

ARCHAEAN WRENCH-FAULT TECTONICS IN THE ABITIBI GREENSTONE BELT OF CANADA; C. Hubert and J.N. Ludden, Department of Geology, Universite de Montreal, Montreal, Canada, H3C 3J7.

Structural studies in the southern sector of the Abitibi greenstone belt of Canada have defined a deformation style associated with a wrench-fault system (1). The fundamental features of this tectonic regime are the following:

i) the formation of lozenge - shaped blocks of terrane which are bounded either by fault - zones or by highly strained zones of ductile deformation. In these blocks there is a pronounced gradient in degree of deformation from well preserved cores to highly deformed and sometimes mylonitized margins;

ii) sedimentary accumulations occur along the margins of the blocks in a series of narrow basins bounded by shear - zones;

iii) blocks of different lithologies and structural and metamorphic histories have been juxtaposed;

The deformation history is summarized below and shown in simplified form in Figure 1. The first deformation phase was simple shearing associated with WSW - ESE sinistral wrench faulting which resulted in NW - SE fold traces and transected schistosity. Progressive deformation affected blocks of terrane in a tectonic regime in which volcanism, shearing, deformation and uplift and erosion were synchronous; terranes composed dominantly of felsic volcanics were juxtaposed with blocks of ultramafic volcanic and sedimentary accumulations.

The first deformation phase was followed by N - S compression resulting in the development of major E - W thrust-shears. This deformation resulted in the formation of an E - W fold trace and crenulation cleavage. The superposition of the two deformation episodes resulted in the generation of NE - SW and NW - SE complementary faults defining " S " and " Z " sigmoidal forms in highly strained E - W shear - zones (Figure 2).

U - Pb zircon ages, compiled in Ludden et al., (2) indicate that the volcanic accumulations in the Porcupine, Rouyn-Noranda and Val D'Or areas of the southern Abitibi belt define an axis of volcanism of tholeiitic lineage that was at its peak at approximately 2700 m.y.. These volcanic rocks superimpose an older volcano-plutonic terrane which is characterized in the NE - Abitibi belt and can be correlated towards the SW across the Kapuskasing front to the Wawa subprovince (2,3). This axis of volcanism is approximately 2850 - 2720 m.y. in age and is dominated by calcalkaline volcanic and plutonic rocks.

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A tectonic model is proposed in which the southern Abitibi belt formed in a series of rift basins which dissected an earlier formed volcanic arc. Comparisons can be made with Phanerozoic areas such as, the Hokuroko basin of Japan, the Taupo volcanic zone of New Zealand and the Sumatra and Nicaragua volcanic arcs. In addition the identification of the major E - W thrust shears make it possible to speculate that the southern Abitibi belt comprises a collage of blocks of terrane which have been accreted against a more stable continental margin or micro-continent. If this interpretation is correct analogies can be made with the SW margin of the U.S.A. in which recently formed blocks of volcanic terrane are being accreted against the western margin of the U.S.A..

FIGURE 1 : Deformation History of the Southern Abitibi Belt.

