EARTHQUAKE MULTIPLETS AND DYNAMIC TRIGGERING IN THE WESTERN CORINTH RIFT, GREECE

C. Duverger[1], P. Bernard[1], H. Lyon-Caen[2], M. Godano[3], S. Lambotte[4], A. Deschamps[5], A. Nercessian[1]
[1]*Institut de Physique du Globe, Paris, France*
[2]*École Normale Supérieure, Paris, France*
[3]*Mines ParisTech, Fontainebleau, France*
[4]*Institut de Physique du Globe, Strasbourg, France*
[5]*Géoazur, Sophia-Antipolis, France*

Key words Corinth rift, multiplets, swarms, transient processes, pore pressure, creep, dynamic triggering.

The Corinth rift (Greece) is one of the most active tectonic structures of the euro-mediterranean area. Its north-south opening rate of around 1.5 cm.yr^{-1} results into a high microseismicity level and a few destructive M>6 earthquakes per century. The seismic activity follows a swarm organization with alternation of intensive crisis and more quiescent periods. A large number of multiplets, which are a set of earthquakes with a similar waveform, are recorded in the western part of the rift. Multiplets are often assimilated as repeated ruptures of small asperities due to transient forcing such as silent creep or diffusion of a pore pressure front. Here, we present various analyses on microseismic multiplets occurring in the western Corinth rift from 2000 to 2014 to retrieve their spatio-temporal characteristics and their coupling with seismic-aseismic processes.

Firstly, we focus on slow transient forcings with evidence of (1) fluid pore pressure migrations within permeable corridors resulting from the intersection of the major faults with a brittle geological layer (Fig. 1) during the large 2003-2004 swarm [1], (2) creep through a repeater-like multiplet initiating the 2003-2004 seismic crisis and the specific clustering of a multiplet located at the border of the fault plane of the 1995 Aigion seismic rupture. We show that multiplets with a persistent activity through several years, suggesting some forcing by creep, are located close to the northern coast of the gulf, whereas short-lived (few days) multiplets, possibly related to fluid pressure instabilities, are located under the gulf [2]. Many of identified spatial clusters have been reactivated in the last 15 years, which provides some clues to better assess the local strain rate and the origin of the forcing.

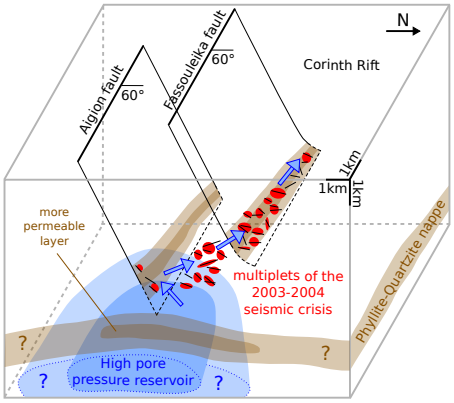

Figure 1. 3D view of the intersection of a Hellenic nappe with the Aigion-Fassouleika fault system. Permeable corridors allow the microseismicity diffusion forced by a deep capped high pore pressure reservoir.

Secondly, we analyze the dynamic triggering by moderate to large earthquakes of the microseismicity recorded in the western Corinth rift. We focus on three regional earthquakes: the 8 June 2008 M_w 6.4, the 22 January 2010 M_w 5.2, and the 7 November 2014 M_w 5.0. These events produced a global increase of the local microseismicity, and we attempt to characterize the differences in sensitivity of the various local clusters to the dynamic triggering.

References

[1] C. Duverger, M. Godano, P. Bernard, H. Lyon-Caen, S. Lambotte, The 2003–2004 seismic swarm in the western Corinth rift: Evidence for a multiscale pore pressure diffusion process along a permeable fault system, *Geophysical Research Letters*, **42**, 18, (2015)
[2] M. Godano, P. Bernard, P. Dublanchet, Bayesian inversion of seismic spectral ratio for source scaling: Application to a persistent multiplet in the western Corinth rift, *Journal of Geophysical Research*, **120**, 11, (2015)