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Volcanic structure of fast spreading oceanic crust from borehole geophysics in ODP Hole 1256D, eastern equatorial pacific.

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During Ocean Drilling Program Leg 206, a 502 meters deep borehole (Hole 1256D) was drilled on the Cocos plate, in 15 m.y old oceanic crust formed at a superfast spreading ridge. This campaign is the first part of a multi-leg strategy to sample a complete upper crustal section of ocean basement from extrusive lavas, to the uppermost gabbros. In the long run, this hole should be deepened down to the Moho, finally meeting one of the initial objectives of scientific ocean drilling. A full set of downhole measurements (gamma ray, bulk density, electrical resistivity, acoustic velocity), as well as electrical and acoustical images were recovered within the upper basaltic oceanic crust.

Downhole measurements and images recorded in Hole 1256D show a high degree of variation, reflecting the massive units, thin flows, pillow lavas, and hyaloclastite encountered in Hole 1256D. Massive lavas are characterized by high electrical resistivity, low porosity ($<$6%), high density (2.6-2.8 g/cm^3), and low natural radioactivity ($<$6 gAPI) values. In the topmost massive unit, the electrical and acoustic tools imaged veins and fractures that can be matched to structures imaged on cores. Pillow

lobes are easily recognized on the FMS and UBI images. Pillow basalts appear on the image logs as circular to elliptical bright patches of varying sizes. The pillow rims are identified as darker regions of high conductivity, as they are more altered compared with the central part of the pillows. Hyaloclastites consist of highly heterogeneous material, with resistive material (basalts and basaltic glassy clasts) cemented in a conductive matrix (altered glass). Integration of drilled cores and downhole geophysical data was performed to reconstruct the complete section of the drilled basement. Using this approach the volcanic architecture of Hole 1256D has been reconstructed and used to discuss magmatic processes and structural aspects of the formation of the upper oceanic crust at a super fast spreading ridge.