Confererence: Results of the SATREPS Project:"Enhancement of Earthquake and Tsunami Disaster Mitigation Technology in Peru" JICA/JST
National University of Engineering – Faculty of Civil Engineering
Japan-Peru Center for Earthquake Engineering Research and Disaster Mitigation -CISMID

# Resultados Grupo 1: Escenarios Sísmicos para Lima y Tacna

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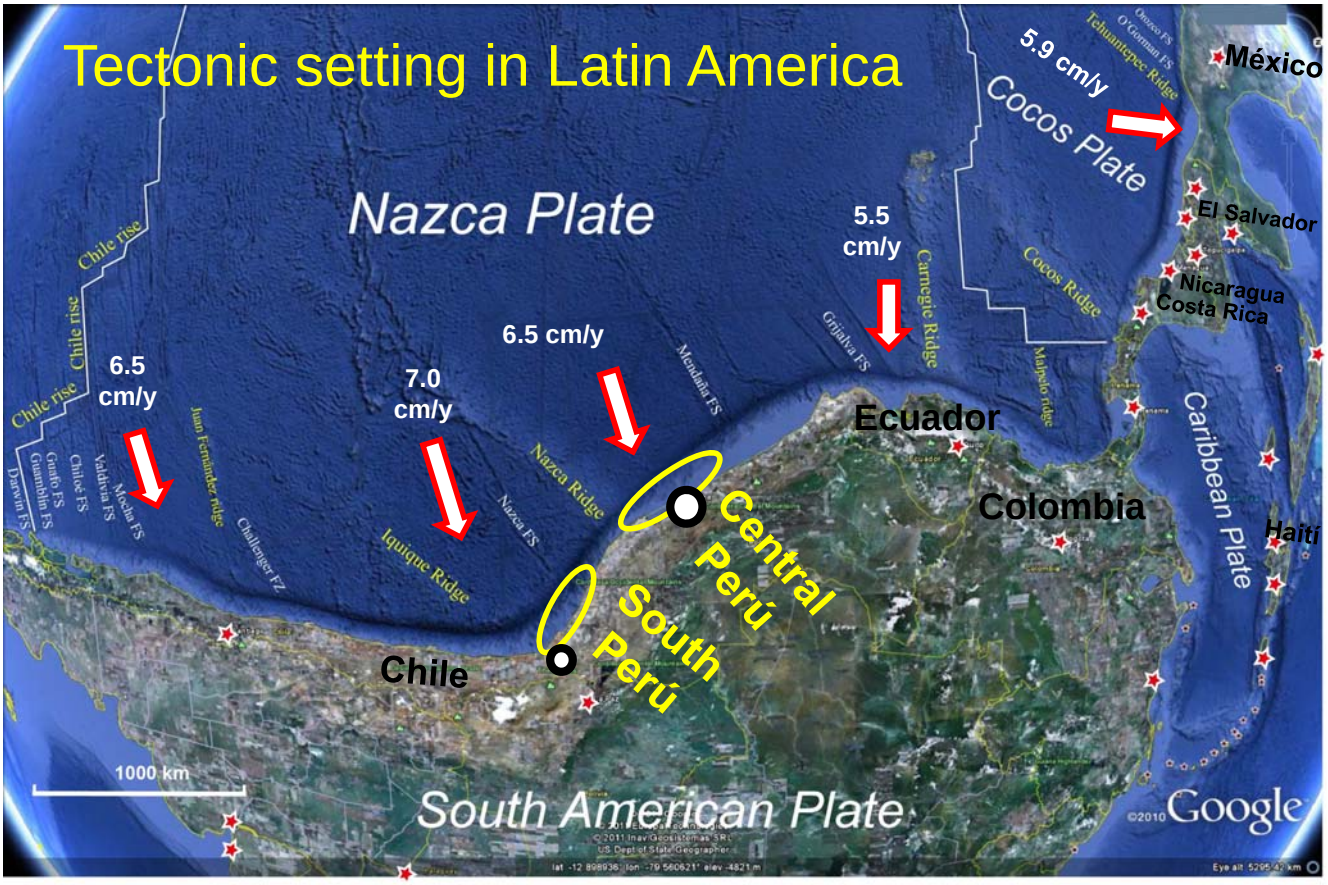
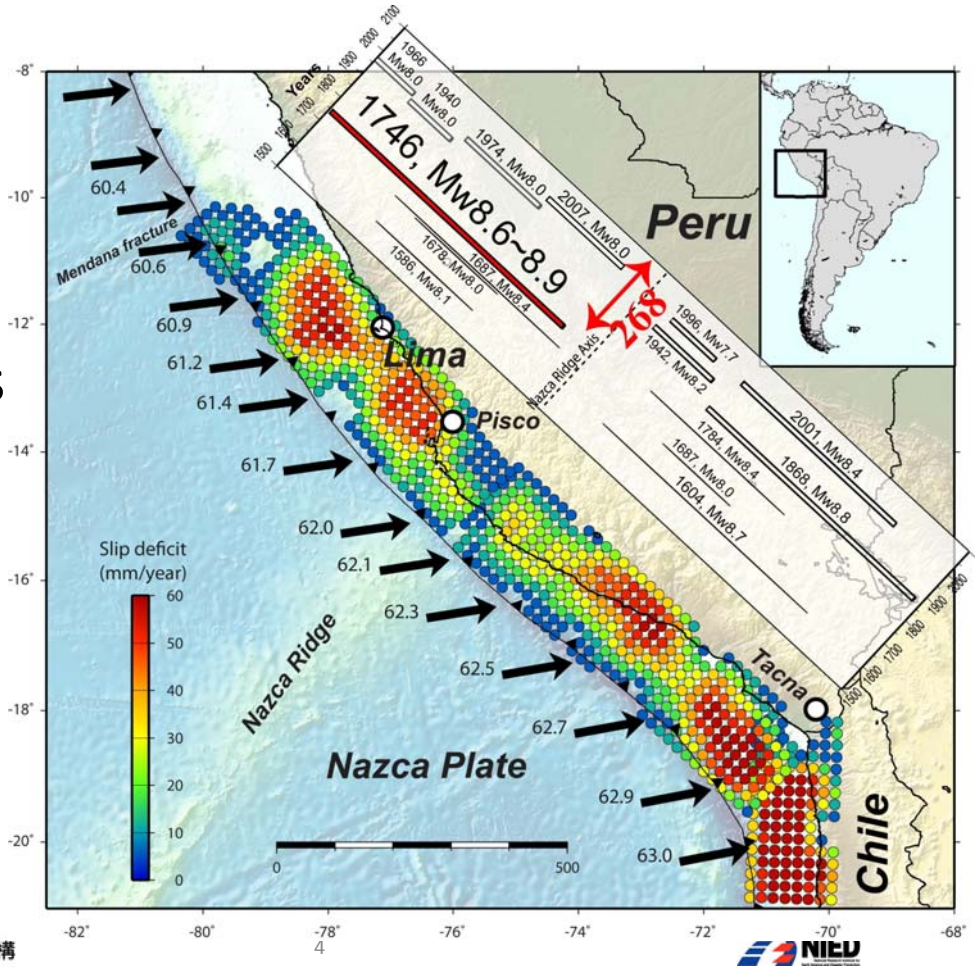
## Contenido

