Geophysical Research Abstracts
Vol. 18, EGU2016-6222-1, 2016
EGU General Assembly 2016

Wilson-cycle "kick-off": Constraining the influence of a Large Igneous Province during the Neoproterozoic evolution of the pre-Caledonian margin of Baltica

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The supercontinent Rodinia broke up in the late Neoproterozoic to form the oceans and margins separating paleocontinents such as Baltica, Avalonia and Laurentia, which in turn later collided to form the Caledonian - Appalachian mountain belts. Some of the geological products of the complex evolution from passive-margin- to break-up are presently found in nappe complexes within the Scandinavian Caledonides. As described by P-G. Andreasson and co-workers in several papers from the 1990's, the break-up was associated with emplacement of major dolerite dike-complexes of Ediacaran age (c. 600 Ma), probably constituting a pre-Caledonian Large Igneous Province (pCLIP). The dominantly dolerite-dike swarms intruded a thinned continental crust comprising both crystalline basement and marine sediments deposited in pre- to early syn-rift basins. During peak rifting a sheeted dike complex defining the ocean-continent transition (OCT) evolved. More than 100 Myr later, during early stages of plate convergence, distal parts of the margin and the OCT experienced high to ultra-high pressure metamorphism, before the remnants of the dike swarms and the OCT were finally thrusted onto Baltica as the Seve and Särv Nappe Complexes. This occurred during the Scandian phase of the Caledonian orogeny at c. 425 Ma. Parts of the ancient magma-rich rifted margin are now exposed in the Scandinavian Caledonides. The best-preserved parts provide a remarkable analogue to present day OCTs and adjacent areas that generally only is observable in seismic sections. In order to understand the dynamics of the continental break-up, we will investigate the exposed areas to better constrain the active mechanisms that eventually produced oceanic crust. Also, with an improved understanding of magma-rich segments, a better comprehension may be achieved for magma-poor segments, which in the present study area occur both to the south and north of the pCLIP-segment in central Scandinavia. This presentation reports on 'research-in-progress' and we expect to present new results from systematic photogrammetry, including 3D model(s) of dike swarm geometries. Furthermore, we will use the models to estimate the volume of dikes compared to wall rocks and to generate a 2D, synthetic seismic profile through the OCT. Observations from some parts of the study area (Sarek) suggest that there are several generations of dikes, which possibly are related to an evolution of the stress field during magma emplacement. Detailed work in progress on the metamorphic petrology and geochronology will be used to better constrain the P-T conditions during emplacement of the dikes as well as characterize the Proterozoic basement rocks into which the break-up related pCLIP were emplaced.