POLYPHASE THRUST TECTONICS IN THE BARBERTON GREENSTONE BELT.

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In the circa 3.5 by old Barberton greenstone belt, the supracrustal rocks form a thick and strongly deformed thrust complex. Structural studies in the southern part of the belt have shown that 2 separate phases of over-thrusting (D_1 and D_2) successively dismembered the original stratigraphy. Thrust nappes were subsequently refolded during later deformations (D_3 and D_4). This poster deals with the second thrusting event which, in the study region appears to be dominant, and (unlike the earlier thrusting), affects the entire supracrustal pile.

The supracrustal rocks form a predominantly NE/SW oriented, SE dipping tectonic fan (the D_2 fan) in which tectonic slices of ophiolitic-like rocks are interleaved with younger sedimentary sequences of the Diepgezet and Malalotcha Groups[1] (Fig. 1). Two distinct levels of decollement can be distinguished within this fan: (1) Within the ophiolitic sequence, usually below the pillow lavas. These zones are delineated by strongly sheared serpentinite lenses and talcose schists. Asbestos fiber is commonly developed in such sheared lenses, as for example in the Havelock and the Msauli asbestos deposits. (2) At the base of the Diepgezet Group, within ferruginous shales and banded cherts. This upper decollement zone is not always obviously sheared, but it is ubiquitously folded in a disharmonic manner and is thought to have been gravity induced, on a dynamic slope, during sedimentation, because: (1) The finely laminated rocks at this stratigraphic level are conformably to unconformably overlain by a 2 to 3 km thick medium to coarse grained clastic sequence (the rest of the Diepgezet Group and the Malalotcha Group; the Malalotcha Group is derived from a quartz-rich source and from the reworking of folded Diepgezet Material). (2) Within the D_2 fan, individual tectonic units may be folded independantly of one another[2] (Fig. 2). The D_2 folds are mostly isoclinal, with fold axes broadly parallel to the thrust contacts (Fig. 2), and are contemporaneous with the emplacement of the nappes. Another set of D_2 folds is contemporaneous with the deposition of the Malalotcha Group sediments and probably formed in tectonically ponded basins, during periods of thrust propagation along the lower decollement level.

Structural and sedimentological data indicate that the D_2 tectonic fan was formed during a prolonged, multi-stage regional horizontal shortening event during which several types of internal deformation mechanisms were successively and/or simultaneously active. Movement appears to have been predominantly to the NW and to the N. During D_2, periods of quiescence and sedimentation followed periods of thrust propagation. Although the exact kimematics which led to the formation of this fan is not yet known, paleoenvironmental interpretations together with structural data suggest that D_2 was probably related to (an) Archean collision(s).

References

(1) Lamb, S. (1984) Structures and sedimentology on the eastern margin of the Archean Barberton greenstone belt, northwest Swaziland, Ph.D Thesis, University of Cambridge, UK. (2) Paris, I.A. (1985) The geology of the Simbubule area, Barberton. Ph.D Thesis, University of the Witwatersrand, Johannesburg, South Africa.

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Paris, I.

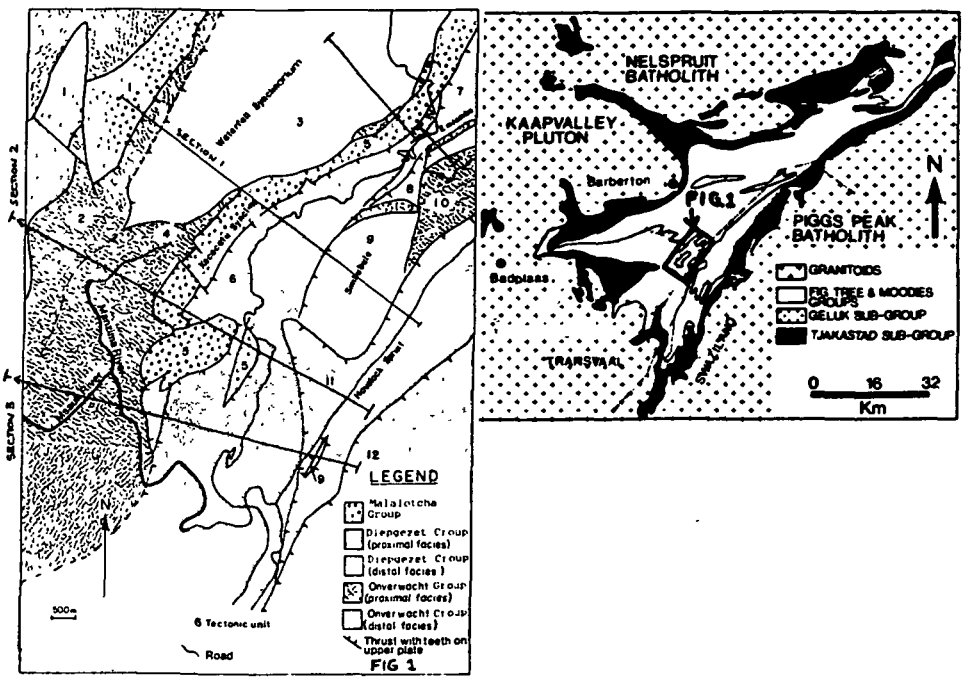

FIG 1

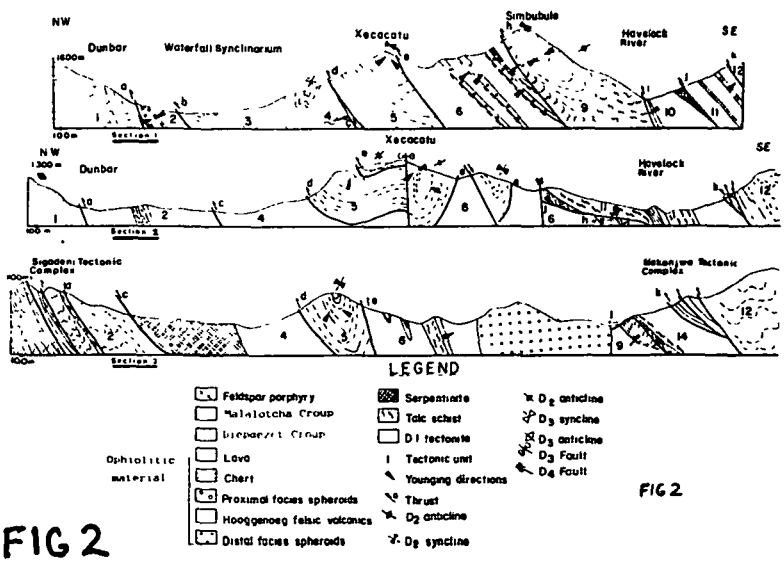

FIG 2

Figure Caption: (1) Simplified geological map of part of the investigated area (for location see inset). (2) Three sections, as located on Fig. 1 showing part of the thrust complex. Note how some of the thrust-slices (individually numbered) composed of sediments (*Diepgezet* and *Malalotcha Groups*) are tight to isoclinally folded. Folding and thrusting are related to the same regional deformation (D_2).