Geophysical Research Abstracts
Vol. 19, EGU2017-7914, 2017
EGU General Assembly 2017
© Author(s) 2017. CC Attribution 3.0 License.

Integrating rift inheritance and different plate kinematic scenarios in Alpine models: implications for the interpretation of the deep structures of the Alps

Gianreto Manatschal (1), Julie Tugend (1), Pauline Chenin (1), Michael Nirrengarten (1), Marie-Eva Epin (1), Suzanne Picazo (2), and Geoffroy Mohn (3)

(1) University of Strasbourg-CNRS, IPGS, EOST, Strasbourg, France (manat@unistra.fr), (2) University of Lausanne, Lausanne, Switzerland, (3) University Cergy-Pontoise, Paris, France

The Alps result from the imbrication of its former rifted margins and intervening oceanic basins. Thus, the formation and evolution of this orogen depends, among other factors, on the overall kinematic evolution, nature and size of the oceanic domain, and on the occurrence of inherited rift structures. Most Alpine models mainly focus on the compressional history. Only few of them integrate plate kinematic scenarios and rift/oceanic models based on the latest observations and concepts derived from the research developed at rifted margins. In this presentation we will mainly focus on three recent outcomes of this research that may significantly impact the interpretation of the Alps.
1) The nature of the J-magnetic anomaly (including anomaly M0) as an oceanic isochron is questioned as a result of the re-evaluation of the breakup processes offshore Iberia-Newfoundland. As a consequence, classical kinematic models proposed for the Iberia plate and used also for the Alpine domain need to be revised.
2) The size of the oceanic basins prior to their subduction in the Alpine domain indeed depends on the plate kinematic model. New plate kinematic models, in line with studies of the mantle rocks derived from the Alpine ophiolites, do not show any evidence for an unequivocal mature oceanic domain with depleted mantle lithosphere.
3) Hyperextended magma-poor rifted margins, such as the fossil Alpine Tethys margins, include extremely thinned continental crust (<10 km) and exhumed serpentinized mantle with minor magmatic additions. Rheological weaknesses inherited from hyperextension are likely to control the location of decoupling levels and formation of buttresses during orogeny resulting in important implications for the nature of orogenic roots and restorations.

In our presentation we will review different plate kinematic scenarios and their consequences for Alpine restorations (i.e. maximum vs. minimum size of the oceanic domains, widths of hyper-extended domains and timing of main events). In addition, we will discuss the importance of rift structures and their potential reactivation during Alpine collision. Eventually, our aim is to show how plate kinematic scenarios resulting in variable size of oceans as well as the complex rift architecture may result in antagonist interpretations of the deep structures of the Alps.