

Present-Day Stress in Sedimentary Basins: Insights from 20 Years of the World Stress Map Project

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The World Stress Map (WSM) Project has, since 1986, compiled a free and public global database of over 16000 quality-ranked present-day stress indicators. This global database provides fundamental insights into the state and origin of present-day stress in the crust and, in particular, has revealed that the plate-scale present-day stress field is primarily controlled by plate boundary forces. However, petroleum geomechanics applications, such as wellbore stability and hydraulic fracture stimulation, require knowledge of the present-day stress at smaller basin- and field-scales.

The WSM database contains stress information from approximately 70 sedimentary basins worldwide, allowing a unique examination of the controls on stresses in the oil patch. Whilst some sedimentary basins exhibit roughly uniform stress fields (e.g. the Western Canada Basin, Northern North Sea), many others exhibit numerous regional and local variations in stress orientation (e.g. Central North Sea, North German Basin, Baram Delta Province, Permian Basin). Basin- and field-scale stress fields result from the complex combination of numerous factors including far-field forces (e.g. plate boundary forces), basin geometry (e.g. the shape of deltaic wedges), geological structures (e.g. diapirs, faults), mechanical contrasts (e.g. evaporites, overpressured shales, detachment zones), topography and deglaciation.