- Estimación de escenarios sísmicos para los Andes Centrales, Perú
- Simulación del movimiento fuerte en Lima para el escenario sísmico
- Estimación de escenarios sísmicos para el Sur de Perú
- Simulación del movimiento fuerte en Tacna para el escenario sísmico

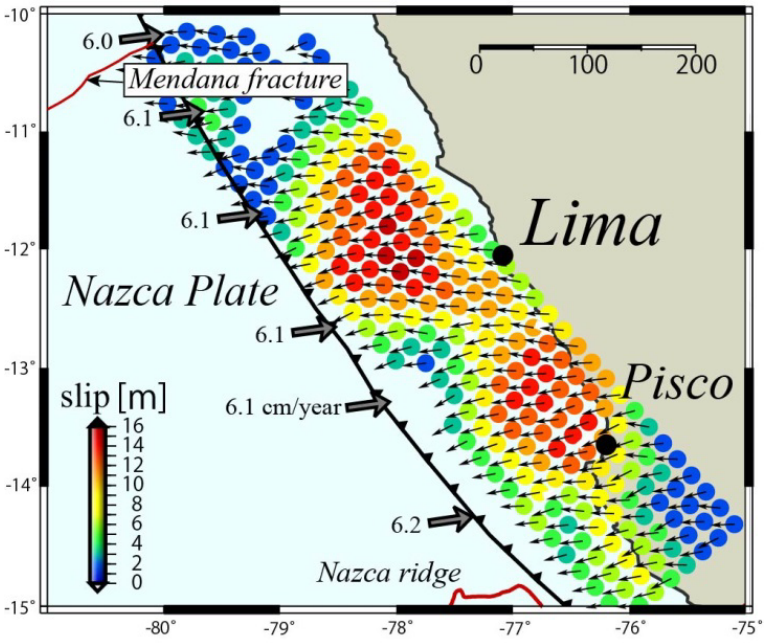



Historical earthquakes in Peru



# Slip deficit rate for Peru and Northern Chile and scenario earthquake for Central Peru

- Slip deficit since 1746 (268 years)
- Maximum slip 16 m
- Magnitude **Mw~8.9**, (neglecting the 20 century earthquake sequence)

