Geophysical Research Abstracts
Vol. 20, EGU2018-12377, 2018
EGU General Assembly 2018

Morpho-tectonic and magmatic evolution recorded in a fossil Ocean-Continent Transition: insights from field observations (Grison, Alps).

Marie-Eva Epin, Gianreto Manatschal, Méderic Amann, Charlotte Ribes, Antoine Clausse, and Théobald Guffon
Strasbourg, EOST, IPGS-CNRS, UMR 7516, Strasbourg, France (meepin@unistra.fr)

Despite the fact that many studies have investigated mantle exhumation at slow spreading ridges or deformation at proximal margins, there are still numerous questions concerning the 3D architecture, tectonic and magmatic processes associated to the formation of Ocean-Continent Transitions (OCT). Due to the general inaccessibility of rocks and structures of present OCTs, covered by thick sediments and/or deep water, we focus our study on a fossil OCT exposed in the Err and Platta nappes in SE Switzerland. Detailed mapping of the area enables to document the top basement architecture from a hyper-extended crust (Err nappe) to an exhumed mantle domain (Platta nappe) including the exhumation structures and their relationship with extensional allochthons, syn- and post-tectonic sediments and magmatic additions.

Our observations show a complex polyphase evolution and in-sequence stepping of detachment faults from hyper-extension to first mantle exhumation linked to a younging of the syn-tectonic sedimentation towards the future ocean. Further oceanwards, mantle exhumation occurs simultaneous to first magma emplacement. We highlight with field examples: i) the evolution from in- to out-of-sequence deformation, ii) the occurrence of poly-phase deformation showing exhumation faults truncated by later high-angle normal faults, iii) the interaction between tectonic and magmatic processes, iv) the existence of topographic top-mantle highs and lows, and v) intense fluid circulation and hydrothermal activity along damage zones of exhumation faults and high-angle normal fault.

The overall observations provide important information of the temporal and spatial evolution of the tectonic, magmatic, and fluids systems controlling the formation of ultra-distal magma-poor rifted margins over an area of 400 km^2. These field observations enable to better highlighting the 3D architecture of OCTs and the processes controlling lithospheric breakup and initiation of seafloor spreading.