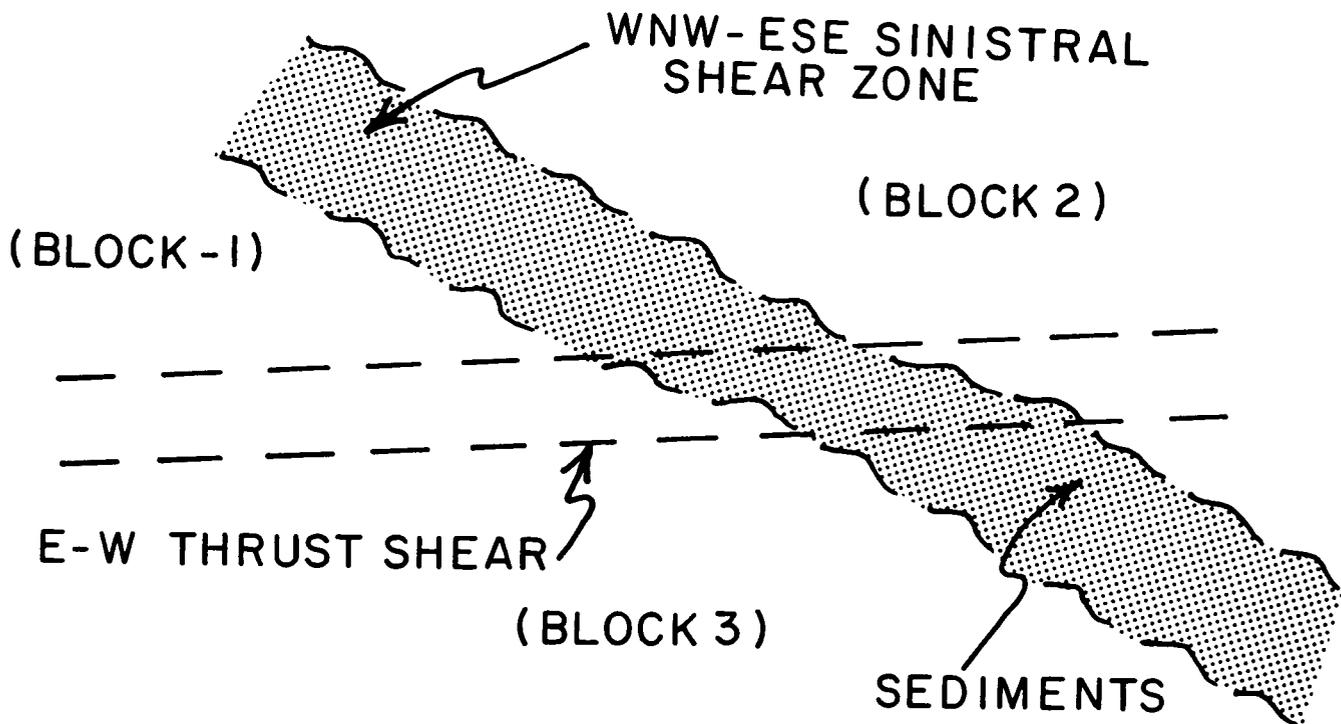
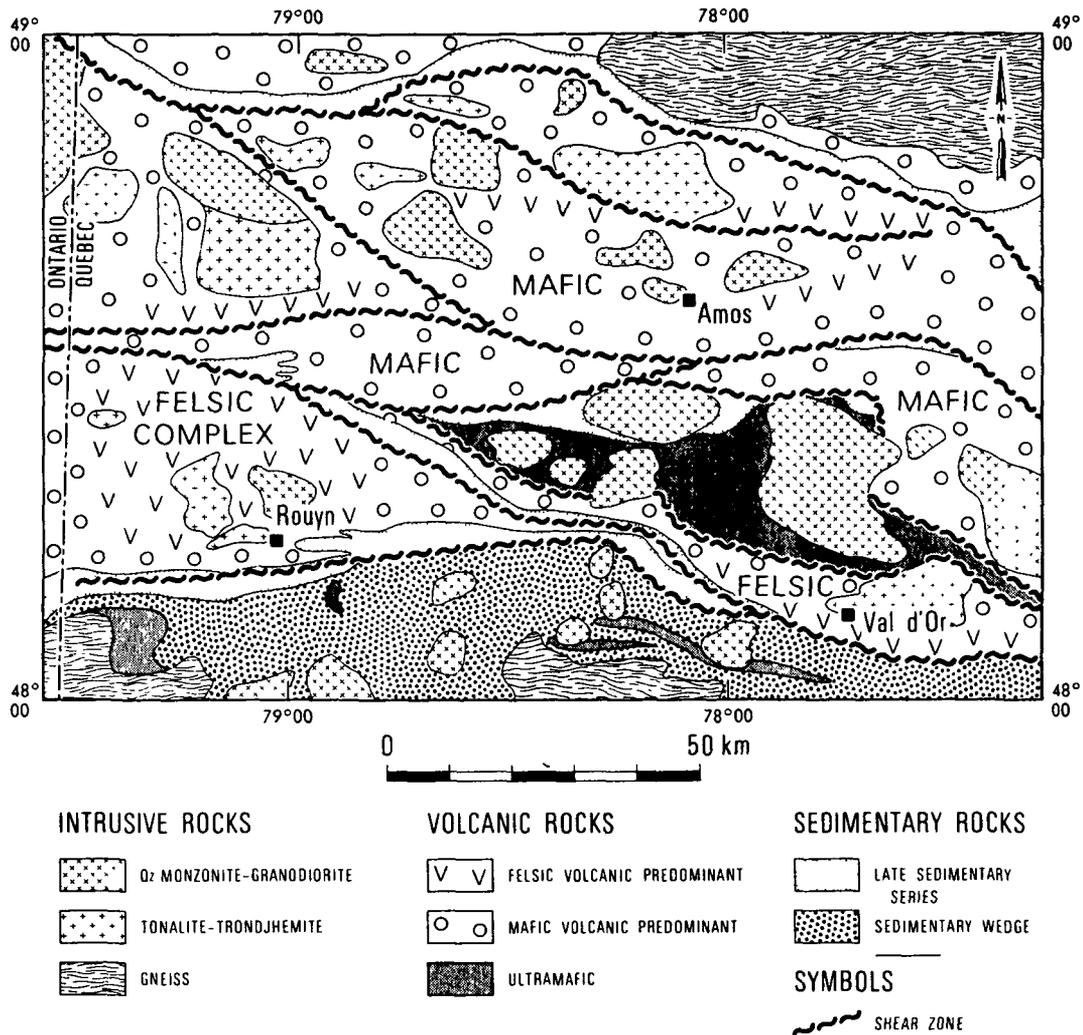


FIGURE 2 : Schematic representation of " lozenge - shaped " blocks of terrane bounded by shear-zones and thrust-shears in the Southern Abitibi belt



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