

# The Late Riphean *Porsangerhalvøyen* tectonometamorphic event in the North Norwegian Caledonides: a comment on nomenclature

David Roberts

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A case is presented for replacing the name 'Porsanger' in 'Porsanger orogeny', in the Kalak Nappe Complex of the Finnmark Caledonides, by the adjectival 'Porsangerhalvøyen'. Moreover, until proved otherwise, this deformational-diachronous unit is best relegated to the rank of a tectonometamorphic event, rather than be accorded the status of a regionally extensive orogeny.

D. Roberts, Geological Survey of Norway, 7491 Trondheim, Norway.

Before 1990, all metamorphism and deformation in the post-Svecokarelian supracrustal rocks of the Caledonide allochthon in Finnmark, northern Norway, had been ascribed either to a Late Cambrian to earliest Ordovician *Finnmarkian* event or to the main, Late Silurian-Early Devonian *Scandian* orogenesis. An isotopic dating investigation by Daly et al. (1991) from five separate localities in the Kalak Nappe Complex (Fig. 1), utilising U-Pb, Sm-Nd and Rb-Sr methods, and a companion study of Sm-Nd depleted-mantle model ages (Aitchison 1990), led to major reconsiderations of tectonothermal event chronology in this part of the Caledonides. From their results, Daly and colleagues concluded that at least the earliest deformation and amphibolite-facies metamorphism affecting the ubiquitous Sørøy Group metasedimentary succession took place before c. 800 Ma. Deposition of the Sørøy Group succession was considered to have occurred during the period c. 1.3-0.8 Ga (Aitchison 1990). Daly et al. (1991) also proposed that the >800 Ma tectonothermal event "be termed the 'Porsanger orogeny', from Porsangerhalvøya where the pre-800 Ma structures were first recognized."

Robins (1991, 1996) subsequently reintroduced an older term for this very same, Late Riphean event – the 'Sørøyen' orogeny or event. This particular term, deriving from structural relationships observed on Sørøya (Sturt 1972), was originally coined (Gee & Wilson 1974) for the Late Cambrian-Early Ordovician tectonometamorphic event on this island. Later, this event became known as the 'Finnmarkian Phase' of the Caledonian orogeny (Ramsay & Sturt 1976), an event now

recognized widely in some of the Baltoscandian-derived nappes of this region. Re-application of the term 'Sørøyen' to a >300 million year older event is therefore inadvisable. Recent isotopic dating (R.J. Roberts, pers. comm. 2002) and preliminary stable isotope investigations (V.A. Melezhik, pers. comm. 2003) on Sørøya are also indicating that it would be unwise to redefine the 'Sørøyen' and extend its usage away from the type area in the southwestern part of the island.

The name 'Porsanger' for this pre-800 Ma (or pre-850 Ma; Kirkland & Daly 2003, R.J. Roberts pers. comm. 2002) should also be abandoned, for two main reasons. First and foremost, the geographical name Porsanger has already been used for the *Porsanger Dolomite (Formation)* (Holtedahl 1918, White 1969), part of the Tanafjorden Group in the subjacent Gaissa Nappe Complex (Fig. 1). This designation clearly has precedence following the rules of the Norwegian Committee for Stratigraphy (Nystuen 1989).

A second reason, and in part following from the above, is that it is clearly inappropriate, indeed unacceptable (Nystuen 1989, section 4.8), in naming a deformational-diachronous unit, to borrow or re-use a geographical name that has been applied to a stratigraphic unit from a completely different nappe or thrust sheet, in this case the subgreenschist-facies Gaissa Nappe Complex (Gayer et al. 1987, Rice et al. 1989). Moreover, the structural and metamorphic history of the Gaissa Nappe metasedimentary rock assemblage – a succession with an age range from latest Riphean to Early Tremadoc (Reading 1965, Nikolaisen & Henningsmoen

