

A deformed accretionary terrane in the Newfoundland Appalachians

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An imbricate stack of three thrust sheets is present on New World Island, northeast Newfoundland. These sheets are separated by movement zones, commonly marked by melange. Because of the tectonic setting and the geometry the area is interpreted as part of an accretionary terrane.

Our work shows northwest directed thrusting indicating southeasterly subduction. The presence of an U. Lland-

overy olistostrome near Cobbs Arm in one of our movement zones, date that thrust as U. Llandovery. Since this sheet is one of the lowest in the pile, the formation of the accretionary prism, as now exposed, must have started prior to the U. Llandovery.

Sedimentological work in the area by a group of workers from Oxford University reveals three distinct sequences which were interpreted as being deposi-

ted in three different basins, bounded by high angle faults which were active during sedimentation. More recently it has been suggested that the faults are northwest dipping thrusts. Either interpretation is incompatible with our structural data. There are no suitable high angle faults and they assume the opposite sense of movement on the thrusts to that determined in the field. Furthermore, the youngest basin is associated with the oldest thrust and the oldest basin with the youngest thrust; this is not normal in accretionary terranes where the piggy-back relationship is observed.

We present an alternative explanation which agrees with both the sedimentological and the structural information. First we assume that the fault delineated basins were parts of a single continuous basin and that the pre-deformational spatial distribution of the parts was the reverse of that assumed by the Oxford group for the basins. Thus the northwest basin, in their interpretation, becomes the southeast portion of our continuous basin and so forth. This we believe, fits the sedimentological data better than the assumption that the spacial distribution was the same, before deformation, as

now. In our model the present distribution is a product of thrusting and later folding.

Sedimentation occurred on the west margin of the Iapetus Ocean during Ordovician and L. Silurian times. Current directions and composition of the sediments show the source to be to the northwest where there was an island arc and the North American craton. Starting in L. Silurian times, underplating of the basin floor took place with subduction to the southeast and an accretionary prism was formed. Continued shortening caused folding of the thrust pile and finally the collision between North America and Europe resulted in modification of these folds.

This deformation sequence offers an explanation of the observed variation in deformational history in this part of the Appalachians. In the northwest the Taconic event represents Ordovician subduction along the edge of the North American continent and the Acadian event represents the Silurian/Devonian collision. In the southeast the deformation is related to subduction on the southeast side of Iapetus plus the final collision. It is continuous from at least as early as L. Silurian through to Devonian.