GAS DETECTION CAPABILITIES, GAS INDUCED ACOUSTIC STRUCTURES AND GHOST IMAGERIES IN UNIBOOM RECORDS IN THE ADRIATIC SEA

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Abstract
UNIBOOM and similar boomer systems can easily monitor the presence of even the slightest gas content in the sediments, because of the relevant variations in the sound velocity and in the acoustic impedance The gas behaviour related to the grain size and the permeability versus the frequency and the signature of the acoustic impulse give sometimes inexplicable or at least very difficult imageries and records.
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For a proper appreciation of the importance of gas in the acoustic behaviour of wet sedimentary sequences we must take into account the strong variations in the sound speed in the different systems, according to the gas percentage in the interstitial waters. The relevant sound velocity in waters can vary from about 1500 m/s down to about the same speed in air, that is in the order of 350 m/s! This implies large variations of the acoustic impedance and very strong gradients in limited space, depending from the gas content only. The history of sedimentary sequences may be better described [1] if different gas diffusion and/or intrusion can be attributed to episodes of the same type but occurring in different times. A good example is offered by the sedimentary sequence of the Jabuka deep [2] in the central Adriatic, where surface pockmarks and buried ones (aborted?) appear to have occurred in different times, but driven by the same and much more deeper gas source. Gas concentrations in sedimentary layers give more problems than help in evaluating the acoustic records given by UNIBOOM, boomers or similar high resolution microseismic systems. In any case the presence of gas always reduces more or less the acoustic penetration. Vertical penetration of 100 metres or more can be easily achieved, in fine, no-gassy sediments as in the southern part of the central Adriatic sea, where a resolution of about 20 centimetres can be achieved. Penetration over 200 metres is rather unusual and achievable only in areas free from potential gas sources as in the gulf of Taranto, in the Jonian see. Some other examples are given, as also "ghost" imageries and geologic hazards [3]. The excellent results can be achieved only if the behaviour of the used system is very well "understood" by the user, with special regard to the geometry of the towed gears. Most of the "tricks" used to achieve the best results lie in regulating the distances and the reciprocal position of the hydrophone and the boomer plate, respectively emitting and receiving the signals. If the geometry is perfectlyset, the acoustic multiples will disappear and there will be no need at all to filter the received echoes. In some cases the geometry must be adjusted to the acoustic characteristics of the boat or ship used. Such difficulties are generally underestimated by the "standard" users, who are not always satisfied with their results. The conclusion is that in the last ten to twenty years the use of UNIBOOM and similar sound systems has largely diminished in favour of systems that are much more simple and easier to handle, like sub-bottom profilers, CHIRP and similar ones

References
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