

FIRST DESCRIPTIONS OF TWO NEW BOREHOLE PROFILES FROM THE RIES IMPACT CRATER, GERMANY.

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Introduction: The Ries impact crater with a diameter of ~25 km, located in southern Germany, is a complex crater structure that is famous for its largely preserved ejecta blanket inside and outside the crater [1, 2]. The principal outline of the crater interior consists of (i) a central crater basin filled with suevite and lake deposits, (ii) an inner crystalline ring with a diameter of 12 km, that consists of uplifted brecciated basement units, (iii) the megablock zone displaying a hummocky relief and containing parautochthonous and allochthonous megablocks, and (iv) the tectonic crater rim [3, 4]. Here we present borehole profiles of two new drilling sites at the Ries impact crater in southern Germany that were drilled by the Geological Survey of Bavaria (LfU). The first drilling location was selected to investigate a post-impact hydrothermal spring site and its basement, which is part of the crystalline ring. The second drilling location was aimed at constraining the occurrence and volume of impact melt rock in the Ries crater.

Drilling sites: The first drilling site is located south of the city of Nördlingen and north of Reimlingen on the southern crystalline ring. (R4390848/H5411481). The 65 m deep borehole profile can be subdivided from base to top: (1) 65.0-63.9m: altered, brecciated gneisses embedded in reddish clay material (bunte breccia?), (2) 63.9-56.2m: altered mm to cm-sized gneiss and amphibolite fragments embedded in a grayish, fine-grained matrix, calcite veins and melt veins? present, (3) 56.2-36.7: grayish breccia, partly clast supported, with abundant biotite-rich gneiss and amphibolite fragments, (4) 36.7-23.0m: intact gneisses with foliation dipping consistently 45°, (5) 23.0-22.5: grayish fine-grained matrix including cm-sized granitic clasts, (6) 22.5-0.4 m: Travertin limestone and Ries lake deposits, (7) 0.4-0.0 m: topsoil.

The second drilling site is located a few meters south of the outcrop Polsingen, in which impact melt rock is exposed (R4405236/H5420826). The 35 m deep borehole profile is subdivided from base to top: (1) 35.0-34.0: iron-rich, ocher sandstone (Dogger), (2) 34.0-27.5: brecciated limestone (Malmian) (3) 27.5-23.8: grayish marly limestone, quartzite at top, (4) 23.8-20.5m: iron-rich, ocher sandstone (Dogger), (5) 20.5- 5.8m: heavily brecciated and sand-sized crystalline basement material (especially granitic fragments), (6) 5.8-3.0m: mm to cm-sized crystalline clasts (especially granites) embedded in a dense reddish to grayish impact melt matrix. (7) 3.0-0.1 m: strongly brecciated reddish impact melt rock with mm to cm-size crystalline clasts (8) 0.1-0.0m: topsoil.

References: [1] Pohl J. et al., 1977. Impact and Explosion Cratering, Flagstaff, Arizona. [2] Kenkmann T. and Ivanov B. 2006. *Earth and Planetary Science Letters* 252. 15-29. [3] Stöffler D. et al., 2001. *Meteoritics and Planetary Science* 36. No.9. [4] Stöffler D. 1997. *Geologica Bavarica* 75. 163-189.