

Provenance characteristics of the Brumunddal sandstone in the Oslo Rift derived from U-Pb, Lu-Hf and trace element analyses of detrital zircons by laser ablation ICMPS

Andersen, T.¹, Saeed, A.², Gabrielsen, R.H.¹ & Olausen, S.³

¹ Department of Geosciences, University of Oslo, PO Box 1047 Blindern, N-0316 Oslo, Norway

² GEMOC, Macquarie University, NSW-2109, North Ryde, Australia

³ Eni Norge AS. P.O. Box 101 Forus, NO-4064 Stavanger, Norway

The 800 m thick Brumunddal sandstone (Brumunddal Group) is a partly eolian, partly fluvial sandstone deposited in a fault-limited basin in the northern part of the Oslo Rift in Permian time. Deposition of the sandstone represents the youngest rift-related activity in the northern part of the Oslo Rift. Well rounded detrital zircons are common accessory mineral grains in the sandstone. U-Pb dating of detrital zircon from a sample of the Brumunddal sandstone by LAM-ICPMS gives a range of ages from (rare) late Archaean ages to Permian (283 ± 4 Ma). The age and initial ϵ_{HF} pattern of zircon in the sediment match the main rock forming events in Fennoscandia from Archaean to Phanerozoic time. This kind of diverse provenance was most likely obtained by repeated recycling of previous clastic sediments of Fennoscandian origin, with sedimentary rocks of the Neoproterozoic Hedmark Basin as the direct precursor. Trace element distribution show a conspicuous absence of U- and Th enriched zircons which is typical for granitic proto-source rocks. This is consistent with complex transport and redeposition history of the detritus: High U-Th, metamict zircons were selectively removed by abrasion during repeated transport-deposition-erosion cycles. In addition to recycled material, Caledonian syn-orogenic intrusions and Permian intermediate to felsic plutonic rocks in the Oslo Rift itself were minor but still significant sources of detrital zircon.