

SCALY MELANGES AND MULTIPLE OPHIOLITIC "SUTURES": POSSIBLE SUBDUCTION INTERFACE MATERIALS GENERATED DURING CRUSTAL THINNING BY SUBDUCTION TECTONIC EROSION

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In a number of circum-Pacific examples, the well-marked down-bend of the subducting oceanic plate occurs, not in the vicinity of the trench, but shallowly displaced by several hundred kilometres beneath the margin. The lower part of any originally thicker crust in this region is missing. Also, at least off NE Japan and off N-Central Peru, the subducting plate passes through a minor inflexion near the trench.

Development of this changed configuration is attributed to subduction tectonic erosion (STE). The STE arises from downbend-related penetrative downfaulting of the subducting plate. Incremental movements of the faults beneath the forearc entrap and carry away slivers of the hanging-wall material, resulting in a progressive change of downbend location. Similar action at the near-trench inflexion may be reversed as the plate emerges from the inflexion zone, disgorging these slivers into the interface melange.

Thus the underside of the extensive forearc sheet will be "battered" with a sheared mixture of ophiolitic, pelagic and other material imported by the subducting plate, plus some upper-plate material detached and carried along by it. The latter could range widely in character because the forearc sheet may encompass some former oceanic crust and a former arc, as well as continental crust.

Scenarios for the ultimate exposure of the interface materials all stem directly from the configuration. The thinned and extensive forearc sheet may fail structurally, collapsing by imbrication, either during open-ocean subduction or at the start of collision. Each imbricate sheet will have a "battered" base, so the stack will be a multiple "sandwich" in which the butter has the aspect of a series of ophiolitic sutures. If the slices get carried down and lodged successively at the subduction downbend, eventual metamorphism, prior to exhumation, may turn the butter into a series of ophiolitic streaks and pods of remobilised serpentinite. Finally, continental collision may push thick crust beneath the undercut forearc sheet, resulting in its erosion and the exposure of the subduction interface melange.

Possible examples abound, ranging from the ophiolitic streaks and pods in high-grade exotic terranes of the North American Cordillera and in the Western Gneiss of Norway, through the multiple "sutures" between the Alpine Penninic Nappes, to the argile scagliose (Apennines) and the Dunnage Melange of northern Newfoundland. In each case, confirmation as such would shed major light on the evolution of the orogen concerned.