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Microseismicity and passive tomography results in Attica region, Greece

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New findings about the tectonic regime and volcanic arc of broader region of Attica, Greece were resulted from 3D passive tomography study.

The dataset was acquired from two local seismograph networks installed for the seismicity monitoring of the Attica region and Saronikos gulf in 2001 and 2004. The 2001 network included 28 land stations and 8 OBS. The network recorded 739 earthquakes with magnitude greater to 3. The recording duration of the network was 45 days. The second network included 17 portable seismographs and operated for 2 months in 2004. The network was recorded 545 earthquakes (M$>$3) in total. Both the seismograph networks used digital type instruments.

More than 12000 P-wave and S-wave readings have been analysed and the most of these were finally used in the passive tomography (5492 for the P-wave and 5081 the S-wave). The rest of these were from earthquakes located far from the investigated area.

For the P-wave picking we can consider an uncertainty of about 0.01 s. Extra care has been given on S-wave arrivals picking in order to distinguish the pure S-wave phase from the mode-converted phases. The S-wave picking was done on traces after rotating into the radial and transverse components. The uncertainty of the S-wave picks was considered about 0.03 s.

The first location of the hypocenters was done by the “Hypoinverse” algorithm.

For the selection of the initial velocity model we were based on 1D velocity inversion

method. As initial Vp/Vs ratio model we adopted a constant value of 1.79.

The used for the 3D tomography algorithm SIMULPS can invert for both the Vp and Vp/Vs ratio. The inversion resulted to 3D velocity models of P-wave and S-wave. Moreover, the relocation of the epicentres has given a clear picture of the active tectonics of the region.

The inversion also succeeded to clearly map the areas of high and low Poisson Ratio.

The high values which can be correlated with gabbroic and basaltic rocks were mostly found to be under the volcanic arc areas. Nevertheless, we also found an other place that consistently presented high values of Poisson ratio under the Aegina island. Since Aegina was a palaeovolcano these high values can also be correlated with existence of basaltic rocks. In contrast, below Attica coast, we mainly met low values that can be correlated to quartz rich rocks.

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