

Fast changes along the trench
make Central America an
excellent target for the study of
subduction zone processes

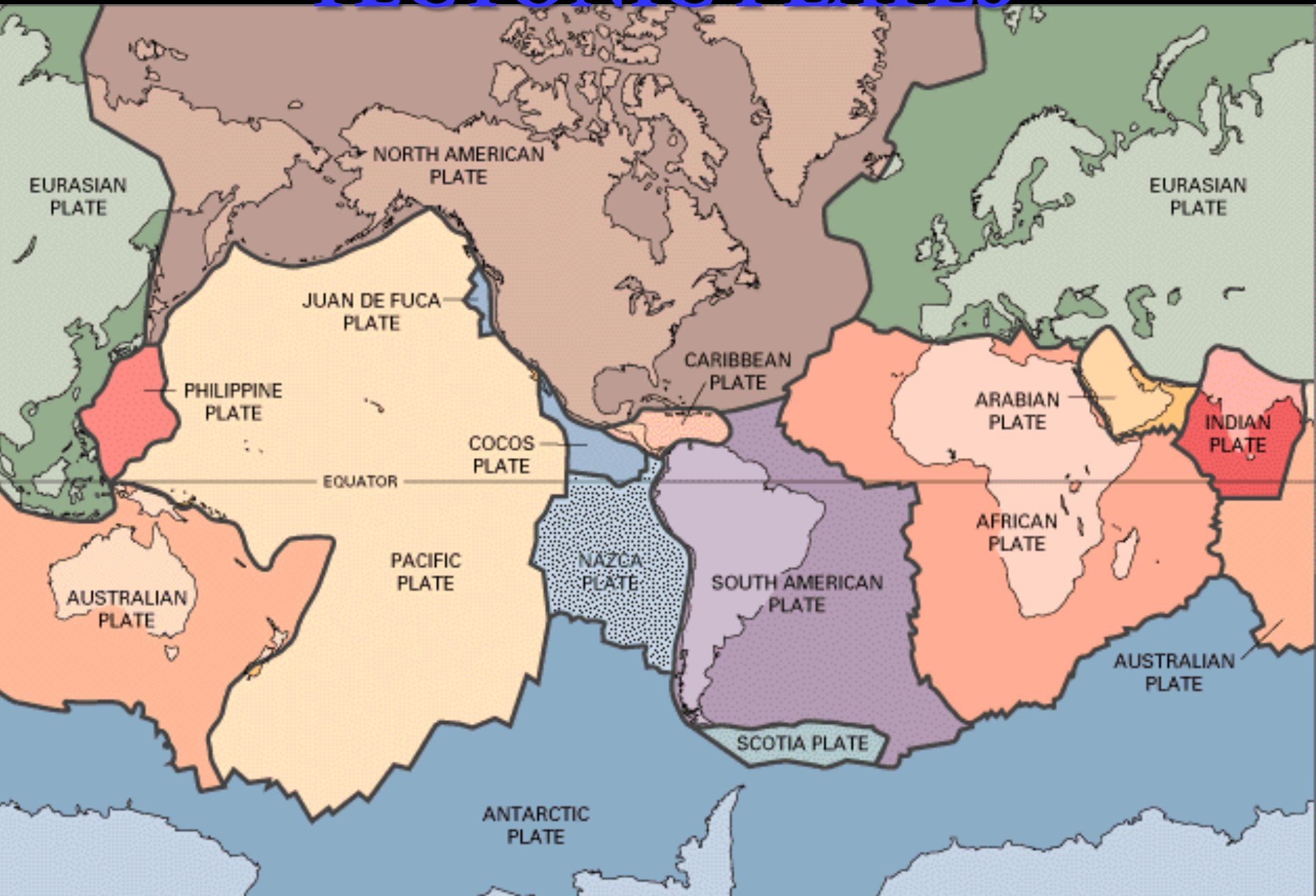
Marino Protti

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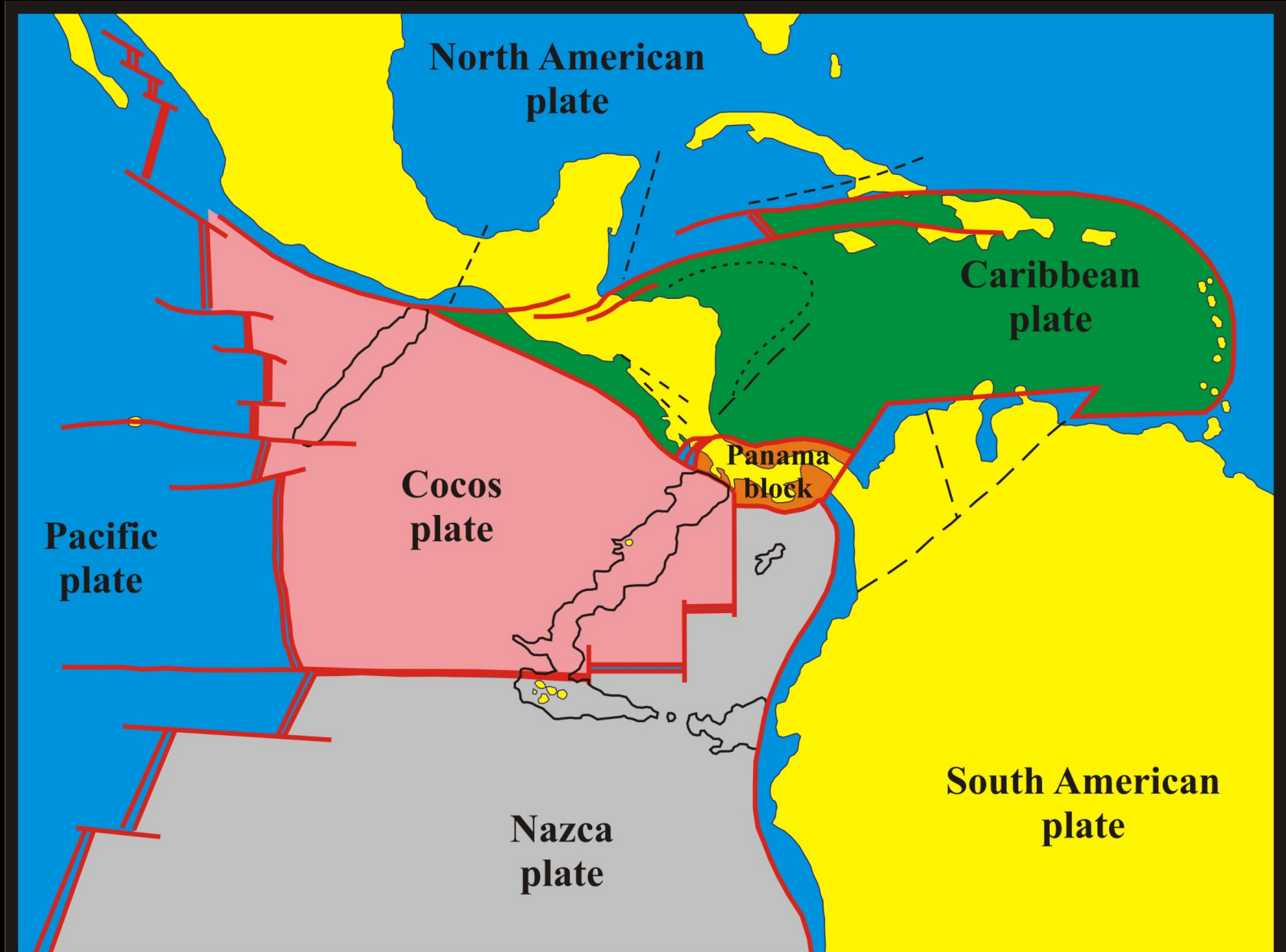
Agenda

- ◆ Tectonic setting of Central America
- ◆ Seismic sources in Central America
- ◆ Upper plate deformation
- ◆ Geometry of the Wadati-Benioff Zone
- ◆ Large subduction earthquakes in the region
- ◆ Characteristics of the subducting plate
- ◆ Future research
- ◆ LACSC 2016

