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THRUST TECTONIC VARIATIONS ALONG THE IAPETUS CLOSURE ZONE ACROSS THE BRITISH ISLES: EXAMPLES OF VERGENCE CONTROLS AND PLATE MOTION TRAMLINING ARISING FROM PRIOR SUBDUCTION MARGIN SEGMENTATION.

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Circum-Pacific subduction zones display abundant evidence of sharply bounded along-strike segmentation related to major differences in the profile of the subduction interface. These, notably the shallow landward displacement of the subducting plate downbend, by hundreds of kilometres in some segments, or groups of segments, are attributed to subduction tectonic erosion (STE) of the hanging wall. Thus the configuration of the hanging wall exerts major control upon the subduction process. Large offsets in the hanging wall at segment boundaries must tend to tramline the direction of subduction, changes in plate convergence direction being accommodated elsewhere by a component of strike-slip.

When ocean closure causes two such variably undercut margins to meet, much further convergence may be possible, at least until, somewhere, the respective subduction interface downbends are closely opposed. Due to segmentation, the thin-skinned and/or imbrication tectonics that develop during this "crunch" phase ìmay vary sharply along strike, the vergence being decided by which of the opposing segments can override the other at the moment of encounter. In turn, the dominant vergence will determine which subduction interface is active and therefore which of the built-in tramlining directions is operative. To exhaust the closure potential of both margins a late change of vergence (and tramlining direction?) is likely.

Across the British Isles, both margins of Iapetus had experienced subduction. Evidence of Ashgill-Llandovery northward displacement of arc volcanism by STE is present within the Southern Uplands-Longford-Down (SULD) complex and conglomerates of the Scottish Midland Valley. Similar evidence of major SSE-ward STE, during Llanvirn-Caradoc, is present in eastern Ireland (Balbriggan-Tramore) and the Irish Sea area (Isle of Man-Snowdonia) but is limited to 30km in the English Lake District.

Four tectonically distinct resulting segments can be discerned:- English, Manx-Welsh, Irish, and Connemara. Summary interpretations follow. In the English segment the lack of STE meant that the former subduction interface dipped steeply SE from near the shelf edge, giving the margin a rigidity that enabled the SULD complex to override it for about 100km, accreting its Southern Belt in the process. In the Irish segment, by contrast, the STE-thinned SE margin overrode the SULD complex, overturning it northward. In the intervening Manx-Welsh segment, the cross-over of behaviour produced a largely frontal encounter of the margins, relieved by SE-directed imbrication (N of Isle of Man, N of Anglesey) of the thinned margin, and eventually by a basal thrust reaching to S Wales. Finally, in all three segments the entire SULD complex was sheared off its roots and thrust NNE over its arc terrane. In the Connemara segment, however, the SULD complex equivalent was apparently driven beneath its hinterland but there is no evidence of what happened first. Sinistral action within the SULD complex probably represents the disparity between the two tramlining directions.

These interpretations have in part been controlled by a large body of stratigraphic and sediment-derivation data.

Some conclusions. (N.B. These appeared on the poster only.)

1. Ordovician subduction beneath the SE margin of Iapetus in the British Isles was 160^{o} -directed and major segmentation, by STE of the hanging wall, occurred, evident as differences in arc migration.

2. After elimination of Iapetus in Late Llandovery time, the several crunch tectonics phases involved an estimated further 700km of plate convergence.

3. During crunch, progressive NNW-vergent thrusting N of 'the suture' (including the 340^{o} -directed Girvan-Ballantrae thrusting (A.Williams, 1959)) was controlled in direction by the tramlining beneath the reactivated SE margin.

4. Crunch produced complex thin-skinned interleaving of the two margins, varying from segment to segment. Along-strike offshore segments may differ yet again.