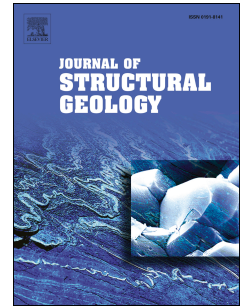


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Brittle reactivation of ductile precursor structures: The role of incomplete structural transposition at a nuclear waste disposal site, Olkiluoto, Finland

Pietari Skyttä, Taija Torvela



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1 **Brittle reactivation of ductile precursor structures: the role of incomplete structural**
2 **transposition at a nuclear waste disposal site, Olkiluoto, Finland**

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4 Pietari Skyttä, University of Turku, Department of Geography and Geology, FI-20014 University of Turku,
5 Finland

6 Taija Torvela, University of Leeds, Earth and Environment, Leeds LS2 9JT, UK

7

8 **Abstract**

9 Reactivation of discrete deformation zones that are orientated favourably with respect to the stress
10 field is a well-known phenomenon. What is less clear is the role of other structural features and
11 heterogeneities in localizing deformation. In this paper we describe how brittle deformation structures
12 are localized into zones of incomplete structural transposition inherited from earlier ductile
13 deformation phases. In our example, these zones of incomplete structural transposition are
14 characterised by localised high-strain structures of the latest ductile deformation stage, including short
15 limbs of strongly asymmetric folds and anastomosing networks of minor shear fabrics. When such
16 zones are systematically organized, and orientated favourable with respect to the stress field, they can
17 be very efficient in localizing deformation and forming new fault zones. Applied to the site of the
18 planned geological repository of nuclear waste in Olkiluoto, Finland, the recognized structural
19 inheritance provides tools to understand the geometries, networks and kinematics of the brittle fault
20 zones and the related secondary fracturing which together define the rock mechanical and
21 hydrogeological framework for the repository.

22

23 Keywords: Structural inheritance; Fault linkage; Transposition; Nuclear waste disposal;
24 Palaeoproterozoic; Fennoscandian Shield

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27 **1. Introduction**

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