N86-23132

BASEMENT-COVER RELATIONS AND INTERNAL STRUCTURE OF THE CAPE SMITH KLIPPE: A 1.9 Ga GREENSTONE BELT IN NORTHERN QUEBEC, CANADA; M.R. St-Onge and P.F. Hoffman, Geological Survey of Canada, 588 Booth St., Ottawa, Ont. K1A 0E4, S.B. Lucas, Geological Sciences Dept, Brown University, Providence, R.I. 02912, D.J. Scott, Geology Dept, McMaster University, Hamilton, Ont. L8S 4L8, and N.J. Bégin, Geological Sciences Dept, Queen's University, Kingston, Ont. K7L 3N6.

The Cape Smith Belt is a 380x60 km tectonic klippe (1 and references therein) composed of greenschist- to amphibolite-grade mafic and komatiitic lava flows and fine-grained quartzose sediment, intruded by minor syn- to post-tectonic granitoids. Previously studied transects in areas of relatively high structural level show that the belt is constructed of seven or more north-dipping thrust sheets which verge toward the Superior Province (Archean) foreland in the south and away from an Archean basement massif (Kovik Antiform) external to the Trans-Hudson Orogen (Early Proterozoic) in the north. A field project (mapping and structural-stratigraphic-metamorphic studies) directed by MRS was begun in 1985 aimed at the structurally deeper levels of the belt and underlying basement, which are superbly exposed in oblique cross-section (12 km minimum structural relief) at the west-plunging eastern end of the belt. Mapping now complete of the eastern end of the belt confirms that all of the metavolcanic and most of the metasedimentary rocks are allochthonous with respect to the Archean basement, and that the thrusts must have been rooted north of Kovik Antiform. The main findings (2) are:

1. A thin autochthonous to parautochthonous low-strain sedimentary sequence on the south margin of the belt rests directly on Archean basement showing no evidence of Proterozoic transposition.

2. The bulk of the belt is separated from the autochthon by a sole thrust which, except at the south margin of the belt, is located at the basement-cover contact. The hangingwall and footwall rocks of the sole thrust record high ductile strains over a zone of increasing width, from south to north, toward the hinterland. Late syn-metamorphic thrusts faults with relatively small displacements cut the sole thrust and its associated shear zone, and place basement gneisses over cover rocks.

3. Lensoid meta-ultramafic tectonic blocks occur locally within the basal shear zone. Their metamorphic anthophyllite-actinolite assemblage differs from the serpentine-tremolite assemblage of cumulate meta-ultramafics occurring in sills at higher structural levels. The blocks may have been tectonically transported from mantle depths during thrusting, although this idea remains to be tested.

4. The allochthonous rocks above the sole thrust occur in a series of thrust sheets bounded by south-verging (D1) thrust faults, which are defined by structural repetitions of stratigraphy and splay from the sole thrust. Favorable lithologies at all structural levels (excepting the southern autochthonous margin) have a pevetrative syn-metamorphic schistosity (S1) which is planar to south-facing tight to isoclinal folds of bedding (F1).

5. A transverse stretching lineation (L1) common in the lower stgructural levels and pervasive in the basal shear zone, when considered with the F1 fold asymmetry and overall thrust-ramp geometry, indicates relative southward translation of the cover during D1.

6. A pelitic interval above the sole thrust on the north margin of the belt contains the metamorphic assemblage kyanite-staurolite-garnet-biotite-muscovite-plagioclase-quartz. The asemblage is indicative of metamorphic T of 550°C and minimum P of 5.5 Kbars.

7. Mesoscopic late- to post-metamorphic chevron to rounded parallel folds (F2) of the S1 fabric have a marked limb asymmetry suggestive of a gravitational origin as folds cascading off basement-cored macroscopic D2 antiforms into pinched cover-rock synforms. The distribution of north- versus south-vergent mesoscopic folds however is not always consistent with the mapped limbs of the macroscopic folds, possibly reflecting diachronous development of the macroscopic folds.

8. Macroscopic high-angle D3 crossfolds affect both the basement and cover in the eastern half of the belt and provide a cumulative structural relief of 12-15 km. D3 fold hinges are readily documented by reversals in plunge azimuth of the D2 folds. Plunge projections permit the construction of a composite structural cross-section linking the highest and lowest structural levels of the belt.

The main implication of these observations is that the presence of Archean basement beneath the belt has no direct bearing on the question of the tectonic setting of the mafic-ultramafic magmatism.

REFERENCES

(1) Hoffman, P.F. (1985) Can. J. Earth Sci., 22, 1361-1369.
(2) St-Onge, M.R. et al. (1986), Geol. Surv. Can. Pap. 86-1A.