
Creep-dilatancy development at a transform plate boundary

Nabil Sultan^{*1}, Shane Murphy², Vincent Riboulot², and Louis Géli

¹Unité de recherche Géosciences Marines (Ifremer) (GM) – Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) – Ifremer - BP 70 29280 Plouzané, France

²GeoOcean – Institut Français de Recherche pour l'Exploitation de la Mer (IFREMER) – France

Abstract

How tectonic plates slip slowly and episodically along their boundaries, is a major, open question in earthquake science. Here, we use offshore in-situ sediment pore-pressure acquired in the proximity of the active offshore Main Marmara Fault and onshore geodetic time-series data set from a single GPS station to demonstrate the pore-pressure/deformation coupling during a 10-month slow-slip event. We show that pore pressure fluctuations are the expression of hydro-mechanical process affecting the deep seismogenic zone and indicate that small disturbances in geodetic data may have important meaning in terms of transient deformations. These results have major implications in understanding the spatial impact of slow-slip processes and their role in earthquake cycles. We demonstrate that piezometers measuring along a transform fault can help define the time scale regulating the coupling between slow-slip events and earthquake nucleation process.

^{*}Speaker