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15. The Southern Continuation of the Wilson Thrust

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INTRODUCTION

The Wilson thrust was discovered during GANOVEX V (1988/89) and identified at that time for some 80 km in the Wilson Hills in northwestern Victoria Land from Axtheim Ridge (Noll Glacier) to McCain Bluff. The thrust is situated within the Wilson Terrane trends about NNW-SSE and dips to the WSW. The upper plate is thrusted to the NNE (FLÖTTMANN & KLEINSCHMIDT 1991a, b; in press). At McCain Bluff, rocks resembling the metaturbidites of the Morozumi Range are overthrust by Wilson migmatites. Therefore, a southern prolongation of the Wilson thrust was assumed also between granitoids of Renirie Rocks and metaturbidites of Lonely One Nunatak (Fig. 1) and between basement of the Helliwell Hills (SW) and the metaturbidites of the Morozumi Range. Field work during GANOVEX VI was aimed to produce evidence in favour of these assumptions.

WILLIAMS BLUFF

Contrary to our earlier assumption, Williams Bluff is not cut just by a small secondary thrust but by the main one. The bluff consists entirely of coarse-grained granitic mylonite with slickenside-like transport lineation and a perfect, rather large-scale, ductile s-c fabric due to well preserved granite-derived feldspar crystals about 5 cm in diameter. Williams Bluff is about 500 m high and 4 km long. That means, the shear zone has to have a minimum thickness of 1000 m. The average orientation of the c-surfaces - and therefore of the thrust as such - is 260/55 (dip direction: CLAR compass), the transport lineation is down dip, the direction of tectonic transport 75-80° confirming the data given by FLÖTTMANN & KLEINSCHMIDT (1991 b).

RENIRIE ROCKS

Many inconspicious indications of thrusting were found at Renirie Rocks. The nunatak consists mainly of granitic rocks of Granite Harbour Intrusives. The southernmost end only is made up of agmatitic migmatites. Marked shearplanes with a slickenside-like appearance are rare in the migmatites and in the western and central granitoids but increase in abundance to the northeast, down the slope to the Rennick Glacier. Their spacing lies between 10 cm and 1 m, sometimes even closer. Most of these shearplanes form discrete surfaces, but towards the NE there are shearzones more than 5 cm wide and deformation zones with a collective width of 75 cm. The shear surfaces are often overprinted by glacial striations and therefore sometimes hard to distinguish.

All shear planes dip with 25-40° to the SW (220-250°) with a mean of 240/35, i.e. they show a low variance and are parallel to the main thrust. The distinct, slickenside-like lineation on the shear planes due to quartz fibre alignment reflects a tectonic transport towards ENE (70°) like the Wilson thrust itself (FLÖTTMANN & KLEINSCHMIDT in press).

Therefore, the small shear planes in the granitoids of the eastern part of Renirie Rocks have to be regarded as small associates of the Wilson thrust. The latter must pass closely to the east of Renirie Rocks. Its distance to Lonely One Nunatak and the nunataks to the west may be larger as traces of thrusting are hardly recognizable there. Only joints and quartz veins showing fibre growth and slickenside striation occur, parallel to the thrust in

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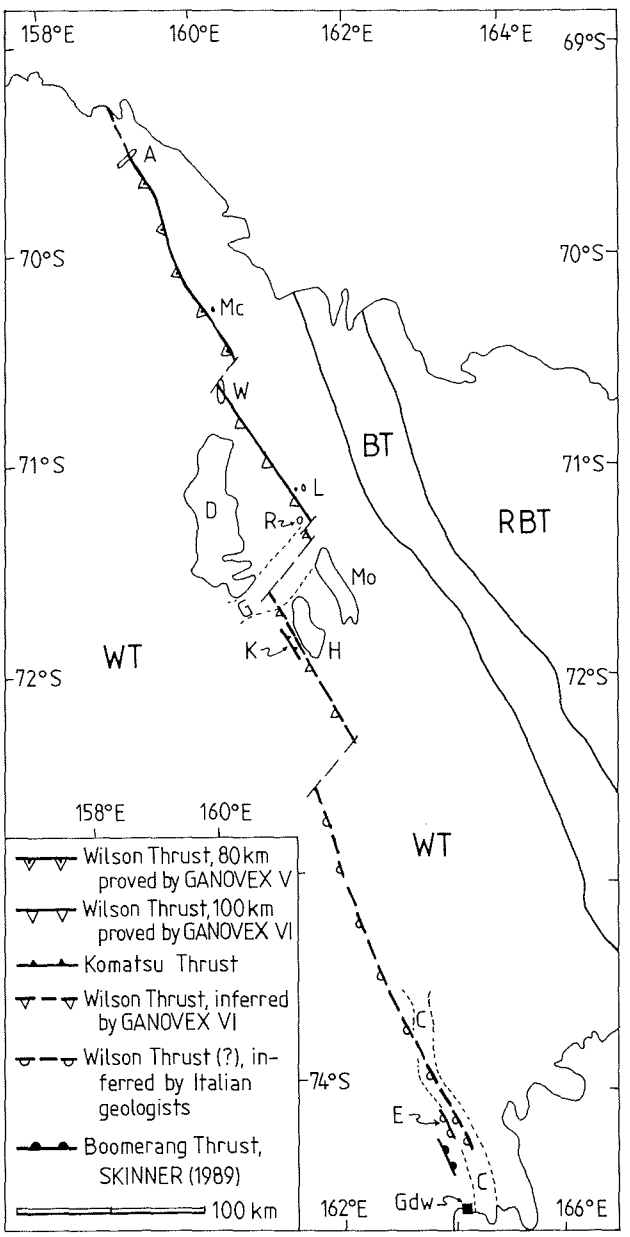

Fig. 1: The Wilson Thrust in Victoria Land. WT = Wilson Terrane, BT = Bowers Terrane, RBT = Robertson Bay Terrane, A = Axtheim Ridge, C = Campbell Glacier, D = Daniels Range, E = Mt. Emison, G = Gressit Glacier, Gdw = Gondwana Station, H = Helliwell Hills, K = Komatsu Nunatak, L = Lonely One Nunatak, Mc = McCain Bluff, Mo = Morozumi Range, R = Renirie Rocks, W = Williams Bluff.