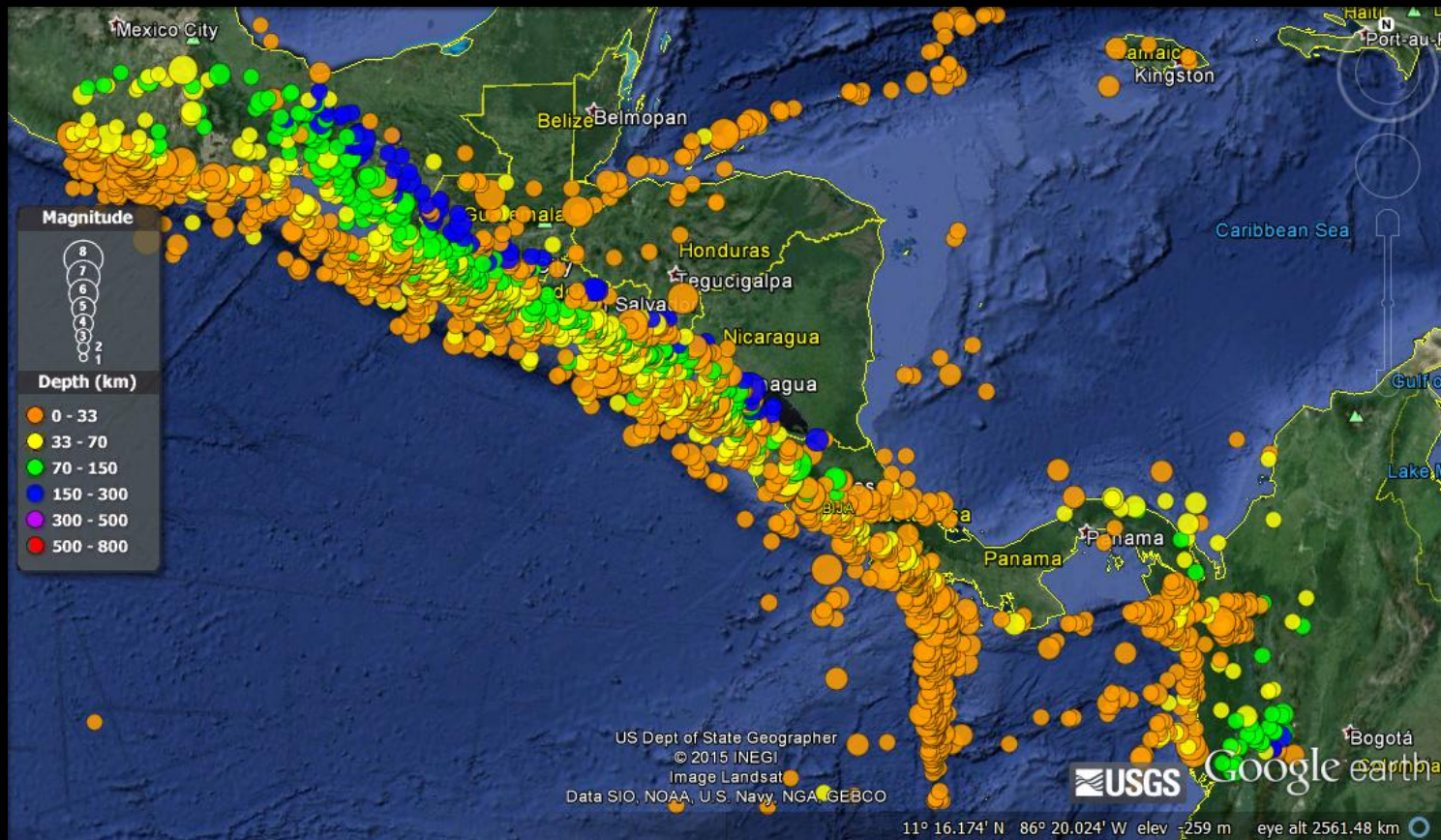
TECTONIC PLATES



REGIONAL TECTONIC SETTING



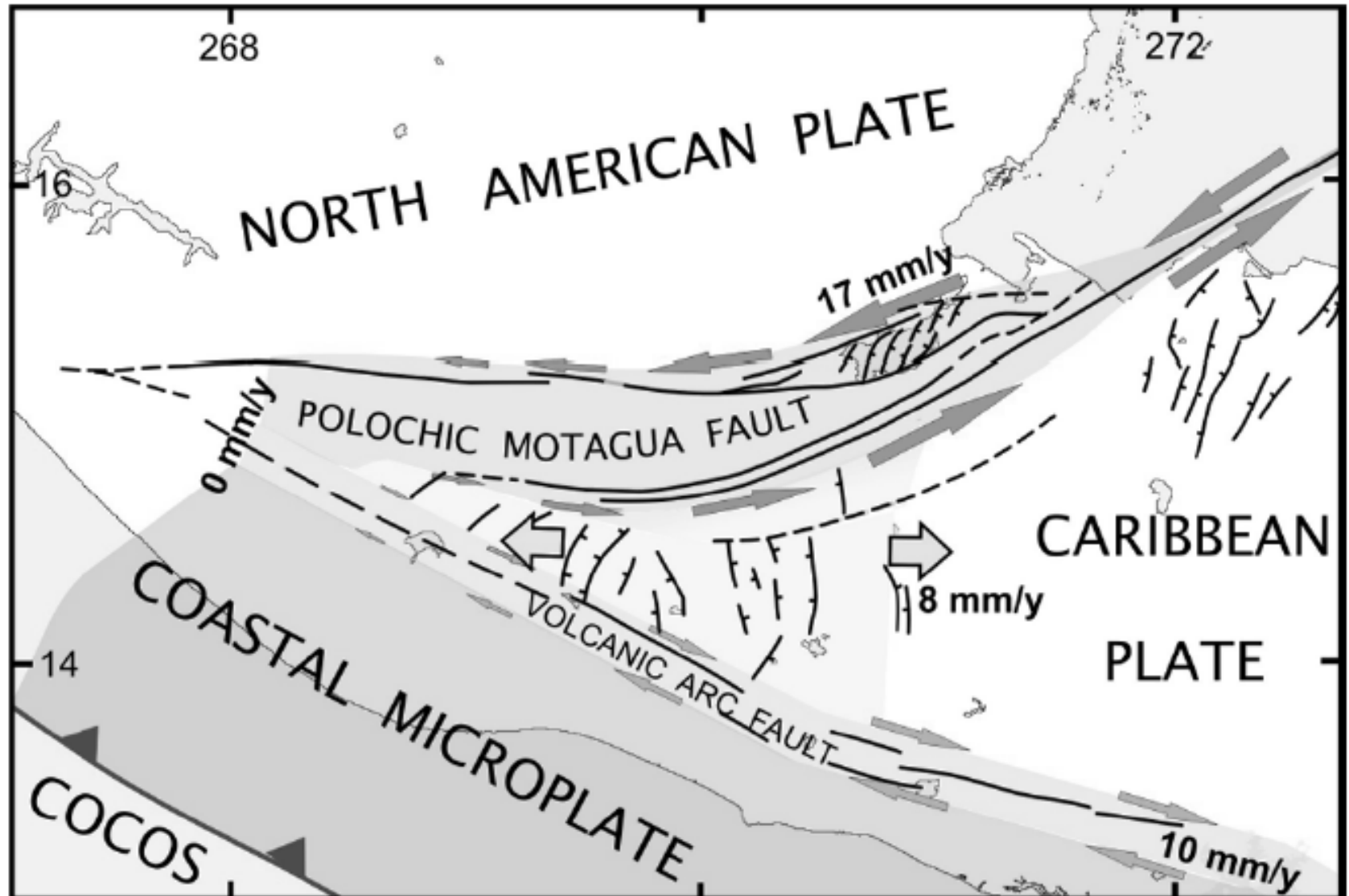
Seismicity of Central America 1900-2015 (M>5)



