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Crustal Seismic Anisotropy of North-West Himalaya

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Seismic Anisotropy is an almost pervasive behaviour of the earth and shear wave splitting is the most explicit indicator of anisotropy. Shear wave splitting refers to the splitting of seismic shear wave energy into two components when travels into an anisotropic medium, fast and slow with orthogonal polarization directions and different propagation velocities.

The Himalaya, nearly 2500 km long mountain range is formed due to shallow underthrusting of the Indian plate under the Tibetan Plateau at about 55 ma (Ni and Barazangi et al. [2]). The study of Receiver Function reports the mid-crust anisotropic layer in the Nepal Himalaya. The crustal anisotropy is less understood in the Western Himalaya. The present study will contribute some knowledge in understanding the velocity structure, crustal deformation and active stress field of th**is** region. An automatic analysis code "ANISOMAT+" (Piccinini et al. [1]) composed of a set of MATLAB scripts and functions is applied to the crustal earthquakes located in the selected test areas to calculate shear wave splitting parameters**,** fast polarization angle (ɸ) and delay time (dt). Seismic recordings of local earthquake events were collected from 5 broadband seismological stations in North-west Himalaya and were transformed into Seismic Analysis Code (SAC) binary files so that they could be served as the input to the code.

Amplitude diagrams for fast and slow components and the particle motion, before and after the cross-correlation coefficient correction for one of the events of the station TKS "2003.07.15-15.04.06.TKS." are plotted which indicates the presence of anisotropy. Overall, the obtained results show that the NE-SW is the average fast polarization direction parallel to the S_{Hmax} in this region as obtained from available active stress indicators. Thus, dominant direction of S_{Hmin} in the region strikes along NW-SE direction while 0.05 second is the average delay time for this region. Rose diagram (figure 1e) is also plotted for the 5 stations of the local temporary network. Fast polarization angles have been shown in the diagram for each station. The scale of the delay time for each event is shown by the

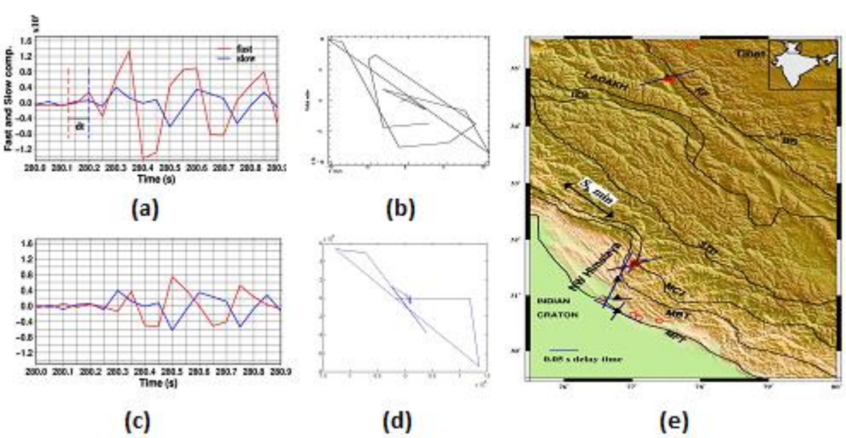

Figure 1: (a) Amplitude diagram before delay time correction. (b) Particle motion before delay time correction. (c) Amplitude diagram after delay time correction. (d) Particle motion after delay time correction. (e) Figure showing direction of minimum stress and delay time in NW Himalaya.

blue line. These values can be related to different causes, such as the active stress field and the existing crustal structures and tectonic style i.e., the direction of plate movement. To conclude, a systematic study of the spatial and temporal variations of anisotropic parameters at different stations could provide a new key for understanding the seismogenic process.

References:

[1] D. Piccinini, M. pastori, L.Margheriti (2013) ANISOMAT+.

[2] Ni, J., and Barazangi, M., (1984) J. Geophys. Res. 89, 1147-1163.

[3] Pastori, M. (2012) Crustal fracturing field and presence of fluid as revealed by seismic anisotropy.