Abb. 1: Die Wilson-Überschiebung in Viktorialand. WT = Wilson Terrane, BT = Bowers Terrane, RBT = Robertson Bay Terrane, A = Axtheim Ridge, C = Campbell Glacier, D = Daniels Range, E = Mt. Emison, G = Gressit Glacier, Gdw = Gondwana Station, H = Helliwell Hills, K = Komatsu Nunatak, L = Lonely One Nunatak, Mc = McCain Bluff, Mo = Morozumi Range, R = Renirie Rocks, W = Williams Bluff.

direction. These planes have the position 220/40, their lineation 210/40. The arrangement of the quartz fibres indicates northeasterly thrusting of the hanging wall.

The temperature conditions during thrusting will be evaluated through thin section investigations. From field evidence, a minimum of 450° C is indicated by pegmatites, ductile s-c fabric, and c-axes of tourmaline grown parallel to the transport lineation.

Sometimes, 10-30 cm thick aplitic dikes cut the shear zones. As these belong to the Granite Harbour magmatic

event, the compressional deformation of Renirie Rocks and, consequently, of the Wilson thrust interfere with the Granite Harbour magmatism and belong both to the Ross Orogeny.

The displacement of the minor thrusts on Renirie rocks is minimal: 8 subthrusts of outcrop 4G2015 amount to 11 cm.

SOUTH OF RENIRIE ROCKS

The field results from Williams Bluff and Renirie rocks confirm the structure suggested by striking photo lineations found in the ice cover between the two areas on LANDSAT images AN 89 and AN 90 (1983). Moreover, LANDSAT image AN 89 suggests that south of Renirie Rocks the thrust continues for about 10 km up to the middle of the Gressit Glacier, after a righthand offset of 2.5 km.

HELLIWELL HILLS

The continuation of the Wilson thrust further south is not clear. Because of its thickness at Williams Bluff and its significance at Renirie Rocks a termination is unlikely. The following possibilities have to be discussed (Fig. 1): (i) Straight continuation into the Morozumi Range (without offset); (ii) location between Morozumi Range and Helliwell Hills; (iii) pass through the Helliwell Hills; (iv) position between Helliwell Hills and Komatsu Nunatak; (v) west of Komatsu Nunatak.

For assumptions (ii) to (v) an offset has to be postulated along the Gressit Glacier.
(i) A close check showed no evidence for the presence of relevant shear zones in the Morozumi Range.
(ii) The position in the gap between Morozumi Range and Helliwell Hills has been postulated by FLÖTTMANN & KLEINSCHMIDT (1991 b). But the very low grade rocks of the Morozumi Range continue without break in metamorphic grade across the glacier in the Helliwell Hills (see TESSENSOHN et al. this volume). Contrary to the situation at Renirie Rocks no secondary shear zones were found along the opposite margins of these two mountain ranges.
(iii) A N-S continuation through the central Helliwell Hills can be disproved, because both, metamorphism and deformation, increase gradually in the exposed rocks from E to W.
(iv) A continuation of the thrust between Helliwell Hills and Komatsu Nunatak is indicated by late folds of pegmatites. Their attitude of long-short limbs and their vergence indicate a top to NE directed tectonic transport. This feature resembles thrust-related F3-folds of pegmatites at Axtheim Ridge near the northern end of Wilson thrust. A minor thrust system within Komatsu Nunatak (Komatsu thrust) shows the opposite sense of shear, as the hanging wall is thrusted some 10 m to the west. Komatsu thrust therefore has to be regarded as a conjugate set of the Wilson thrust system.
(v) We cannot exclude that the assumed righthand offset of the Wilson thrust along the Gressit Glacier is much larger than 40 km. In this case, the southern continuation of the thrust would pass to the west of Komatsu Nunatak but due to the lack in outcrop there is no evidence for such a case.

CAMPBELL GLACIER AREA / CENTRAL VICTORIA LAND

A continuation of the Wilson thrust system towards the Ross Sea is probable, because several ductile shearzones have been discovered along the western margin of the Campbell Glacier by Italian geologists: at Mt. Emison late medium-grade shearzones are dipping towards 230-250° (CASTELLI et al. 1989); at Wishbone Ridge south of Mt. Dickason, mylonites occur parallel to the schistosity (210-230/60-40; PALMERI et al. 1989). This seems to indicate the presence of a larger thrust system along the Campbell Glacier the geometry of which corresponds to the one of the Wilson thrust (250/40). Compared to these thrust zones, the „Boomerang thrust" (SKINNER 1989) is unimportant and can be regarded as conjugated and therefore as an analogue to the Komatsu thrust mentioned above. It can never be regarded as an equivalent of the more than 400 m wide Exiles thrust in Oates Land (FLÖTTMANN & KLEINSCHMIDT 1991a, b; in press).

In summary it can be statet: Down dip attitude of transport lineations and thus, orthogonality of the Wilson thrust kinematics, could be proved for more than 220 km, i.e. from Axtheim Ridge to Renirie Rocks. This contradicts any transpressive character of the thrust.

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