

# Geologic studies on rocks of the Jurassic Ferrar Group

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As part of the helicopter-supported research in the Shackleton Glacier region, geologic studies were conducted on Jurassic extrusive and intrusive rocks (Ferrar Group) and, to a limited extent, on underlying Permian and Triassic strata (Beacon Supergroup).

Work on the Ferrar rocks had two principal aims: first, the collection of Ferrar Dolerite sills for geochemical analysis and radiometric dating and, second, the examination and collection of rocks from the Prebble Formation, a pyroclastic sequence underlying the Jurassic Kirkpatrick Basalt, in order to understand its paleovolcanology and tectonic setting. Dolerite sills were collected at sites from Cape Surprise to Otway Massif (figure) to provide as complete a stratigraphic coverage of their occurrence as possible. Sites ranged from the basement granite to the Prebble Formation, thus encompassing the whole of the Beacon sequence. In addition, a special effort was made to collect sills from the Nilsen Plateau that have been reported to carry significant amounts of olivine and, thus, possibly to be more mafic than any other known occurrence of Ferrar tholeiites. In the course of work on the Otway Massif, a subvolcanic system was discovered. This system shows subsurface interactions related to the formation of the pyroclastic rocks of the Prebble Formation.

The pyroclastic rocks of the Prebble Formation were examined at Mount Pratt and Otway Massif where as much as 360 meters (m) of stratigraphic section are present (Elliot and Larsen 1993). New sections were measured, and previously measured sections were re-examined; evidence was found for water-magma interactions, and these interactions support a phreatomagmatic origin for these deposits, like that advo-

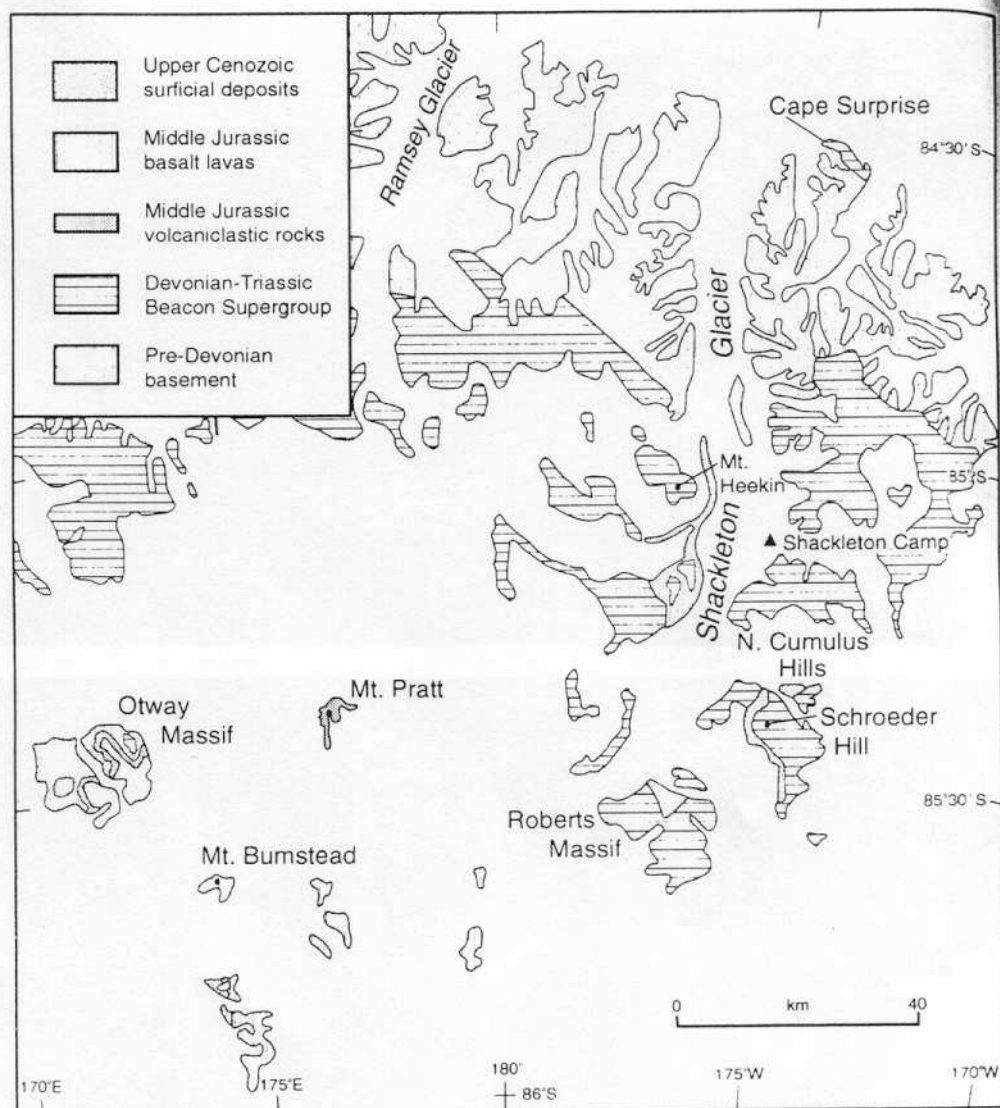
cated for the Prebble Formation rocks in the Marshall Mountains north of the Beardmore Glacier (Hanson and Elliot 1994, in press). Based on regional relationships, the contact with the Triassic Falla Formation appears to have significant topographic relief. The Falla Formation shows considerable tilting and folding, both of which are attributed to the emplacement of Ferrar magmas at shallow depths. Intrusion breccias with compositions somewhat similar to the breccias of the Prebble Formation occur in a number of places as thin dikes and small bodies. At two localities, the contact with the overlying basalts is marked by a paleosol. In the course of work on the Beacon rocks, an additional area of deformed Falla Formation strata was discovered near Schroeder Hill and again is attributed to emplacement of Ferrar magmas at shallow depth; although intrusion breccias were not found, dikes with irregular and contorted forms cut the Falla rocks.

Coarse-grained channel sandstones were collected from the Upper Permian part of the Buckley Formation and from the Triassic Fremouw and Falla Formations for provenance studies on zircons and thermal history from apatites. The former will be used to investigate evidence for an active magmatic arc as well as crustal ages in the source regions and the latter, for estimates of the possible original stratigraphic thickness of the lavas as well as timing of any postdepositional heating.

Field checking of the geology of the Shackleton and Ramsey Glaciers region was carried out so that, with the aid of existing maps and information supplied by other project participants at the Shackleton Glacier camp, three 1:250,000 geologic quadrangle maps can be completed.

After completion of the work in the Shackleton Glacier region, further fieldwork was conducted at the Coombs Hills in southern Victoria Land where pyroclastic rocks of the Mawson Formation, equivalent to the Prebble Formation, are extensively exposed (Grapes, Reid, and McPherson 1974; Bradshaw 1987). The Mawson rocks show similarities to the Prebble Formation breccias and again are the products of major phreatomagmatic eruptive events that involved explosive interaction between magma and groundwaters held in the Beacon sedimentary rocks. Clastic dikes, made up of varying proportions of sedimentary and volcanic material, are common, as are intrusion breccias and small plugs and dikes of basalt. The great thicknesses of breccia and the widespread occurrence of dikes and sills in the Mawson Formation suggest that the region was a major eruptive center during the Jurassic.

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Location and simplified geologic map of the Shackleton Glacier region. Ferrar Dolerite sills are co-extensive with both the Permian-Triassic Beacon Supergroup rocks and the Middle Jurassic volcanoclastic rocks of the Prebble Formation. Solid triangle indicates the location of the Shackleton camp.

## References

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