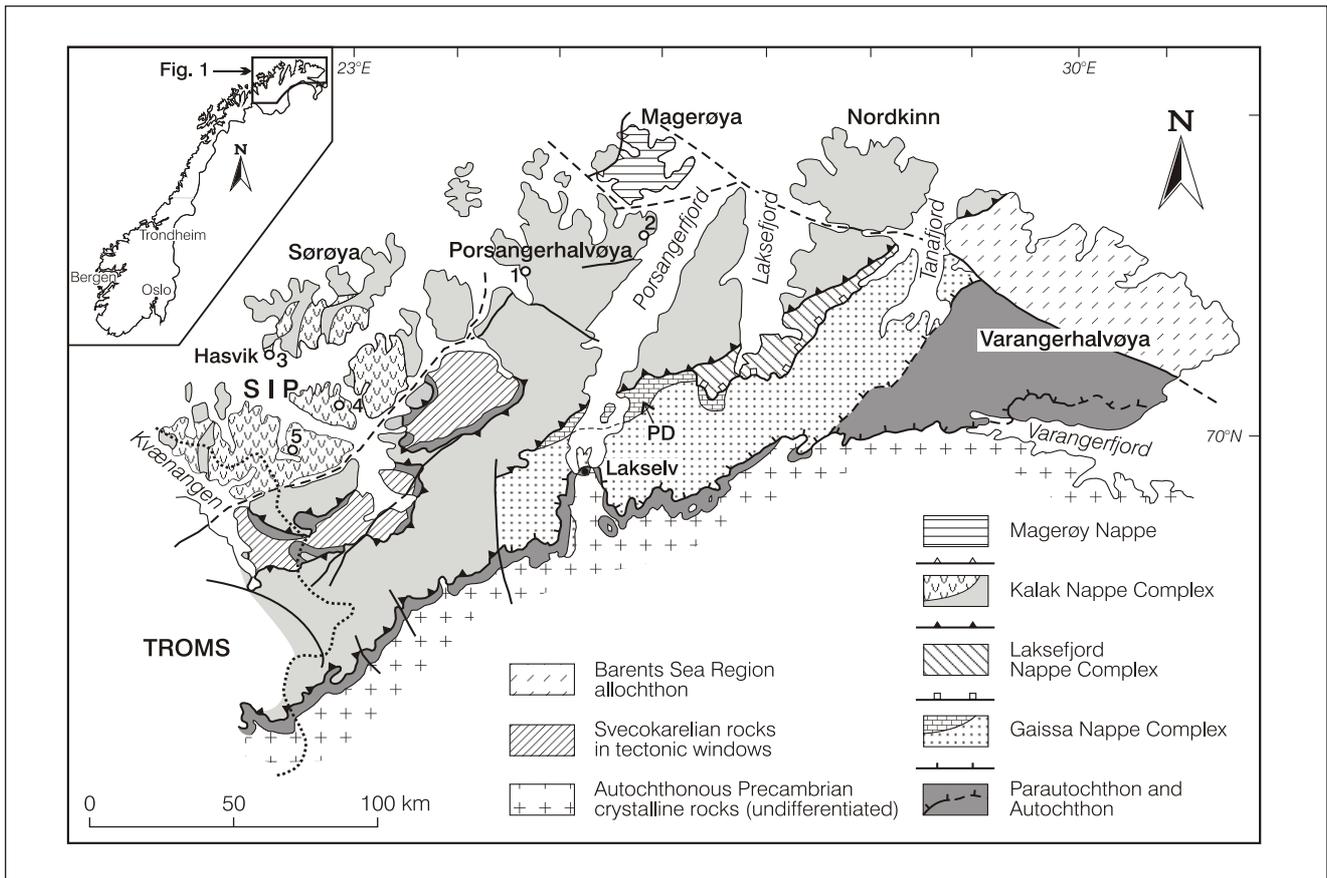


Fig. 1. Simplified tectonostratigraphy of the Caledonides of Finnmark (modified from Roberts 1985). The five small circles numbered 1-5 mark the locations of the samples dated by Daly et al. (1991), the first three of which formed the basis for their introduction of the term 'Porsanger orogeny'. 1. Litlefjord metagranite, U-Pb zircon  $804 \pm 19$  Ma (now revised to  $850 \pm 15$  Ma, Kirkland & Daly 2003). 2. Repvåg metagranite, Rb-Sr whole rock  $851 \pm 130$  Ma. 3. Hasvik gabbro, Sm-Nd whole rock/minerals  $700 \pm 33$  Ma (now revised, with a U-Pb zircon, Vendian age, R.J. Roberts, pers. comm. 2002). 4. Kvalfjord gabbro, Sm-Nd whole rock/minerals  $612 \pm 33$  Ma. 5. Storvik gabbro, Sm-Nd whole rock/minerals  $604 \pm 44$  Ma. PD – principal areas of outcrop of the Porsanger Dolomite (Formation). SIP – Seiland Igneous Province (V ornament).

1985) – is far simpler than that recorded in the multiply deformed and pluton-intruded Kalak Nappe Complex.

A solution to the dilemma of finding a new, acceptable, geographical name in an area where many such names have already been used for numerous formations, thrust sheets or faults lies in the fact that two of the five rocks dated by Daly et al. (1981) come from the peninsula of Porsangerhalvøya (Fig. 1). It is from these localities, and thrust sheets, that these authors defined their pre-800 Ma orogenic event; in particular from the fact that the Litlefjord granite ( $804 \pm 19$  Ma; now redated to  $850 \pm 15$  Ma – Kirkland & Daly 2003) is cutting a penetrative foliation and folds in the country rocks. It is therefore proposed that this informal deformational-diachronous unit be renamed the 'Porsangerhalvøyan' event. This designation eliminates the objections raised by use of the name Porsanger, and at the same time acknowledges recognition and, as yet, restriction of these structures to the type area on Porsangerhalvøya.

The ultimate significance, extent, precise origins and age of the 'Porsangerhalvøyan' folding and related foli-

ation remain to be discovered. As yet, it is not known how areally restrictive these structures may turn out to be, and whether they may relate, for example, to a rift-affiliated, transtensional, mega-shear zone rather than be accorded the status of major, contractional, orogenic deformation (cf. Reginiussen et al. 1995). On the other hand, it is not altogether impossible, given the poor lower age constraints, that the deformation may relate to late-stage, Sveconorwegian activity (cf. Leslie & Nutman 2003). The precise nature of the affiliation of the host rocks intruded by the Litlefjord granite is also contentious. Daly et al. (1991) and Ramsay et al. (1985) considered that the granite cuts migmatitic psammities of the Klubben Formation of the Sørøy Group, whereas Rice (1990, p.171) favoured intrusion into basement paragneisses of the Eidvågeid Sequence. The existing map picture (Gayer et al. 1985, Roberts 1998) shows that the granite cuts through imbricated basement and cover rocks. If correct, this would place a pre-850 Ma age on some of the thrust-sheet imbrication in at least the higher parts of the Kalak Nappe Complex. A detailed remapping of this small area is clearly required. In addition, more isotopic dating and structural studies

are necessary on Sørøya and neighbouring islands in order to fully assess the extent of the Porsangerhalvøyen tectonothermal event.

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