xenoliths. The gabbro and associated diorite are notably sheared along parts of the contact, even against rocks as ductile as marble. On the other hand, in some places the contacts are sharp, and the rocks nearly undeformed. The gabbro generally appears 'fresh' in the field, even for such a structurally competent rock. Thus the field evidence seems ambiguous. The most reasonable field interpretation would be that of Speedyman (1983), that the gabbro intrudes the metasediments. But, just as with the Honningsvåg gabbro on Magerøya (Krill et al. 1988), correlations imply that the Husfjord gabbro is older than some of the sediments surrounding it (Krill & Zwaan 1987). If so, the contact would be tectonic rather than intrusive.

In the summer of 1988, I was fortunate to participate on a 4-day geophysical survey and sampling cruise in the northeastern half of the Seiland Province with the Geological Survey of Norway. We observed and sampled from over 50 shoreline localities evenly distributed around the islands of Seiland and Stjernøya. I was impressed by the common presence of modal cumulate layering, high-temperature ductile foliation with garnet and pyroxene, layer-parallel extensional deformation, and abundance of mafic and syenitic dikes cutting the high-temperature structures. It seems that many of the igneous rocks were being deformed at granulite-facies metamorphic grade at the same time as the plutons and dikes intruded. In the rift-magmatic hypothesis, this metamorphism is not orogenic, but rather is regional-scale contact metamorphism related to the high thermal gradient produced by thinning of the crust, upwelling of asthenosphere, and intrusion of magma. The spread of ages from 800 to 520 Ma for both deformation and intrusion is most compatible with such a model. Following this long period of magmatism, continental rifting in the Seiland area apparently terminated when sea-floor spreading to produce the Caledonian Iapetus ocean initiated elsewhere.

As an aid in improving and testing the rift model for the Seiland rocks, it may prove useful to compare them with the igneous rocks of the Oslo graben. The Permian 'Oslo Petrographic Province', exposed over an area of about 40×200 km, is a classic example of magmatism in such a paleorift. Although the period of intrusions was relatively short, deformation took place between and during the different magmatic events (see Fig. 5 in Ramberg & Larsen 1978). The Oslo Province exposes a relatively shallow level in a rift zone, as many of the volcanic rocks have not yet been removed by erosion. Nevertheless, it is much deeper than other known rifts, where volcanic rocks dominate over intrusive rocks. It is very uncertain what rocks and structures lie below the Oslo Province at depths corresponding to the present erosion level of the Seiland Province. Although the Oslo Province displays mainly alkaline felsic rocks at the surface, gravity studies (Ramberg 1976, Neumann et al. 1986, Wessel & Huseby 1986) suggest that the Oslo Province overwhelmingly consists of mafic or ultramafic rocks at depth. These rocks can be studied geophysically, and can even be sampled in the form of ultramafic xenoliths brought to the surface in a basalt (Neumann et al. 1988). It is not yet known if perhaps the rocks at depth are systematically somewhat older than the felsic rocks, or what ductile deformation structures might be present at these depths. It seems likely that a synthesis of our knowledge of the Seiland and Oslo provinces will lead to a better understanding of the characteristics of different levels of continental rift environments.

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