The purpose of this field excursion is to examine the classic examples of superposed folding exposed on the glaciated slabs on the shores of the reservoir of Loch Monar. The outcrops are world-famous following the descriptions and analysis by John Ramsay over sixty years ago. These outcrops inspire discussion not only of polyphase folding and its tectonic significance but also the recognition of rheological contrasts and the role of melting and volume change during deformation.

The outcrops are within the Morar Group of the Moine Supergroup. These are Neoproterozoic strata, chiefly psammites and pelites, probably sourced from the erosion of Grenvillian basement. They were deposited on Lewisian-type basement of the Laurentia. The Morar Group lies in the footwall to the Sgurr Beag Thrust, a Caledonian structure - arguably a mid-crustal analogue to the more famous Moine Thrust. Both were NW/NNW-directed structures. However, the Sgurr Beag Thrust has been refolded creating complex map patterns (Fig. 3.1).

The refolded geometries at Loch Monar principally relate to D2 and D3 deformations - and both deform the Sgurr Beag thrust (and rocks on either side). D1 structures are difficult to recognise (they did not feature in Ramsay’s original account) but are layer parallel and are inferred to reflect shearing associated with the thrust. However, the regional significance and absolute age of these deformation events/episodes remains controversial. Likewise the origin of the thin pegmatites is debatable - Ramsay argues that they are sourced from a buried Caledonian granite while others suggest that they chart a thermal peak during the enigmatic “Knoydartian” orogenic event (750-800 Ma). All things that can be discussed while examining the stunning structures....
Fig. 3.2. Simplified geological map of the Loch Monar study area (located on Fig. 3.1). Modified after Sheet 57N 06W - Great Glen (BGS 1:250000 solid geology). key outcrops at at A. Modified from Ramsay (2010: Moine field guide).

Fig. 3.3. Layer patterns resulting from superposed folding - as illustrated by Ramsay (1967, Fig. 10-13) depending on the angle between hinge lines (α) and the angle between the poles of axial surfaces (β).

\[ \alpha = \text{angle between first fold axis and } b_2 \]

\[ \beta = \text{angle between pole to first fold axial surface and } \phi^0 \]

\[ \text{between } \phi^0 \text{ & } 90^0 \]

\[ 90^0 \]

\[ \text{between } \phi^0 \text{ & } 90^0 \]

\[ 0^0 \]

\[ \phi^0 \]

\[ 1 \]

\[ 2 \]

\[ 3 \]

\[ 4 \]

\[ 5 \]

\[ 6 \]

\[ 7 \]

\[ 8 \]

\[ 9 \]

\[ 10 \]

\[ 11 \]

\[ 12 \]
Fig. 3.5. Classic superposed folding patterns in Moine psammites at Loch Monar.
Fig. 3.5. Ramsay's (1957) field illustrations of fold interference patterns that outcrop on the glaciated slabs at Loch Monar.

Fig. 3.6. Examples of thin granitic seams (the "quartz-feldspathic sheets" in Fig. 3.5) developed in the Moine psammites at Loch Monar.