ISTerre
Institut des Sciences de la Terre

Grand Séminaire
2014/2015

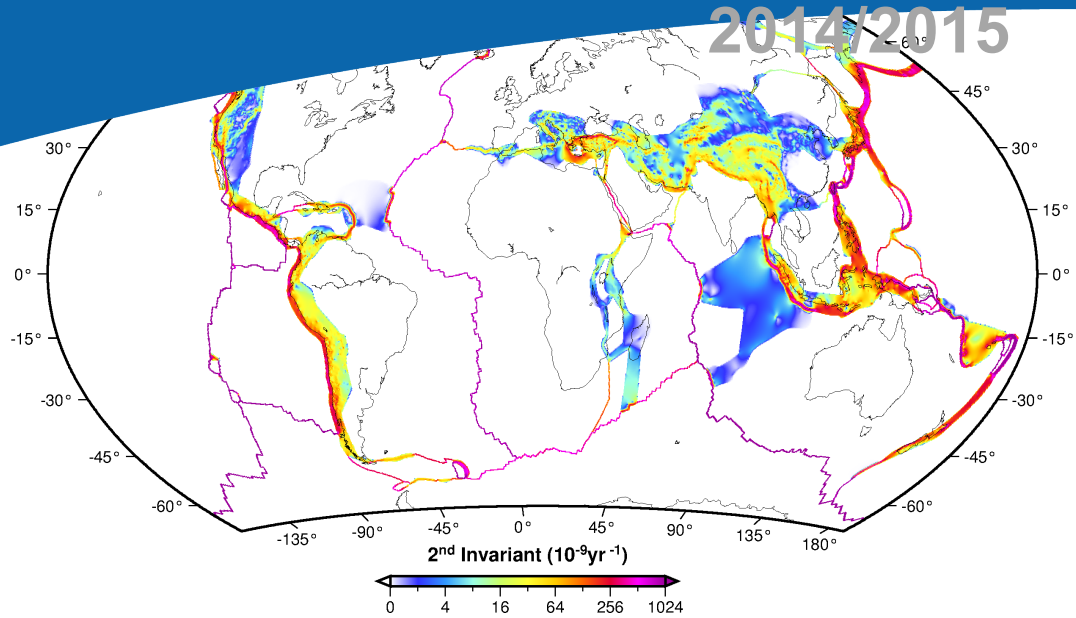

Plate Tectonics 2.0: Using GPS to Refine Global Crustal Kinematics and Forecast Earthquakes

Corné KREEMER

University of Nevada, Reno, Etats-Unis

GPS measurements of crustal velocities have revolutionized our understanding of the earthquake cycle and the present-day deformation in plate boundary zones. Together, we now have fairly good constraints on where and how much strain is building up and where it thus presumably will be released in the next future earthquake. Over the last decade and a half, we have created a model (i.e., the Global Strain Rate Model (GSRM)) that integrates a kinematic description of deformation within plate boundaries into the well-known framework of rigid-body rotations of the tectonic plates. Such a global model, constrained by GPS data, is essential to test and calibrate the relationship between the amount of strain that is accumulating, the seismic moment that has been released, and the number of events of a certain magnitude that can be expected in a given time-span. Even on a global scale, the seismic moment released over the last 100 years is an extremely unstable quantity as it is dominated by the few largest earthquakes. However, if we have a handle on how much geodetic strain will be released seismically, we can use the geodetic moment rate to constrain the area underneath the Gutenberg-Richter relationship to determine the productivity of events of a certain size. We would do this first for all areas of the same plate boundary type to calibrate the relationship, so that we can then make the forecast for any deforming area. While these forecast based on tectonic strain accumulation work well, they can be improved by merging them with forecasts based on smooth seismicity, which will add a time-dependency to the forecast and also allow the inclusion of plate interiors. I will present the new GSRM and its associated data and show high-resolution deformation results for various plate boundaries. I will introduce then the assumptions and results of the strain-rate-informed forecast, and discuss its extension using smoothed seismicity.

Jeudi 25 juin 2015 à 11h

Salle de conférences d'ISTerre

OSUG-C, 1381 rue de la piscine, Campus Universitaire
Arrêt Tram B/C Bibliothèques universitaires