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Multiplet analysis and microseismicity structure in the Western part of Corinth Rift (Greece) from 2000 to 2007

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The Gulf of Corinth, in Western Greece, is one of the most active rifts in Europe, with several instrumental and historical large earthquakes with magnitude larger than 5.5, active swarms, a significant background seismicity and an opening rate of 1.5 cm/year.
Focusing on an area around Aigion city, previous seismicity studies have shown the existence of a 3-4 km thick seismically active layer under the rift shallow dipping to the north, with nearly no seismicity at depths shallower than 4-5 km. Several hypothesis have been proposed to explain the existence and mechanism of this seismically active zone: the existence of a low-angle normal fault or shallow north dipping detachment zone on which the major normal faults are rooting and which acts as a shear zone, block deformation, or brittle-ductile transition.
We will present a multiplet analysis and a detailed relocation study of the seismicity from 2000 to 2007 using double difference relocation techniques. Multiplet analysis allows to improve relocation processes and to identify microstructures in seismicity clouds. Therefore, we have significantly improved the picture of the seismicity at depth, and bring some new elements for interpretations.
The seismicity is mainly located beneath the Gulf concentrated at depth of 6-10 km deepening towards the north, with no activity in the upper 4 km of the crust. A clear difference of seismicity is observed between the eastern and western part of this area: to the East, we observed a low seismic activity mainly structured along a low-dip angle plan (25-30°). To the West, the seismicity is much more significant with complex patterns, and is located within a low-dip angle structure (1-2 km thick) with several levels of fragmentation.
From the detailed picture of the seismicity obtained in this study, we will discuss the relationships between deep structures, faults observed at the surface or imaged by seismic/bathymetric studies, and the rupture of some large earthquakes (more particularly, the 1995 Aigion earthquake (Ms = 6.2) and the 1909 Fokis earthquake (Ms = 6.3)).
Finally, considering the space-time distribution of the seismicity, We will discuss the nature and the structure of the shallow dipping seismicity layer under the rift, and propose mechanical interpretations of the deformation in this part of the rift.