Summary

The majority of the focal mechanism solutions used in this publication were computed using earthquakes occurring in central and north-central Oklahoma, a region dominated by strike-slip motion on steeply dipping faults and thus fault strike is restricted to the range of 0° to 180° (Inset a). Optimal orientation ranges between 45°-90°, 105°-120° and 135°-150° and represent fault orientations most likely to have an earthquake. Moderately optimal orientation ranges between 15°-45°, 60°-75°, 90°-105° and 120°-135° and represent fault orientations moderately likely to have an earthquake. All other orientations of fault strike are sub-optimal orientation and have a low likelihood to have an earthquake. These results do not indicate that earthquakes cannot occur on sub-optimal fault strikes, but suggest that they are less likely to happen.

The focal mechanism distribution is shown in the focal mechanism PDF of fault strike. The PDFs are determined by dividing the number of nodal plane orientations by the total number of nodal plane orientations and the number of degrees in each bin. The majority of the focal mechanism PDFs are computed using earthquakes occurring in central and north-central Oklahoma, a region dominated by strike-slip motion on steeply dipping faults and thus fault strike is restricted to the range of 0° to 180° (Inset a). Optimal orientation ranges between 45°-90°, 105°-120° and 135°-150° and represent fault orientations most likely to have an earthquake. Moderately optimal orientation ranges between 15°-45°, 60°-75°, 90°-105°, 120°-135° and 150°-180° and represent fault orientations moderately likely to have an earthquake. All other orientations of fault strike are sub-optimal orientation and have a low likelihood to have an earthquake. These results do not indicate that earthquakes cannot occur on sub-optimal fault strikes, but suggest that they are less likely to happen. The PDF of fault dip with 15° bin intervals and a total of 1,376 nodal planes; (a) PDF of fault dip, (b) PDF of fault rake, (c) PDF of fault strike. The focal mechanism data were obtained from the Oklahoma Geological Survey's earthquake catalog and the U.S. Geological Survey's National Earthquake Information Center.

References


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Preliminary Oklahoma Optimal Fault Orientations

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