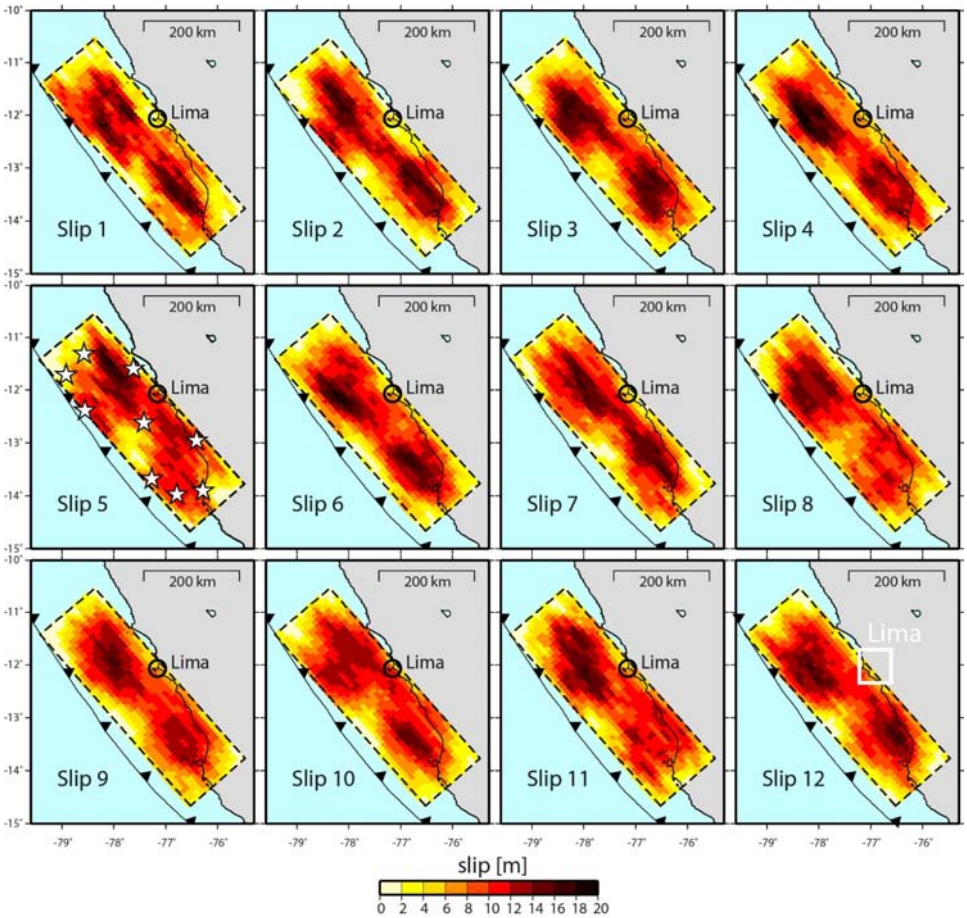



(Pulido et al. 2011)



