Logging in the campus: borehole research and monitoring in a test hole in Barcelona (Spain)

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Almera-1 hole was drilled for research purposes in the University of Barcelona campus area. The hole is 214m deep and was drilled in Quaternary to Paleozoic rocks in a urban area, next to the Institute of Earth Sciences (CSIC) borehole research lab. The main objectives for drilling a research hole were both the study of the poorly known subsurface geology and structure in this urban area and the construction of a dedicated infrastructure for logging tools tests, calibrations and long term monitoring. A direct connection to the lab was built to facilitate long term measuring experiments tool powering and data monitoring. A second auxiliary hole, Almera-2 50m deep was drilled to carry out cross-hole and tomographic experiments and hydrological monitoring. The upper section of Almera-1 hole is cased with PVC and the lowermost is an open hole section in paleozoic rock.

The entire hole was logged in open hole mode (before casing) and also after the hole was cased in order to study the effect of the PVC casing on different logging tools responses (total and spectral gamma radioactivity through casing, acoustic televiewer through casing, full wave sonic through casing and magnetic susceptibility through casing). The comparison shows the effect on each of these tools response of the PVC casing. Also how the tools responses are more or less affected by the attenuation caused by the PVC of the rock signal and how this is more or less critical in the diverse lithologies represented in the Almera-1 hole.

Wireline drilling was used to obtain best core recovery and to carry out log-core comparative analyses for logging tool response calibration and log-core correlation. The results obtained in the study of gamma ray (total and spectral), magnetic susceptibility and acoustic petrophysics are shown.