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On the Seismic Wave Anisotropy in the Upper Crust of Bam Area in South Eastern Iran

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For the last three decades, detection and interpretation of seismic anisotropy has changed into a common tool to study earth's interior. Our scientific objective focused on calculating the magnitude (dt) and the direction (φ) of the anisotropy in the upper crust of Bam area in south eastern Iran. These parameters provide information on the nature of the rocks which the wave propagated through. Seismic anisotropy happens because rocks generally contain fabrics which lead to a directional dependence in seismic velocities. Due to lack of knowledge from anisotropy in the Bam area, studying on this branch of seismology seems necessary for this region. The method we have investigated in this study is Teanby et al. (2004) shear wave splitting method. Polarization of two orthogonally polarized shear waves or shear wave splitting is arguably one of the most robust indications of seismic anisotropy in the earth. Methods of shear wave splitting analysis are divided into several main groups, where searching for the optimal pair of splitting parameters is inevitable. In Teanby et al. (2004) method selection of the shear wave analysis window is automatically and the splitting analysis is performed for a range of window lengths, the parameters that are stable over many different windows are the answers. In this study, we have compiled a data base of approximately 310 high quality seismograms selected by visual inspection of over 1100 records of Sg phase. These events were recorded at 15 stations of IIEES temporary seismic network which installed after 2003.12.26 Bam earthquake. Bam region is located within Lat. 28.8 to 29.5 deg. and Long. 58.0 to 58.7 deg.. The main fracture system of this area is Bam fault which characterized by an average strike of N-NW over a length of about 50 Km and dipping west. Our results of anisotropy parameters made by Sg phase analysis, strongly suggest two directions for the fast component but one regional trend is apparent. According to this study the main direction of anisotropy in the upper crust of Bam area is within the azimuth range of 40 to 70 deg, with magnitude ranging from 0.043 to 0.15 sec. We believe that this predominant NE-SW trend for anisotropy is a consequence of tectonic regimes in Persian plate, related to the convergence of Eurasian and Arabian plates. Concerning to the low depths of the aftershocks we used (maximum 20 Km), these results belongs to the upper crust of Bam area. Our magnitude results for crustal anisotropy are less than 0.3 sec., which is in agreement with results of previous experiments in this part of the earth. More ever this anisotropy direction is approximately perpendicular to the Bam fault and consistent with the GPS measurements.