

Periodic variation of stress field in Koyna–Warna reservoir triggered seismic zone inferred from focal mechanism studies

In the Koyna–Warna region a catalog of 50 focal mechanism solutions since 1967 is developed and studied in detail. It is demonstrated that the region experiences alternating phases of predominantly strike–slip and normal faulting of about 6 and 16 years respectively. This phenomenon seems to be governed by peaking and relaxation of the horizontal compressive stress caused by plate compression on the local fault system due to the India–Eurasia collision forces, aided by reservoir trigger mechanism. It is proposed that strike–slip earthquakes start occurring when the horizontal compressive stress in the region reaches a maximum and exceeds the critical limit, whereas normal faulting aided by gravitational force takes over once the horizontal stress accumulated on the faults is almost completely released. It is believed that the reservoirs play a critical role during both these phases by enabling a quicker release of accumulated stresses, causing a more frequent occurrence of seismicity than expected in an intra-plate region.

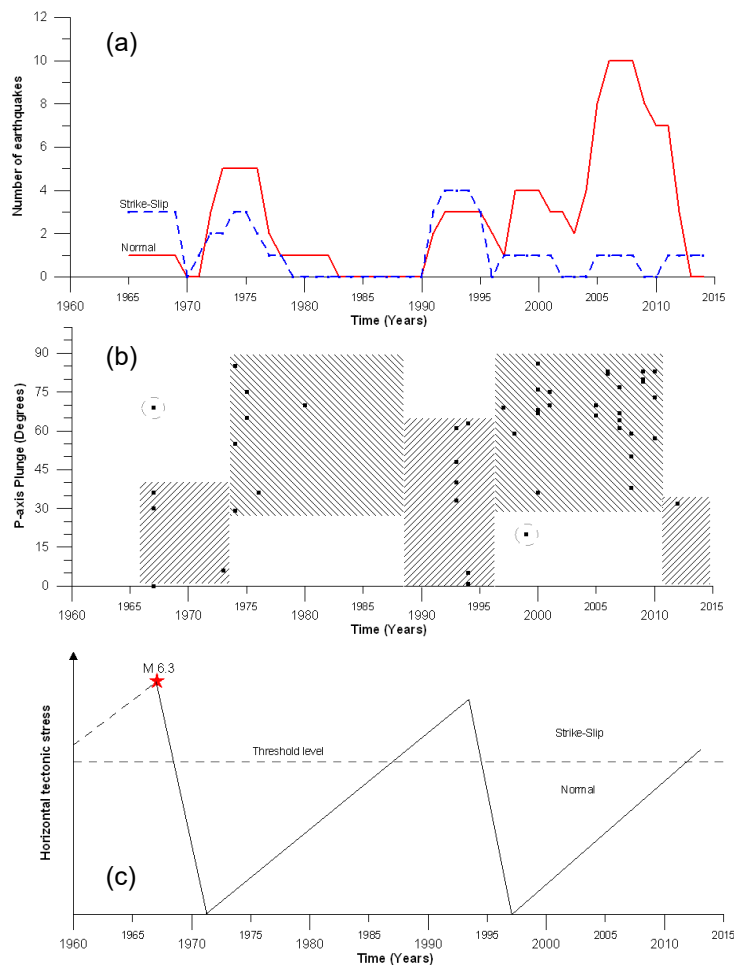


Figure: (a) Number of earthquake focal mechanism solutions of strike–slip (blue) and normal (red) type plotted as a function of time, smoothed by a moving average window. The alternating predominance of each type is visible. (b) Variation of P-axis plunge with time, indicating the segregation of strike–slip type (plunge <math>< 45^\circ</math>) and normal type (plunge >math>> 45^\circ</math>). (c) The proposed model of peaking and relaxation of the horizontal tectonic stress as a function of time, corresponding to the predominance of strike–slip and normal faulting above and below the critical threshold of stress build-up respectively.

For further details: N. Purnachandra Rao and D. Shashidhar, *Tectonophysics* (2016)
<http://www.sciencedirect.com/science/article/pii/S0040195116301032>