Geophysical Research Abstracts
Vol. 17, EGU2015-2214, 2015
EGU General Assembly 2015

Ductile deformation of the continental crust below volcanic and non-volcanic passive margins: insight from high quality industrial seismic profiles

Camille Clerc (1), Laurent Jolivet (1), Jean-Claude Ringenbach (2), and Jean-François Ballard (2)
(1) CNRS, ISTO, Orléans, France (camille.clerc.geol@gmail.com), (2) Total, CSTJF, Pau, France

High quality industrial seismic profiles have now been acquired along most of the world's passive margins. Stunningly increasing resolution over the past decades leads to unravel unexpected structures and to see real images of models drawn from the integration of field data. Some profiles show clear indications of ductile deformation of the deep continental crust, more or less localized along large-scale shallow-dipping shear zones. Maximums of deformation are suggested at the very base of the continental crust, and the Moho appears to be strongly sheared. These shear zones show a top-to-the-continent sense of shear consistent with the activity of counter-regional (continentward) normal faults observed in the upper crust. This pattern is responsible for a migration of the deformation and associated sedimentation or volcanic activity toward the ocean. We present some of the most striking examples and discuss their implications for the time-temperature-subsidence history of the margins.

The distal domain of the non-magmatic margins is generally represented with an important sag basin (i.e. West African margins). This kind of sag basin is usually described as a vertically subsiding basin without differential tilting and resting on a highly thinned, little faulted continental crust. In contrast, we present new interpretations of seismic profiles across the West African margins showing evidences of intense syn-sedimentary tectonic activity within the Sag-basin. Sequences of low-angle normal faults horizontalizing in a hyper-stretched and ductile continental crust control a migration of the depot-center toward the ocean, in response to the horizontal extraction of the base of the continental crust and upper mantle. Finally, the hyper-thinned continental crust has undergone a ductile stretching under a cover of early syn-rift sediments, which implies a probable high thermal regime during rifting.