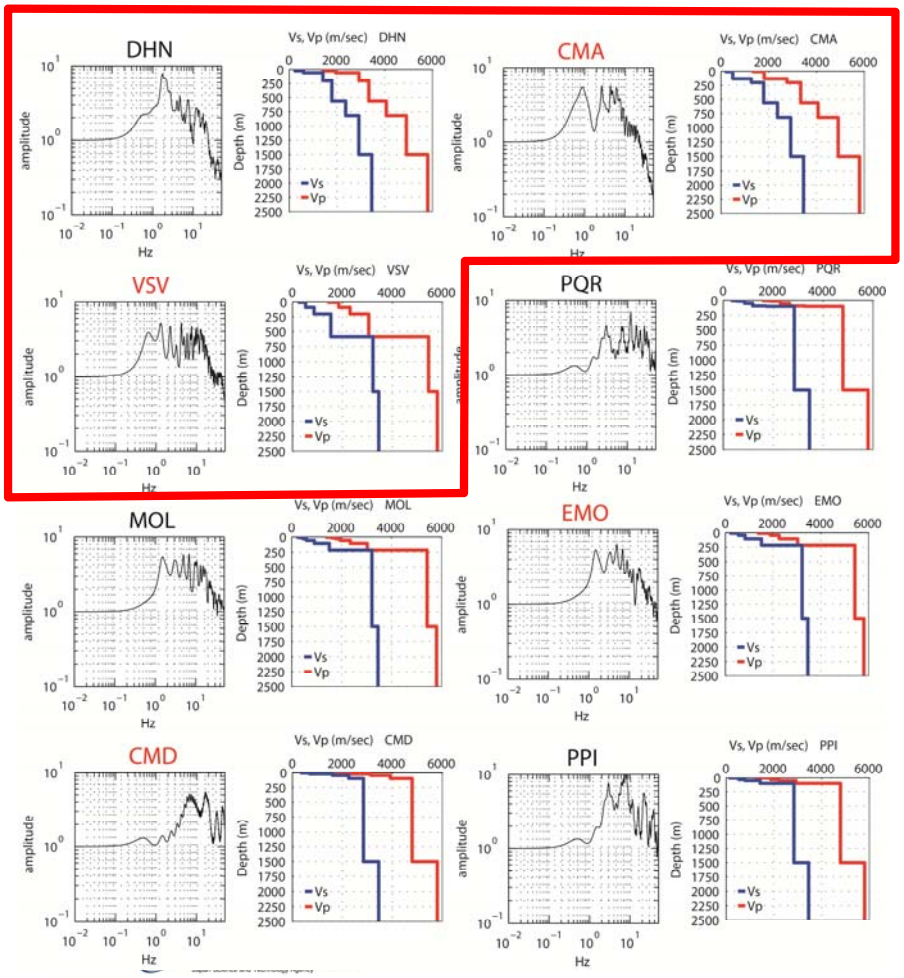
EARTHQUAKE SLIPS SCENARIOS FOR CENTRAL PERU

obtained from geodetic data, as well as information of recurrence of historical earthquakes (Pulido 2014)





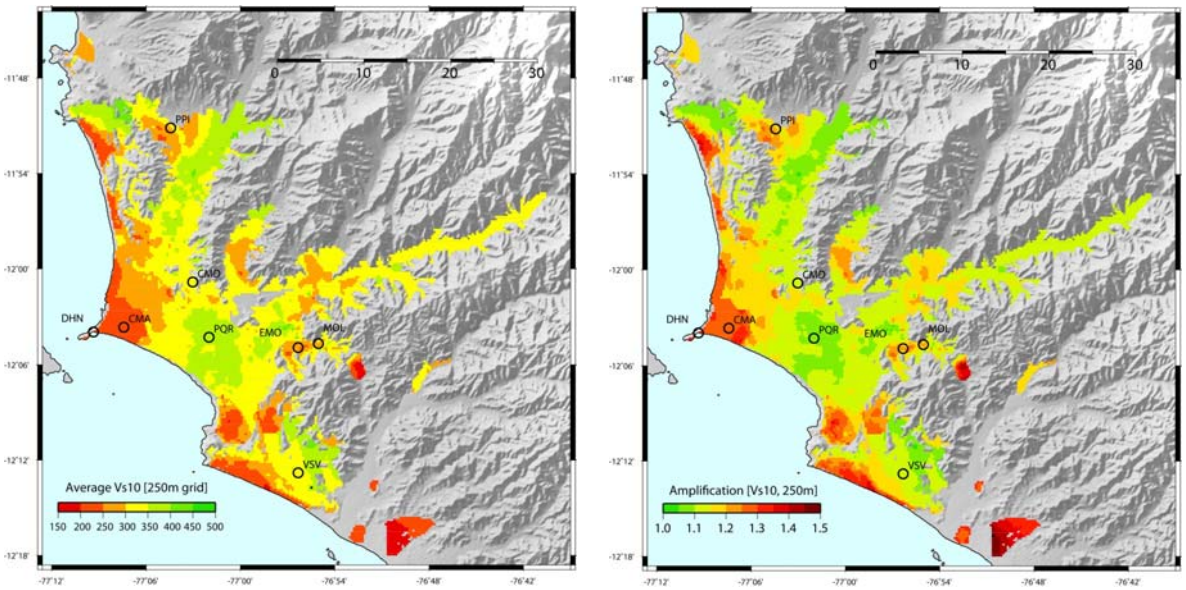

http://www.j-shis.bosai.go.jp/staff/nelson/smsimu_Central_Peru_v1p0/Lima_SMsimu_v1p0.htm

