

**WHERE THE CONTRADICTION BETWEEN NEPTUNISTS AND PLUTONISTS HAVE BEEN JUDGED: RE-OPENING OF THE HISTORICAL ADIT IN THE KOMORNÍ HŮRKA (KAMMERBÜHL) VOLCANO AFTER 180 YEARS**

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A small, inconspicuous scoria cone in western Bohemia, known as Komorní hůrka Hill, played a crucial role during definition of the origin of rocks and the controversy between Plutonists and Neptunists in the first half of 19<sup>th</sup> Century. In 2017 we celebrate the 180 year anniversary of one successful resolution of this debate as scientific adits, on instigation of J.W. Goethe, were dug into this volcano to access its feeding system in order to observe whether volcanoes are fed by burning coal seams, or feeding dykes of magma. The adits into Komorní hůrka Hill were the first large earth-works with a solely scientific goal and without any commercial mining ambition. The basaltic feeder exposed in the adits definitely decided in favour of Plutonists after decades lasting contradiction with Neptunists. Especially significant to the ongoing global Plutonists vs. Neptunists debate was the latter meeting on July 30, 1822. The scientific council consisted of J.W. Goethe, Kaspar Maria Count of Šternberk, Swedish chemist Jöns Jacob Berzelius, medical doctor Pohl from Karlovy Vary Town and the police and municipal councillor Josef Sebastian Grüner from Cheb Town (Fig. 1). The council combined scientists of both schools. Neptunistic theory of burning coal-seam [1-3] was advocated by J.W. Goethe, whereas Kaspar Maria Count of Šternberk and J.J. Berzelius supported the Plutonistic theory. Berzelius also recalled similarities between Komorní hůrka and volcanoes of Chaine des Puy and Eifel. After discussion, Goethe and Berzelius proposed to Count of Šternberk to organize and financially support the digging of adits into the volcano. The adits had to reach the conduit underneath the volcano and show whether a burned coal seam or a basaltic lava neck was to be found and thus solve definitely the principal scientific question. When the adits were completed, Count of Šternberk paid an empire granitic portal to be built on the adits-entrance on the southern slope of the volcano. The portal is decorated with device : „DEN NATURFREUNDEN GEWIDMET von G. K. STERNBERG DCCCXXXVII“ (To the friends of Nature donated by Count K. Šternberk – 1837: Fig. 2).

The Komorní hůrka Volcano is an erosional remnant of a scoria cone with a short lava flow of melilite-bearing olivine nephelinite [4-7]. The volcano erupted

on Oligocene to Pliocene continental sediments of the Cheb Basin, which is located at the intersection of the NE–SW trending Eger Rift with NNW–SSE trending Cheb– Domažlice Graben [8-9].

A recently conducted ground geophysical survey confirmed the position of historical adits, displayed on several archive sketches. The geophysical data comprising ground magnetometry, electric resistivity tomography and refraction seismic profiles also revealed internal structure of the volcano, including the position of the feeding dyke and the geometry of a lava flow emitted from the crater.

Interpretation of measured geophysical data was more or less straightforward on this site due to a simple geology of the monogenetic volcano. Magnetic heights are interpreted as a presence of basic lavas reaching the surface or close to the surface. The main magma conduit reaches the summit of the volcano and the zone of increased magnetic field on the SW face of the hill is interpreted as a lava flow. The interpreted position of the lava flow is in a good agreement with numerous outcrops of basic lavas at this side of the volcano.

With position of historical adits confirmed by geophysical survey, the excavations may safely re-open these historical earth-works and provide an access to wider public. Komorní hůrka Manuscript will then serve as an educational geosite displaying the structure of a small monogenetic volcano, and also history of Earth Sciences. After summarizing the history and geophysical confirmation of historical adits position, excavation and cleaning of the adits started in June 2017. When the adits become accessible, pyroclastic succession will be described in terms of eruptive history of the volcano, as the depositional record may be more complete than the outcrop on NE slope. As the adits reached the main feeding conduit, detailed study on mechanism of magma ascent using anisotropy of magnetic susceptibility will be employed together with new geochronological analyses of the fresh rock. When all data collected and interpreted, a 3D animation of the history of this volcano will be completed to facilitate the interpretation to wider public including children [10]

Fig. 1. Scientific council on Komorní hůrka volcano on July 30, 1822. From left to right: J. W. Goethe, Kaspar Maria Count of Šternberk, J.J. Berzelius, police marshal J.S. Grüner and doctor J.E. Pohl.



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Fig. 2. Portal to Komorní hůrka adits – actual situation.



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