

Phanerozoic denudation across the Kola Peninsula

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Contrasting views exist on the stability of the Earth's shield regions over the last 1 Ga that have major implications for reconstructing erosion patterns on shields and the supply of sediment to intra-cratonic and marginal basins. This contribution explores Phanerozoic denudation rates and patterns on the northern part of the Fennoscandian Shield in the Kola Peninsula, Northwest Russia. This shield region was intruded by magmatic rocks of the Kola Alkaline Province (KAP) in the Devonian and Early Carboniferous. The KAP was emplaced at various depths in the crust and allows assessment of depths and rates of erosion during and since the KAP magmatic episode.

Post-Devonian denudation rates on the shield rocks of the Kola Peninsula have varied in space and time. Around the periphery of the Kola Peninsula, low long-term denudation of shield rocks is indicated by the survival of Riphean cover rocks and Late Devonian lavas, kimberlite crater facies and near-surface emplacement of dykes. In contrast, in the main belts of KAP intrusions, 4–6 km of rock was removed in response to doming between 460 and 360 Ma. Deep denudation is indicated by the emplacement depths of alkaline intrusions and Phoscorite–Carbonatite pipes (PCPs). Erosion on the Kola Peninsula since 360 Ma has been far more limited. Extensive, shallow, late-stage magmatism associated with PCPs, dykes and the large alkaline intrusions in the KAP indicates that erosion depths nowhere exceeded 2 km. Post-Devonian denudation has removed <1 km of rock from the margins of the Kola Peninsula and from the backslope of the Saariselkä–Karelia scarp in northern Finland. AFT data point to an important phase of erosion in the early Mesozoic but depths of unroofing of 3–5 km based on AFT cooling ages for this later phase are in conflict with the evidence of lesser erosion provided by the late-stage KAP intrusions and also require unrealistic depths of former Devonian to Triassic cover rocks.

References:

Hall, A.M., 2015. Phanerozoic denudation across the Kola Peninsula, northwest Russia: implications for long term stability of Precambrian shield margins. *Norw. J. Geol.* 95, 27–43.