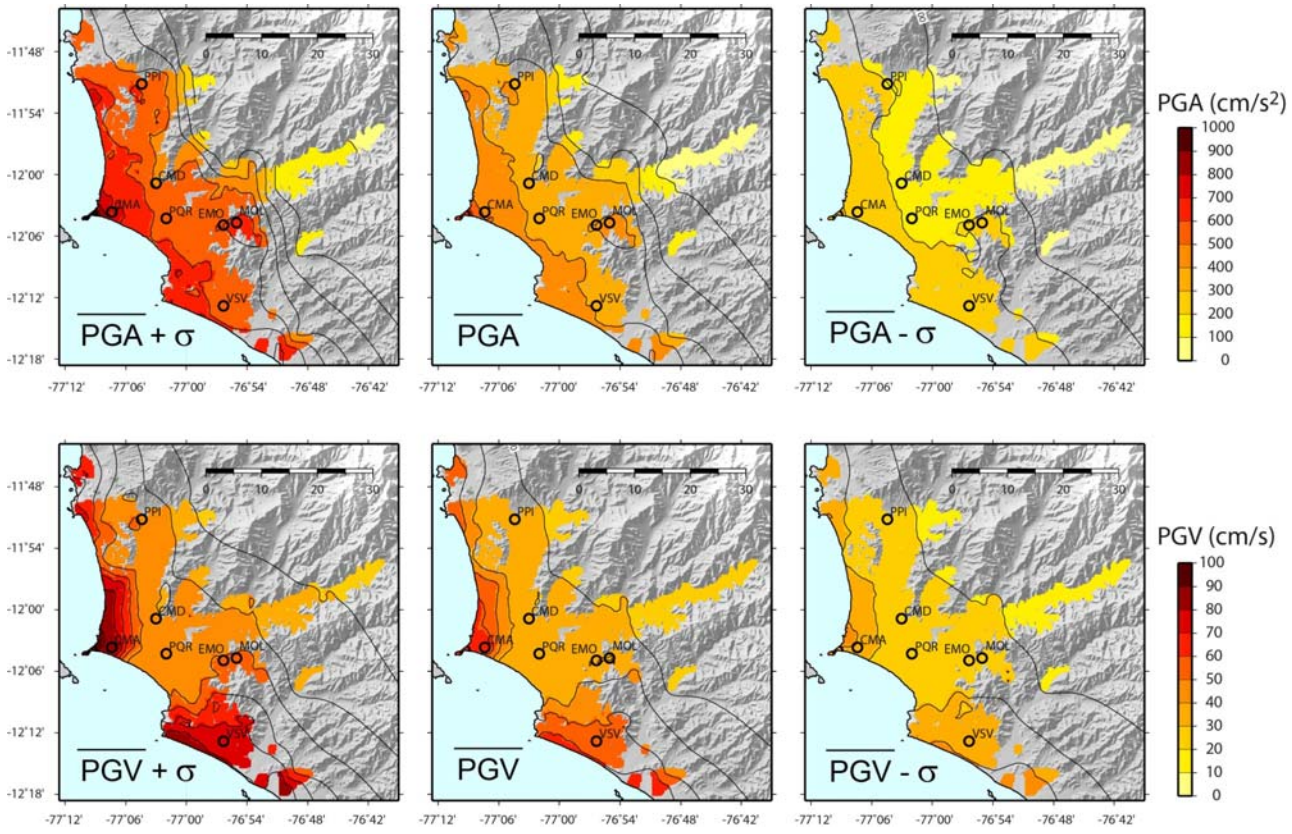



Velocity models obtained from microtremors arrays in Lima and their 1D transfer functions (Calderón et al. 2012)



