Echoes Compact Sub-Bottom Profiler (SBP): Portable SBP for inland & coastal environments

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Résumé

A significant part of paleoclimate/paleoenvironmental-related geoscience research involves high-resolution sedimentological analyses reaching back the Late Pleistocene. High-resolution subaquatic imagery of the first tens of meters is required to understand Pleistocene/Holocene continental sedimentary basin infills. Sub-bottom profiler (SBP) technology is currently the best geophysical equipment to obtain the highest resolution imagery of underwater sediments. Resolution of such systems needs to be in the order of cm/dm to access centennial/millennial timescales. Continental scientific projects, however, suffer from a lack of portable & USVdesigned SBP available on the market that can be easily operated in continental environments (lakes, river, lagoon, etc.).
In this context, Exail sonar system division, based in La Ciotat (France), has recently designed a 10 kHz Chirp sub-bottom profiler (5 – 15 kHz) for continental & shallow water investigations. Echoes Compact is a portable sub-bottom profiler for inland & coastal environments reaching in high-resolution Late Pleistocene & Holocene sedimentary archives. We focus our presentation on two case studies: one in maar lake Issarl'es with paleosismological reconstructions in Massif central (Ard'eche, France), and another in lagoon & coastal areas (Orbetello, Italy) throughout the recent publication from Brocard et al. (2024, Marine Geology), in which Echoes 10 kHz demonstrates outstanding performance in very shallow water environments (1m water depth/12m penetration without multiple). We also present Echoes 3500 T1 geoscience applications, a 3.5 kHz system (1.8 – 6.2 kHz) with higher penetration & lower resolution than the Echoes Compact, with regards to its performance for exploring deeper coring sites especially in coarse sand environments. Brocard et al. (2024) Double tombolo formation by regressive barrier widening and landside submergence: The case of Orbetello, Italy. Marine Geology 477, 107415.

Mots-Clés: sub bottom profiling, subsea imagery, acoustic, geophysics, geophysical software, shallow water

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