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Pore Pressure Diffusion as a possible mechanism for the Ag. Ioanis 2001 earthquake swarm activity (Gulf of Corinth, Central Greece).

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The Gulf of Corinth rift (Central Greece) is one of the most seismotectonically active areas in Europe (Ambraseys and Jackson, 1990; 1997), with an important continental N-S extension of about 13 mm/yr and 6 mm/yr at the west and east part respectively (Clarke et al., 1997a). The seismicity of the area includes 5 main earthquakes of magnitude greater than 5.8 since 1960. In the western part of the rift, where the extension reaches its maximum value, earthquake swarms are often being observed (Bourouis and Cornet, 2009). Such an earthquake crisis has been occurred on 2001 at the southern margin of the west part of the rift. The crisis lasted about 100 days with a major event the Ag. Ioanis earthquake (4.3 Mw) on 8th of April 2001 (Pacchiani and Lyon-Caen, 2010). The possible relation between fluids flow and the observed earthquake swarms at the west part of the Gulf of Corinth rift has been discussed in the works of Bourouis and Cornet (2009) and Pacchiani and Lyon-Caen (2010). In the present work we examine the spatiotemporal properties of the Ag. Ioanis 2001 earthquake swarm, using data from the CRL network (http://crlab.eu/). We connect these properties to a mechanism due to pore pressure diffusion (Shapiro et al., 1997) and we estimate the hydraulic diffusivity and the permeability of the surrounding rocks. A back front of the seismicity (Parotidis et al., 2004) is also been observed, related to the migration of seismicity and the development of a quiescence region near the area of the initial pore pressure perturbation. Moreover, anisotropy of the hydraulic diffusivity has been observed, revealing the heterogeneity of the surrounding rocks and the fracture systems. This anisotropy is consistent in direction with the fault zone responsible for the Ag. Ioanis earthquake (Pacchiani and Lyon-Caen, 2010). Our results indicate that fluids flow and pore pressure perturbations are possible mechanisms for the initiation and the evolution of the Ag. Ioanis 2001 earthquake swarm activity and reveal the possible connection of the complex fracture network to the spatial evolution of seismicity on an active tectonic region as is the Gulf of Corinth rift.

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