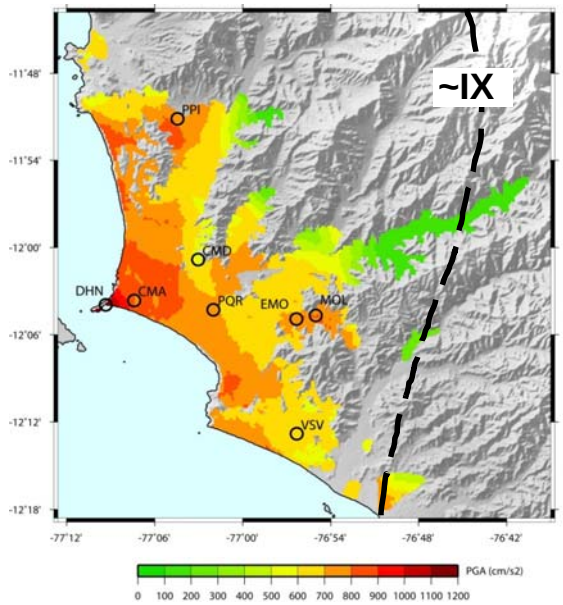

# Average S-wave velocity for the upper 10m and soil amplifications to engineering bedrock (Vs ~ 400m)



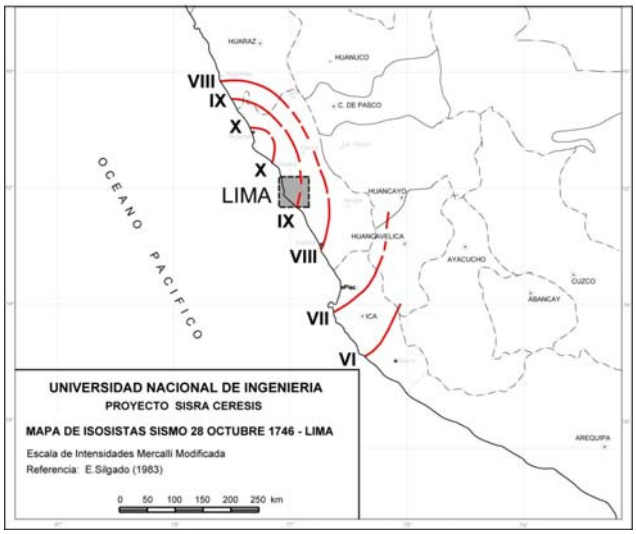





# Most critical scenario & Observed intensities during the 1746 earthquake (M ~ 9)

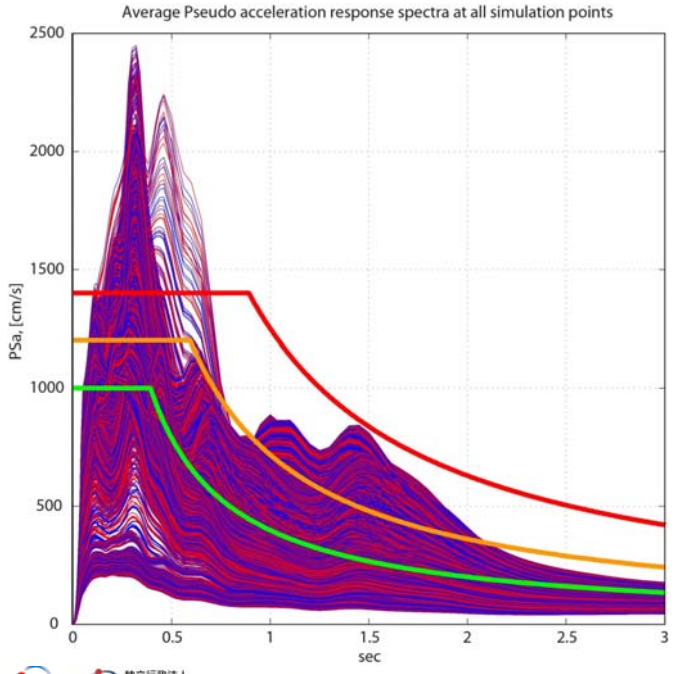



PGA for most critical slip, includes soil amplification




Maximum MMI intensity in Lima IX~X
(Alva et al. 1984)
PGA ~1g, PGV ~90 cm/s

Simulated Pseudo acceleration response spectra (average for all scenarios) at all grid points and the **Peruvian seismic building code design spectra (2003)**



