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ICDP project Drilling the Eger Rift – present status and further plans

Torsten Dahm, **Tomas Fischer**, Heiko Woith, Pavla Hrubcova, Josef Vitek, Michael Korn, Frank Krüger, Josef Horalek, Tomas Vylita, and ICDP-Eger ScienceTeam

GFZ German Research Centre for Geosciences, S2.1 Physics of Earthquakes and Volcanoes, Potsdam, Germany

(torsten.dahm@gfz-potsdam.de)

Within the ICDP-Eger drilling project we are developing one of the most modern and comprehensive laboratories at depth worldwide to study the interrelations between the flow of mantle-derived fluids through the crust and their degassing at the surface, the occurrence and characteristics of crustal earthquake swarms, and the relation to the geo-biosphere. The Cheb basin located in the western Eger Rift at the Czech-German border provides an ideal natural laboratory for such a purpose. In October 2016 the ICDP proposal was accepted for complementing two existing shallow monitoring wells with five new, distributed, medium depth (<400 m) drill holes F3 and S1-S4.

The resulting natural laboratory at depth will comprise five drilling sites for studying above mentioned phenomena. The F1-F3 drillings form a unique facility of three wells at one site within an active CO₂ mofette of Hartoušov for continuous recordings of fluid composition and fluid flow rate, as well as for intermittent GeoBio fluid sampling. Drillings S1-S4 are planned for seismological monitoring to reach a new level of high-frequency, near source observations of earthquake swarms and related phenomena such as seismic noise and tremors generated by fluid movements. Instrumentation of the seismic wells S1-S3 will include 8-element geophone chains and a bottom-hole broadband sensor. The borehole sensors will be complemented at S1 by small-scale surface array of approximately 400 m diameter to obtain truly 3D-array configurations. If possible, broadband surface stations and other sensors will be added to each drill location.

So far, we have completed drillings at sites S1, S2 and S3, with depth of 402, 480 and 400 m. The drilling of S4 is planned in 2020 at one of the recently discovered Maars at the Czech-German border region. Drilling F3 was completed in September 2019 at a depth of 239 m. It has reached several over-pressurized, CO₂ bearing layers. The three boreholes have been connected by underground tubes system to the nearby field laboratory equipped by flowmeters and mass spectrometers allowing for long time precise monitoring of the degassing process. The S1 borehole (Landwust) will be instrumented in January 2020 by a test geophone chain allowing, along with the DAS fibre-optic cable installed behind the casing, to carry out a VSP measurement.

In our presentation we provide information on the status of drillings, sensor installation and plans for the complete monitoring and data handling concept.