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Deformation gradient and magnetic fabric in the Pohorje-Pluton (Slovenia)

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The Pohorje tonalite intrusion west of Maribor (northern Slovenia) was studied by microstructural and susceptibility analysis. The investigations display the kinematics of the intrusion from the emplacement onwards. The gradient of the magmatic and tectonic deformation in the study area highlights several stages since the emplacement in the early Miocene (18.1Ma). The cooling pluton was exhumed rapidly with early flattening and W-E normal faulting of the covering host rocks. The host rocks contact metamorphism in an areola of several tens of meters can be observed. During the late stage of the exhumation NW-SE shearing with high fluid penetration led to a fabric overprint in both the tonalite body and the host rock. Late extension along the NW-SE axis led to brittle normal faulting of the mountain range with cataclasis along the margins of the pluton.

Based on the field work, microstructural analysis, distribution of the quartz c-axes and the magnetic fabric several stages of emplacement and subsequent exhumation can be distinguished. Magmatic fabric is still existent in the internal areas of the Pohorje intrusion. The intrusion was rapidly exhumed with flattening of the tonalite body. During the late stage of exhumation the external parts of the pluton were influenced by the regional tectonic regime by ductile deformation with NW-directed shearing. The host rock has a fabric with pre-existing shear sense pointing also towards NW. A contact areole within several tens of meters from adjacent to the intrusion altered the host rock. Late NW-SE extension led to normal faulting in the northern part of the Pohorje pluton.