Geophysical Research Abstracts
Vol. 14, EGU2012-13486, 2012
EGU General Assembly 2012

Structural heterogeneity in mountain belts: rift- vs. subduction-related control.

A. Vitale Brovarone (1,2,3), J. Malavieille (1), M. Beltrando (2), O. Beyssac (4), G. Molli (5), D. Herwartz (6,7), D. Rubatto (8), P. Monié (1), C. Groppo (2), R. Compagnoni (2), J. Hermann (8), L. Martin (8), Y. Lagabrielle (1), and F. Meresse (9)

(1) Géosciences Montpellier, Université Montpellier 2 - CNRS, Cc 60, Place Eugène Bataillon, 34095 Montpellier, France, (2) Dipartimento di Scienze Mineralogiche e Petrologiche, Università degli Studi di Torino, 10125 Torino, Italy, (3) presently at: ISTEP, Université Paris 06-UPMC, UMR UPMC CNRS 7193, 4 place Jussieu, F-75005, Paris, France, (4) IMPMC, CAMPUS JUSSIEU, BOI“ TE COURRIER 115, 4, PLACE JUSSIEU, 75252 PARIS CEDEX 05, FRANCE, (5) Dipartimento di Scienze della Terra, Universita‘ di Pisa, Via S.Maria 53, I-56126 Pisa, Italy, (6) Steinmann-Institut, Universität Bonn, Poppelsdorfer Schloss, 53115 Bonn, Germany, (7) Universität zu Köln, Institut für Geologie und Mineralogie, Zülpicher Str. 49b, 50674 Köln, Germany, (8) Research School of Earth Sciences, The Australian National University, Canberra ACT 0200, Australia, (9) CNRS-UMR 8538, Laboratoire de Géologie, Ecole Normale Supérieure, Paris Cedex 05, France

In subduction zones, the so-called subduction channel is believed to represent the locus where the primary exhumation of deeply subducted material occurs. It is also considered as a major zone of deformation and tectonic shuffling [1, 2]. The resulting intense deformation that is commonly observed in exhumed subduction terranes is generally considered as the cause for the lithological heterogeneity (e.g. association of continental basement rocks and meta-ophiolites) encountered in highly metamorphosed units [3]. In Alpine Corsica (Western Mediteranean), metamorphism and deformation vary from very low-grade up to lawsonite-eclogite facies conditions. Compared to similar domains of Western Alps [4], deformation in Corsica is often localized, allowing a detailed characterization of primary rift-related vs. subduction-related structures to be done through a wide spectrum of metamorphic conditions [4]. Based on extensive stratigraphic, structural, petrologic (including RSCM and pseudosection) and geochronological (U-Pb zircon; Lu-Hf garnet and lawsonite; Ar-Ar phengite) data, the main tectono-metamorphic units and their evolution from rifting to the final stages of orogenesis have been established. They show a high lithological heterogeneity that is essentially related to primary stratigraphic/tectonic processes occurring prior to subduction during continental break-up and subsequent oceanic extensional tectonics. Otherwise, each unit shows a remarkable metamorphic homogeneity over large areas. These features indicate that large volumes of subducted lithosphere behave as single and coherent tectonostratigraphic units during subduction/exhumation. As a consequence, the number of significant tectono-metamorphic boundaries is limited to the main contacts separating these large volumes of former lithosphere. Our study highlights on the major control exerted by inherited extensional structures during subduction and mountain building in opposition to the formation subduction-related mélange.

[1] Agard P, Yamato P, Jolivet L, Burov E. Exhumation of oceanic blueschists and eclogites in subduction zones: timing and mechanisms. Earth Sci Rev 2009; 92;53–79.

[2] Guillot S, Hattori K. Agard P, Schwartz S, Vidal O. Exhumation processes in oceanic and continental subduction contexts: A review, in Lallemand, S., and Funiciello, F., eds., Subduction zone dynamics: Berlin, Heidelberg, Springer-Verlag 2009; 175–204, doi: 10.1007/978-3-540-87974-9.

[3] Bousquet R. Metamorphic heterogeneities within a same HP unit: overprint effect or metamorphic mix? Lithos 2008; 103:46-69.
[4] Beltrando M, Rubatto D, Manatschal G. From passive margins to orogens: the link between ocean-continent transition zones and (ultra)high pressure metamorphism Geology 2010; 38:559–562.

[5] Vitale Brovarone A., Beltrando M., Malavieille,J., Giuntoli F, Tondella E, Groppo C., Beyssac O. and Compagnoni R. Inherited Ocean-Continent Transition zones in deeply subducted terranes: Insights from Alpine Corsica, Lithos 2011; doi: 10.1016/j.lithos.2011.02.013.