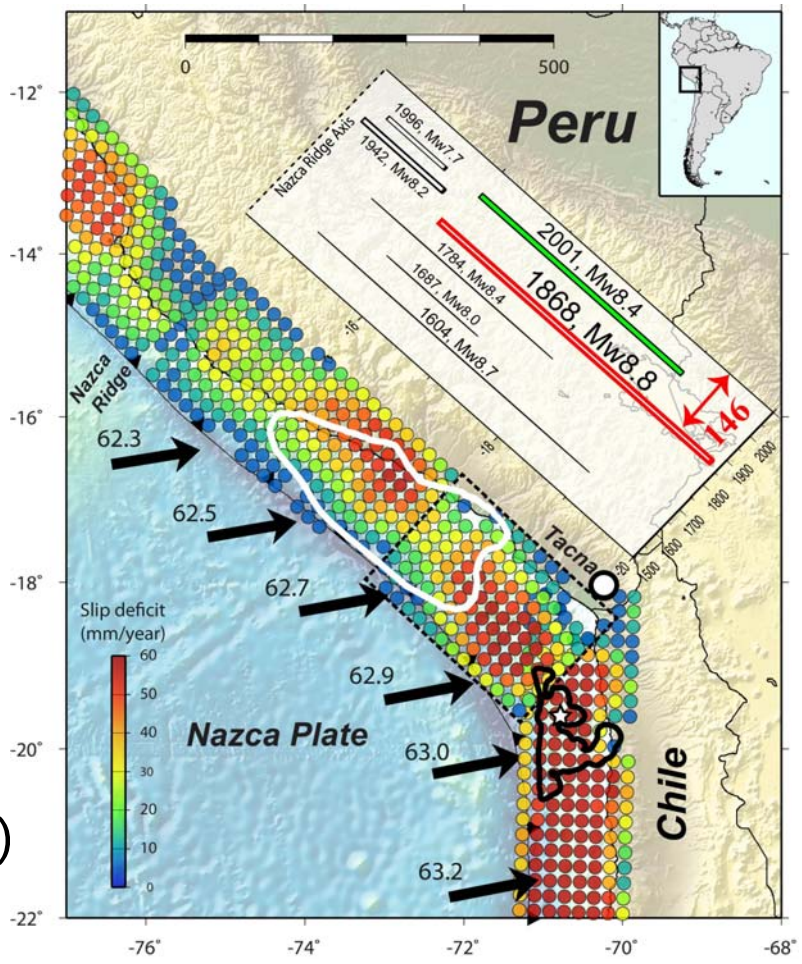

Peruvian building code for the highest seismic zone (Z=0.4g), in rock (**green**), hard soil (**orange**) and soft soils (**red**)



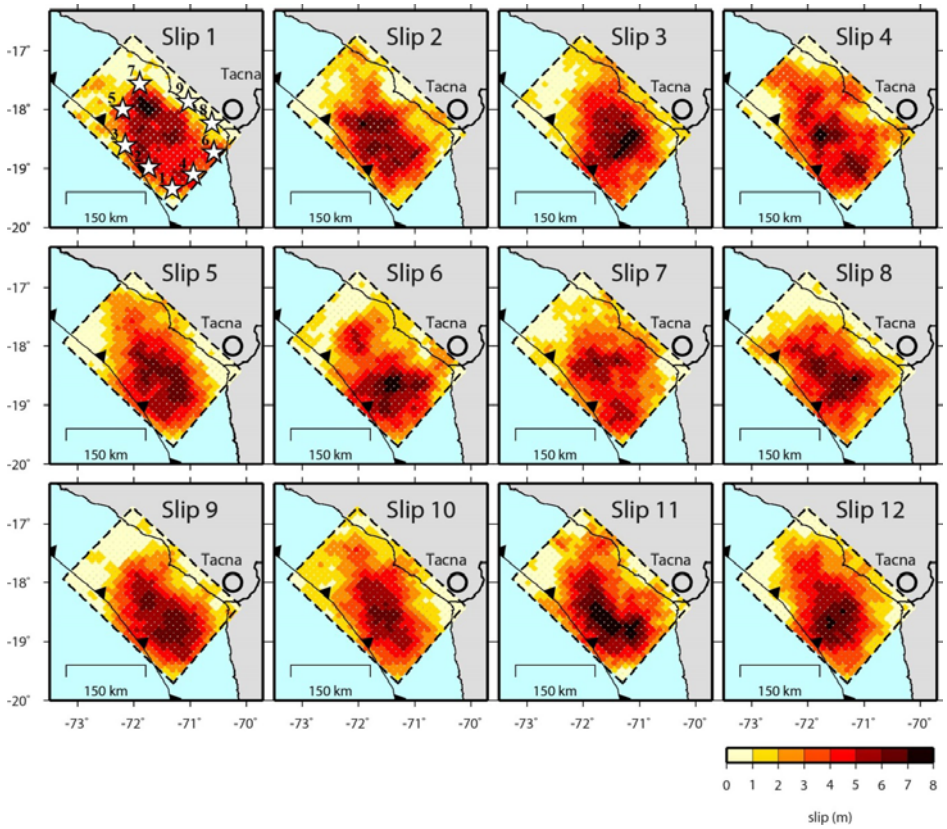
- Estimación de escenarios sísmicos para el Sur de Perú
- Simulación del movimiento fuerte en Tacna para el escenario sísmico

