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Roy H. Gabrielsen, Johan Petter Nystuen, Odleiv Olesen

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Fault Distribution in the Precambrian Basement of South Norway

Roy H. Gabrielsen¹⁾, Johan Petter Nystuen¹⁾ & Odleiv Olesen²⁾

1) Department of Geoscience, University of Oslo
2) Geological Survey of Norway, Trondheim

Corresponding author:
Roy H. Gabrielsen; r.h.gabrielsen@geo.uio.no

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Abstract

Mapping of the structural pattern by remote sensing methods (Landsat, SPOT, aerial photography, potential field data) and field study of selected structural elements show that the cratonic basement of South Norway is strongly affected by a regular lineament pattern that encompasses fault swarms of different orientation, age, style, attitude and frequency. Albeit counting numerous fault and fracture populations, the faults are not evenly distributed and N-S to NNE-SSW/NNW-SSE and NE-SE/ENE-WSW-system are spatially dominant. N-S to NNW-SSE structures can be traced underneath the Caledonian nappes to the Western Gneiss Region in western and central South Norway, emphasizing their ancient roots. Dyke swarms of different ages are found within most of these zones. Also the Østfold, Oslo-Trondheim and the Mandal-Molde lineament zones coincide with trends of Sveconorwegian post-collision granites.

We conclude that the N-S-trend includes the most ancient structural elements, and that the trend can be traced back to the Proterozoic (Svecofennian and Sveconorwegian) orogenic events. Some of the faults may have been active in Neoproterozoic times as marginal faults of rift basins at the western margin of Baltica. Remnants of such fault activity have survived in the cores of many of the faults belonging to this system.

The systems of lineaments were passively overridden by the Caledonian fold-and-thrust system and remained mostly, but not entirely inactive throughout the Sub-Cambrian peneplanation and the Caledonian orogenic collapse in the Silurian-Devonian. The system was reactivated in extension from Carboniferous times, particularly in the Permian with the formation of the Oslo Rift and parts of it remain active to the Present, albeit by decreasing extension and fault activity.

Key words: Lineament zones, fault zones, reactivation, fault distribution, South Scandes, South Norway.

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