

# VULKANOLOGIJA IN KEMIZEM ZEMLJINE NOTRANJOSTI IAVCEI

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## Eruptive and sedimentary evolution of the Pliocene Grad Volcanic Field, North-east Slovenia

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### ABSTRACT

Middle to Upper Pliocene (~3 Ma) Grad Volcanic Field (SW Pannonian basin system) encompasses an area of about 3 km<sup>2</sup>, of which some 1.7 km<sup>2</sup> belong to the outcropping volcanics. Pyroclastic and syn-eruptively reworked volcanoclastic deposits are the most widespread in occurrence. Remains of an autobrecciated lava flow, a residual neck and their peperites are partially reworked by a large debris flow.

Volcanic activity occurred in a continental depositional environment dominated by alluvial fan and braided river systems. Streams draining from the north-west to the south-east were infilling a rapidly subsiding Radgona Depression.

The style of volcanic activity was mainly explosive and was reinforced by hydrovolcanic processes. Three volcanic centres probably existed, and they migrated spatially and temporally from the north to the south over a distance of some 5.6 km. The rocks of the northernmost volcanic centre are fairly eroded and contain abundant, up to 10 cm sized lherzolite xenoliths.

The largest crater developed about 2.5 km to the south. From an early maar stage, a tuff-cone, and subsequently, a tuff-ring evolved. The crater was filled with eroded pyroclastic material and stream load.

A new vent became active some 500 m to the south. Initial stage was mainly magmatic and produced pyroclastic flow and fall deposits. Late-stage eruptions were predominantly hydrovolcanic (phreatomagmatic and phreatic), and built up a small tuff-cone having some 300 m in diameter.

Trachybasaltic and subordinate basaltic magmas erupting in the Grad Volcanic Field are geochemically distinguishable from the neighbouring occurrences in the South Styrian Basin and the South Burgenland Swell. Relatively lower abundance of TiO<sub>2</sub>, MgO, Sc, V and Cu, and higher abundance of MnO, P<sub>2</sub>O<sub>5</sub>, Zn, Sr, Zr, Hf, Nb, Ba, Ta and U indicate somewhat different source and/or evolutionary pattern.

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Delo celovito razloži eruptivni, sedimentacijski in geokemični razvoj pliocenskega vulkanizma pri Gradu na Goričkem v odnosu do sedimentacijskega prostora Radgonske depresije in Štajerskega bazena.





