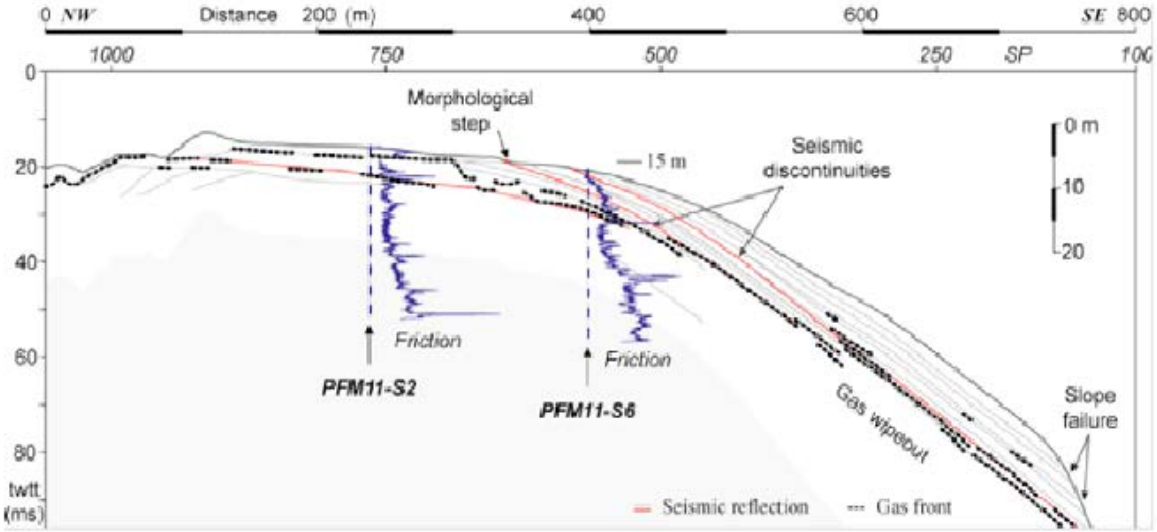
Occurrence of coarse-grained layers (sandy/silty) in ~25mbsl and ~35mbsl from Cone Penetration Tests (CPT) down to 60 m depth

Very weak, fine-grained, low permeability sediments with high sensitivity are interbedded

Penfeld CPT during joint IFREMER - MARUM cruise

weak, creeping clay

sand/gravel (puddingstones)



Sultan et al., 2010 (Can. Geotech. J.)

Bird's eye view of the NADIR approach