# Scenario earthquakes for Southern Peru

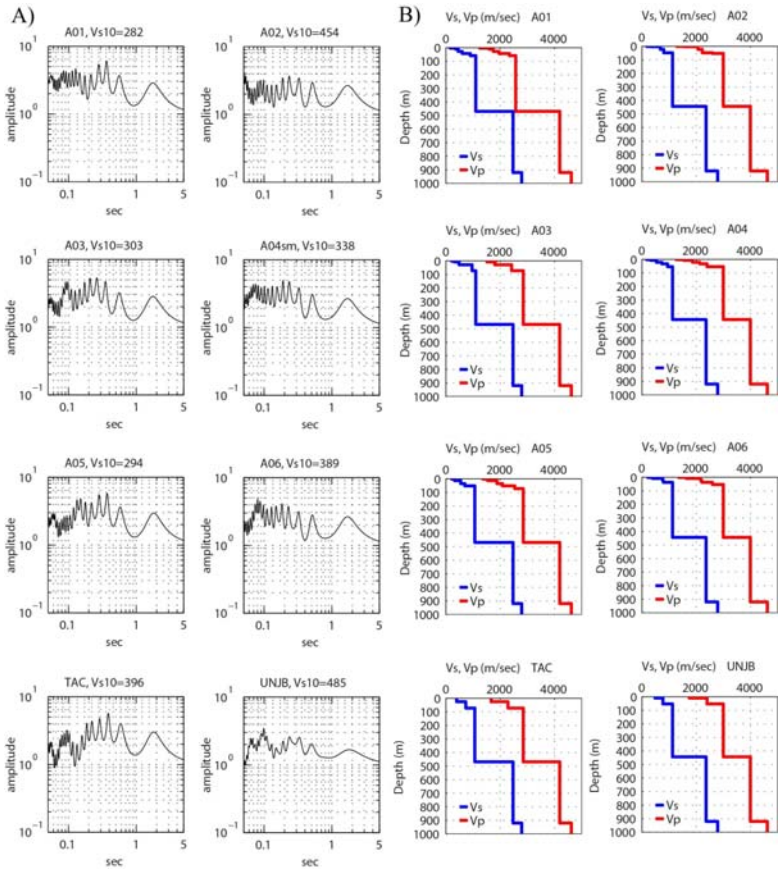
- Slip deficit since 1868 (146 years)
- Maximum slip 8 m
- Magnitude **Mw~8.5**, (removing the Arequipa earthquake)




EARTHQUAKE SLIPS SCENARIOS FOR SOUTH PERU

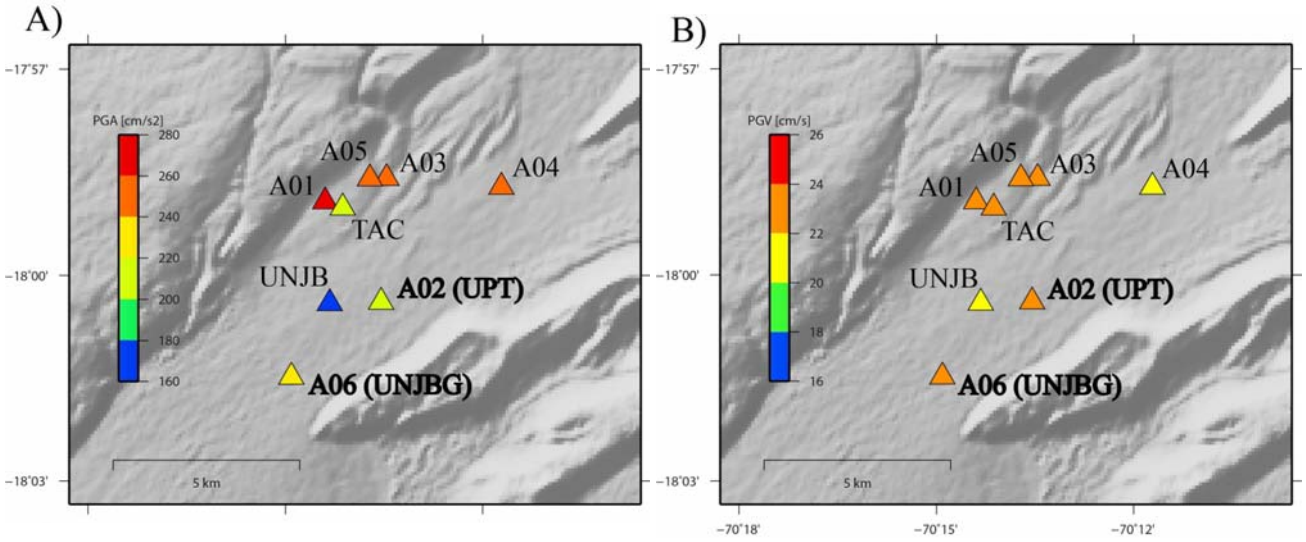


Velocity models obtained from microtremors arrays in Tacnaand their 1D transfer functions (Yamanaka et al. 2014, CISMID 2014)






# Average PGA and PGV for 108 scenarios



# Simulated accelerograms at Tacna (Mw8.5) and Observed records of the Iquique earthquake (Mw8.2)