

P8-3**STRESS DROP AND CLASSIFICATION OF GLOBAL EARTHQUAKES****Y. BAYRAK** and A.YILMAZTURK

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Shallow earthquakes that have occurred all over the world for the time period 1900-1998 are classified in terms of stress drop, fracture mechanism and source complexity. The earthquake data consists of about 7400 events for which body wave magnitude, m_b , surface wave magnitude, M_s , seismic moment, M_0 , and focal mechanism are known. Surface wave magnitude, M_s , range varies from 4.0 to 8.2. The rate of data for thrust faults is about 57%. It is 23% for normal faults, and 20% for strike-slip faults. The moment-magnitude-stress drop relation is of the form (Bayrak & Yilmazturk, 1998)

$$\text{Log}(\Delta\sigma/\mu)=1.485M_s-\text{log}M_0+12.35 \quad (1)$$

where $\Delta\sigma$ is the stress drop, and μ is the rigidity. Stress drops are calculated by using equation (1). Figure 1 shows plots of M_s versus M_0 for all events and the events that have been classified in terms of the type of faulting and source history. Also, the limits and averages of $\Delta\sigma$ are shown on the plots. Stress drops for all events lie between 0.6 and 199 bars. The highest values are observed for strike-slip faults. Average values estimated for these faults introduce twice as high as that observed for dip-slip faults. There is no difference between the upper and lower limits of $\Delta\sigma$ for normal and reverse faults. Categorisation of source history is based on a linear relation between m_b and M_s (Gupta & Rastogi, 1972). It is observed that most of the simple events are associated with normal and thrust faults. The rate of strike-slip faults related to complex earthquakes is 45%. The average value of $\Delta\sigma$ estimated for complex events is about six times higher than that of simple events. It is evident that the highest stress drops are associated with complex events.

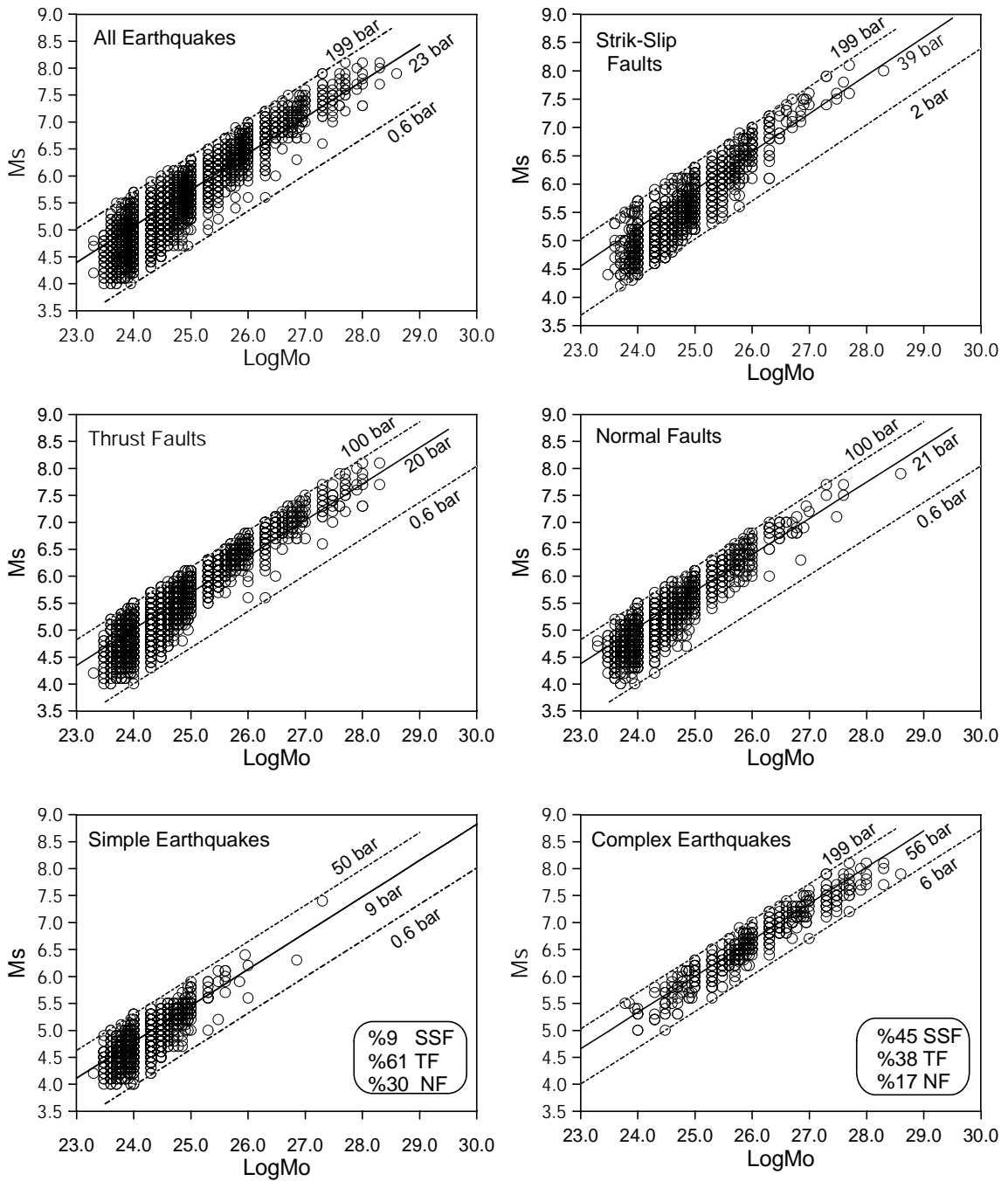


Figure 1. Seismic moment as a function of surface wave magnitude for global earthquakes investigated in this study. Straight lines represent the average stress drops, and dashed lines represent the upper and lower limits of stress drops. Note that the level of stress drop is related to the type of faulting and source history.

References

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