

**SEQUENCE OF TECTONIC ENVIRONMENTS DURING PLATE CONVERGENCE
AND COLLISION: THE CONTROLLING INFLUENCE OF PRIOR STE BENEATH
THE MARGINS, WITH SOME CALEDONIDE EXAMPLES**

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Subduction tectonic erosion (STE) occurs when downbend faulting of a subducting plate, occurring beneath the forearc, continually entraps wedges of the superincumbent forearc material. This carves away the base of the forearc, advancing the downbend location at shallow depth beneath the margin. Circum-Pacific examples show that this advance, once started, is typically very rapid and can proceed for many hundred kilometres, undercutting the original arc, a new one often appearing far to the rear.

A margin thus modified by STE constitutes a huge ready-made thrust sheet, resting on a well-marked shear zone, and this applies even if subduction beneath that particular margin has ceased. This leads to strong qualitative expectations as to the structural behaviour of such STE-undercut margins, both during open-ocean closure and during the protracted collision sequences which such margins engender. Differing significance attaches to major changes of vergence, depending on when it occurs. Along-strike segmentation of the margins, in respect of the amount of prior STE, will result in sharply differing tectonics.

A collision where there had been little or no prior STE beneath either margin would appear far less well suited to yielding the kinds of tectonics encountered in major collision belts, but minor closures must be of this sort.

These points will be illustrated briefly by reference to the Ordovician-Silurian closure of Iapetus in the British Isles and the coeval developments in the central Scandinavia-Greenland Caledonides. In particular, the moment of "crunch" (shelf touches forearc) appears to have been simultaneous (at ca.431Ma/ base turriculatus) in both and the amounts of subsequent closure could have been similar. Both the Southern Uplands Northern Belt and the Norwegian Western Gneiss are seen as the products of the imbricate collapse of the northwestern plate margin, but in very different circumstances. The Western Gneiss now underlies the nappes of the southeastern margin as a result of late back-thrusting. STE segmentation of the southeastern margin in the British Isles sector probably accounts for the occurrence of strong north-westward overturning in Longford-Down and its general absence further east, in the Southern Uplands.