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# Active tectonics of Peru

Mohamed Chlieh<sup>\*1</sup>, Juan Carlos Villegas Lanza<sup>2</sup>, Olivier Cavalié<sup>3</sup>, and Hernando Tavera<sup>4</sup>

<sup>1</sup>Institut des Sciences de la Terre (ISTerre) – ISTerre lab., University Savoie Mont-Blanc - CNRS, Le Bourget-Du-Lac, France – BP 53 - 38041 Grenoble cedex 9, France

<sup>2</sup>Instituto Geofísico del Peru (IGP) – Peru

<sup>3</sup>Géoazur – Université Côte d’Azur, CNRS, IRD, Observatoire de la Côte d’Azur, Géoazur – 250 rue Albert Einstein 06560 Valbonne, France

<sup>4</sup>Instituto Geofísico del Peru (IGP) – Peru

## Abstract

Over 100 GPS sites measured in 2008–2013 in Peru provide new insights into the present-day crustal deformation of the 2200 km long Peruvian margin. This margin is squeezed between the eastward subduction of the oceanic Nazca Plate at the South America trench axis and the westward continental subduction of the South American Plate beneath the Eastern Cordillera and Subandean orogenic wedge. Continental active faults and GPS data reveal the rigid motion of a Peruvian Forearc Sliver that extends from the oceanic trench axis to the Western-Eastern Cordilleras boundary and moves southeastward at 4–5 mm/yr relative to a stable South America reference frame. GPS data indicate that the Subandean shortening increases southward by 2 to 4 mm/yr. In a Peruvian Sliver reference frame, the residual GPS data indicate that the interseismic coupling along the Nazca megathrust is highly heterogeneous. Coupling in northern Peru is shallow and coincides with the site of previous moderate-sized and shallow tsunami-earthquakes. Deep coupling occurs in central and southern Peru, where repeated large and great megathrust earthquakes have occurred. The strong correlation between highly coupled areas and large ruptures suggests that seismic asperities are persistent features of the megathrust. Creeping segments appear at the extremities of great ruptures and where oceanic fracture zones and ridges enter the subduction zone, suggesting that these subducting structures play a major role in the seismic segmentation of the Peruvian margin. In central Peru, we estimate a recurrence time of  $305 \pm 40$  years to reproduce the great 1746 Mw<sub>s</sub> ~8.8 Lima-Callao earthquake.

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\*Speaker