Some Comments on the Use of Accretion and Collision in Orogenic Studies

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Abstract:

There is a notion among some earth scientists worldwide that accretion and collision are two different processes, which is largely derived from the generally accepted distinction between collisional and accretionary orogens. Instead, we argue there is no distinction between accretion and collision as a process, because both record the amalgamation of two, generally buoyant and unsubductable terranes. An exception is made when accretion is used in the sense of incorporating small bodies of sedimentary and/or volcanic rocks into an accretionary wedge by off-scraping or underplating, because such processes commonly are too short and localized to identify them as distinct events. Hence a qualitative assessment of the scale and nature of the accreted terranes and continents seems to play a significant role in distinguishing between accretion and collision, the boundaries between which have never been defined.

Another orogenic classification concerns the use of soft versus hard collision. This terminology is not widely used in the Americas, but is popular in Europe and Southeast Asia. Usage in literature indicates that soft collisions occur when contractional deformation and associated metamorphism are principally concentrated in rocks of the leading edge of the partially pulled down buoyant plate and the upper plate forearc terrane. Soft collisions generally change into hard collisions over time, except if the collision is rapidly followed by formation of a new subduction zone due to step-back or polarity reversal. Marked thickening and metamorphism of the arc`s suprastructure and retro-arc part of upper plate due to contractional deformation and burial are in our opinion the most distinctive characteristic of a hard collision or an advancing Andean-type margin. Strong rheological coupling of the converging plates and lower and upper crust in the down-going continental margin promotes a hard collision. Application of the soft-

hard terminology in orogenic studies can be useful. We discuss an example of the Newfoundland Appalachians where hard and soft segments of the Taconic collision are juxtaposed along the Cabot- Baie Verte fault system. We propose that these segments came together by large-scale dextral translations bringing the Dashwoods terrane, which records a hard collision in the Notre Dame arc from a position to the north of Newfoundland to its present position opposite the Humber margin, where the Taconic collision was soft.

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