Pedersen et al. 1988, Zwaan & van Roermund 1989). The new dates show that magmatic rocks of the Seiland Province and nearby areas range in age from as young as about 520 Ma to as old as about 800 Ma. To interpret the dates requires a structural geologic analysis as well as a geochronologic one–what rocks and structures are the dated rocks actually cutting? The interpretation that they cut orogenic structures has led several authors (Daly et al. 1988, Aitcheson et al. 1989, Aitcheson & Taylor 1989) to an exciting new model: that the Klubben Psammite and other metasedimentary rocks of this part of Finnmark belong to a Late Proterozoic orogen. Part of this older orogen was accreted as a relatively cold and rigid suspect terrane to the Caledonian orogen during the Silurian Caledonian event. According to this model, the 'Finnmarkian' deformation in this area could no longer be regarded as Caledonian, but must be considerably older. Near the Hasvik gabbro the deformation must have ended around 700 Ma.

Thus, from the first round of isotopic dates a previously unrecognized orogenic event was postulated, and now from the second round of dates, a still older orogenic event is being proposed. However, the dated rocks – peridotites, gabbros, and syenites – are atypical for orogenic magmatism. The age of this orogenic event is yet unclear, as various igneous rocks giving dates as diverse as ca. 800, 700, 610, and 520 Ma, all seem to be broadly synkinematic. If there was more than one orogenic event in this area it must be established which rocks were affected by which events. This has also been a problem with the interpretation of both Finnmarkian and Scandian events. Neither the regional stratigraphic sequence nor the Seiland plutonic rocks seem readily divisible, and yet both must be divided according to the multi-orogenic models. There must be some regional break hidden in the stratigraphic, metamorphic, structural, magmatic, and isotopic-age patterns. While continuing the search for such breaks, we should also consider the opposite approach: correlating rocks which have not previously been correlated. In such an attempt, Krill et al. (1988) dated a 'Scandian' gabbro, obtaining a 'Finnmarkian' age and suggesting that it may be related to the Seiland Province. They also suggested that some Scandian and Finnmarkian stratigraphic units are equivalent.

The rocks of the Seiland Province probably do cut older orogenic structures in the Proterozoic basement rocks, but I doubt that they cut orogenic structures in the Klubben Psammite or overlying supracrustal units. This question needs detailed study. If they do not cut synchronous orogenic structures, we can consider a model of crustal extension and rifting for the Seiland Province. Some petrologic aspects of this model have been summarized by Andréasson (1987). The ages of about 800–520 Ma for the Seiland intrusions fit the known pattern of rift-related igneous rocks from breakup of the Late Proteozoic supercontinent. The compilation of Bond et al. (1984) shows these rocks to range in age from 850 to 525 Ma, with a concentration of ages between 700 and 570 Ma.

Most of the magmas of the Seiland area were apparently derived from mantle depths and intruded at moderate to deep crustal levels; but precise intrusion depths are uncertain. To obtain accurate pressure estimates, mineral assemblages formed during intrusion and contact metamorphism must be isolated (Mørk & Stabel 1989, Zwaan & van Roermund 1989). Equilibrium must not be assumed between these minerals and the regional metamorphic assemblages. Syn-magmatic extension or rifting of the middle and lower crust would presumably be associated with high heat flow. Although relatively brittle normal-faulting characterizes the deformation in shallower levels of younger continental rift zones, ductile deformation, such as blastomylonitization should be expected in a deeply eroded Late Proterozoic rift. Figure 2 in Sturt & Ramsay (1988) shows blastomylonites cut by a mafic dike on Sørøya.

Further structural study of the Seiland Province and country rocks might allow recognition of growth faults or rotated extensional faults. It is also not yet clear which of the regionally mapped sedimentary units were intruded by the older plutons of the Seiland Province. Most of the Seiland magmas intruded only as high as the Klubben Psammite, the lowest unit of the stratigraphic sequence. In the pre-orogenic rift model, it need not be assumed that the upper stratigraphic units are as old as the Late Proterozoic intrusions. If there are hidden hiatuses, low-angle unconformities, or low-angle faults in the highly deformed sedimentary sequence, the Klubben Psammite could be as old as 800 Ma while higher units could range into the Early Paleozoic.

The map pattern from the Husfjord area seemed to leave little doubt that gabbro intrudes higher stratigraphic units (Speedyman 1983, Sturt & Ramsay 1988). Nevertheless, Krill & Zwaan (1987) questioned this interpretation, and following an eight-hour midnight-sun visit to this locality (during the geophysical cruise mentioned below), I still think that the gabbro–Falkenes contact could be interpreted as tectonic. Contact metamorphism is documented in the Klubben Psammite (Speedyman 1983), but I observed no contact metamorphic effects in the Storelv Schist or Falkenes Marble. The schist is kyanite-bearing in contact with amphibolitized gabbro, suggesting temperatures and pressures in the realm of regional metamorphism. Layering in the marble rafts shows sweeping fold structures, and the marble lacks scarn development, even within a centimeter of the metagabbro contact. The rafts may be fold enclaves rather than