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Tectonic evolution of the Taiwan orogenic wedge.

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Taiwan represents the best area to study the processes associated with the growth of orogenic wedges. Because of the obliquity of the plate convergence and the geometry of the ocean-continent transition in the Eurasian plate, the progressive evolution from oceanic subduction to the subduction of the continental margin of China induces : (1) in the domain of incipient continental subduction to the south, major eastward backthrusting and shortening of the forearc domain between the former oceanic accretionary wedge and the Luzon arc volcanic edifice and (2) in the domain of mature continental subduction to the north, accretion of parts of the arc domain to the collisional belt associated with westward thrusting and block rotation. Geological observations show that the forearc domain is very narrow along eastern Taiwan and that the arc is probably absent to the north of 24˚N, suggesting that the frontal part of the arc was subducted during an earlier stage of the collision. A model is proposed for the tectonic evolution of the Taiwan orogenic wedge since 12 Ma. In the core of the growing wedge, metamorphic rocks of the Central Range were progressively exhumed and rose through the overlying rocks of the old oceanic wedge owing to the combined effects of erosion of the internal domain of the wedge and underplating at depth favoring uplift. The metamorphic rocks rose along the subvertical surface marking the western extent of the backstop formed by the forearc lithosphere. During uplift of the internal parts of the mountain belt, the rocks of the early oceanic accretionary wedge (including ophiolite blocks of former mélanges) resting on top of it, were deeply eroded and became the source for the olistostromal blocks currently included in the Lichi mélange. Most of these sediments were deposited in collisional basins during shortening of the

forearc domain and were later involved in thrusting. Foreland deformation developed to the west in the Taiwan Strait. Offscraped remnants of the forearc domain including forearc- and intra-arc sediments were tectonically mixed with sediments of former collisional basins. The asymmetrical mechanism of wedge growth by forward thrusting that had been operating in the Taiwan region up to this time was replaced by a more symmetrical evolution with significant backthrusting. Uplift therefore occurred because of the conjugate effects of east-dipping, forward out-of-sequence thrusting, and west-dipping backthrusting. The forearc domain was shortened significantly at this stage. The tip of the arc basement now enters in the collision process, indenting the Central Range, which is now cut by an east-dipping, out-of-sequence thrust. A major west-dipping thrust developed in response to indentation by the arc lithosphere and cut through the continental lithosphere of the China margin. This process might result in the development of a new subduction zone that propagates southward.