

## Trace element budget along a section of fast-spread oceanic crust: Results from drilling at the Hess Deep Rift (ODP Leg 147 and IODP Expedition 345)

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The Hess Deep Rift, where the Cocos Nazca Ridge propagates into the young, fast-spread East Pacific Rise crust, exposes a dismembered, but nearly complete, lower crustal section. The extensive exposures of the plutonic crust were drilled at 2 sites during ODP Leg 147 (Nov. 1992-Jan. 1993) and IODP Expedition 345 (Dec. 2012-Feb. 2013). We report preliminary results of a bulk rock geochemical study (major and trace elements) carried out on 109 samples representative of the different drilled lithologies.

Gabbroic rocks recovered by drilling at Hess Deep span a wide range of modal compositions from troctolites to gabbronorites. Olivine gabbro and troctolite are dominant at IODP Site U1415 interpreted as sampling the lowermost part of the gabbroic crust. U1415 gabbroic rocks have dominantly primitive compositions except for one gabbronorite rubble similar in composition to upper gabbros sampled at ODP Site 894. Olivine gabbro, gabbro and gabbronorite overlap in composition with high Mg# (79-87) and Ni (130-570 ppm), low TiO<sub>2</sub> (0.1-0.3 wt.%) and Yb (1.3-2.3 x chondrite) and positive Eu anomaly (Eu/Eu\*=1.9-2.7). Troctolite has high Mg# (81-89), Ni (260-1500 ppm) and low TiO<sub>2</sub> (<0.1 wt.%) and Yb (~0.5xchondrite) and large Eu/Eu\* (>4). Gabbroic rocks from ODP Site 894 comprise gabbronorite, gabbro, olivine gabbro and gabbronorite. They have evolved compositions with Mg# 39-55, Yb 4-8 x chondrite and Eu/Eu\* 1-1.6. Basalts were recovered at Sites 894 and U1415: they have low Yb (10-12xchondrite) and are depleted in the most incompatible elements (Ce/Yb=0.6-0.9xN-MORB).

The main geochemical characteristics of Sites U1415 and 894 gabbroic rocks are consistent with formation as a cumulate sequence from a common parental MORB melt; troctolites are the most primitive end-member of this sequence. They overlap in composition with the most primitive of slow and fast spread crust gabbroic rocks.