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1 Thrust belts asymmetries and parameters

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The volumes of the orogens above sea-level are about one order of magnitude larger for those belts associated to E-NE-directed slabs with respect to the opposite W-directed slabs. The mean slope of wedge topographic surfaces is about 4.8˚ and 1.9˚ for E-NE-directed and W-directed subductions respectively. The regional foreland monocline is shallower along E-NE-directed slabs than in the opposite settings.

Two asymmetric orogens or accretionary prisms can be distinguished, 1) those in which the subduction hinge migrates toward the upper plate, and 2) those where the hinge migrates away from the upper plate. This difference mostly applies for orogens associated to E-NE-directed or W-directed subduction zones respectively. End members are the Andes, Alps and Himalayas for the first type, and the Barbados, Apennines and the Banda arc for the second type. Convergence, shortening and subduction have independent rates that are function of the migration of the subduction hinge, and the viscosity of the involved upper and lower plates.

Distinctive characters of the asymmetry are also the double vergence versus the single vergence, slow versus fast subsidence rates in the foredeep or foreland basin, deep versus shallow rocks involved by the prism, no or poorly developed backarc basin versus well developed backarc basin. In the orogens along E-NE-directed subduction zones, the basal decollement is in general much deeper than along the accretionary prisms associated to the opposite W-directed subductions, thus generating lower relief.

Besides these first order differences, each orogen is the combination of distinct internal parameters that may also vary along strike. They are namely the depth of the basal decollement, the convergence rate, the shortening rate, the subduction rate, the dip of

the foreland monocline, the topographic envelop, the structural envelop, the foredeep or foreland subsidence rate, the prism uplift rate, the thrusts spacing, the heat flow variability, the thickness and composition of the upper and lower plates, the erosion rate, the sediment supply in the foredeep, and the extension rate, if any.