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World Stress Map release 2005 - Stress orientations from focal mechanisms near plate boundaries

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The World Stress Map (WSM) is the global repository for contemporary tectonic stresses data from the Earth's crust coming from a wide range of indicators (e.g. focal mechanisms, borehole breakouts). The WSM release 2005 contains c. 16,000 data sets all classified according to a unified quality ranking scheme, so that the comparability of data from different types of measurements is guaranteed. The WSM is an open-access database available through our website www.world-stress-map.org. The web pages also provide details about the data, utilities for data plotting, stress maps for specific regions, and many other useful information.

In the WSM release 2005 we refined the definition of so-called "Possible Plate Boundary Events" (PBE) for stress data deduced from single focal mechanisms (FMS) near plate boundaries. Here, the orientation of the P-B-T axes might be rather controlled by the geometry of the plate boundary and its shear strength than by the stress field orientation. Thus, the P-B-T axes might considerably deviate from the principal axes of the regional stress field. By analysing the FMS data of the WSM release 2005 we found a higher potential for large deviations when the following criteria are met: (1) The tectonic regime of the FMS reflects the plate boundary kinematics. (2) The angle between the strike of the nodal plane and the strike of the plate boundary is smaller than 30 degrees. (3) The event is located within a critical distance to the closest plate boundary.

The critical distances depend on the types of plate boundaries. We estimated them by means of statistical analysis as being 45 km for continental transform faults, 80 km for oceanic transform faults, 70 km for oceanic spreading ridges, and 200 km for subduction zones. The three detection criteria are met by 3451 of the 9864 FMS

data which thus were marked by a PBE flag in the WSM release 2005. Users should be aware that these data might considerably deviate from the regional stress field as shown in four case studies.