



Age constraints on mineralization and deformation processes in the Palaeoproterozoic Skellefte District, Sweden

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Five new U-Th-Pb ion-probe age determinations on zircon were performed on samples from the Palaeoproterozoic Skellefte District, which is known for producing Zn, Cu, Pb, Ag and Au from volcanogenic massive sulphide (VMS) and orogenic gold deposits. These dating results are part of a data set used to constrain the 4th dimension within ongoing 4D-modelling projects in the Skellefte District.

The ~ 1.89 Ga ages for three metatonalites from the pre-tectonic Viterliden intrusion, and the 1.89-1.88 Ga age for a metarhyolite from the stratigraphic hanging-wall to the Kristineberg deposit indicate that the igneous activity in the western part of the district was short-lived and synchronous with magmatism in the other parts of the district. According to the field relations, the youngest phase of the Viterliden intrusion is a quartz-plagioclase porphyritic tonalite, in this study dated at 1889 ± 3 Ma. It may be correlated with the so-called “mine-porphyry”, which post-dates ore-related alteration in the Kristineberg mine. The structurally oldest intrusive phase, a hornblende-tonalite was in this study dated at 1892 ± 3 Ma. Therefore, it is of the same age or slightly older than the hanging-wall metarhyolite, and may have acted as a basement for the volcanic rocks in the area. If this is the case, only the youngest, locally occurring components of the Viterliden intrusion would actually be intrusive into the volcanic pile. However, the ages of the metavolcanic rocks in the footwall to the Kristineberg deposit are not known and, for this reason, the age relationship between the intrusive complex and volcanic units is not fully understood. The igneous crystallization ages of the hanging-wall metarhyolite and the quartz-plagioclase porphyritic tonalite provide a minimum age for the ore-formation at ~ 1880 and 1890 Ma, respectively.

A metarhyolite dyke from the central part of the Skellefte District, in this investigation dated at 1872 ± 4 Ma, truncates stratified metasedimentary rocks along the axial surface of an open, upright synform related to the compressional main deformation event. The dyke is considered post-deformational in age since it lacks any subsolidus-foliation, which may generally be observed in the hosting metasedimentary rocks. Therefore, this age determination, together with the existing ~ 1875 Ma age for the hosting metasediments, constrains the main folding in the district to 1875-1865 Ma. This is in agreement with a time-scale for transition from crustal extension to shortening in a tectonic regime characterized by basin inversion, as recently suggested for the Skellefte District.