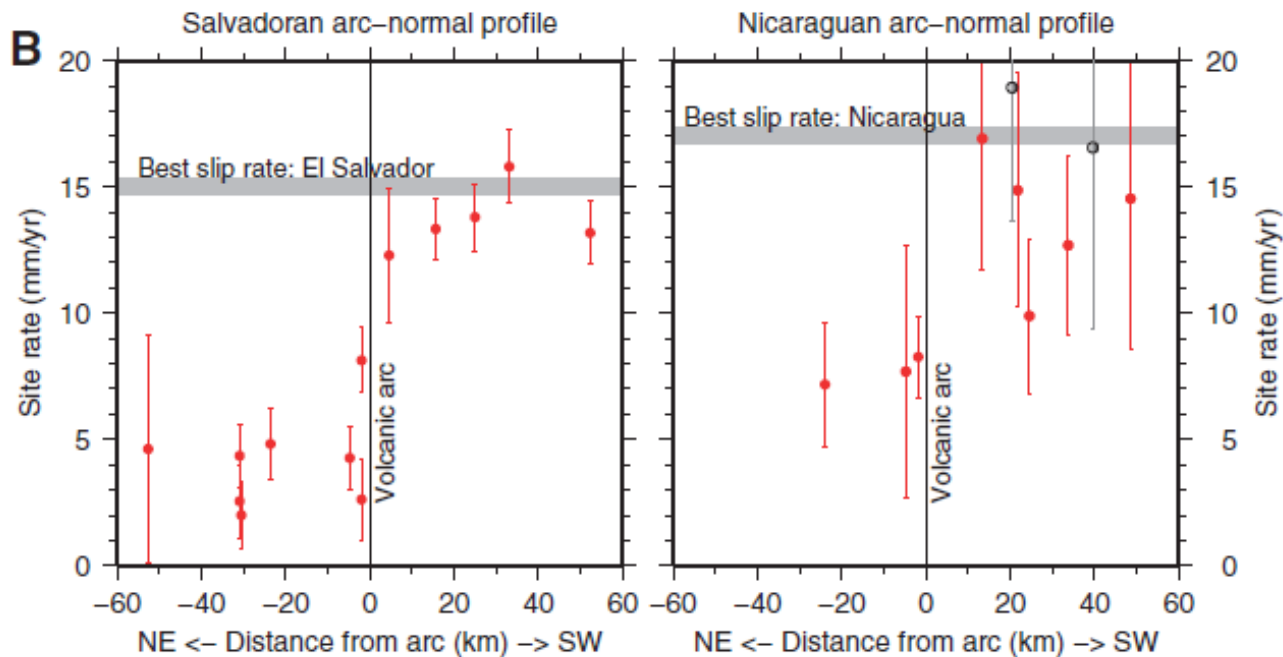
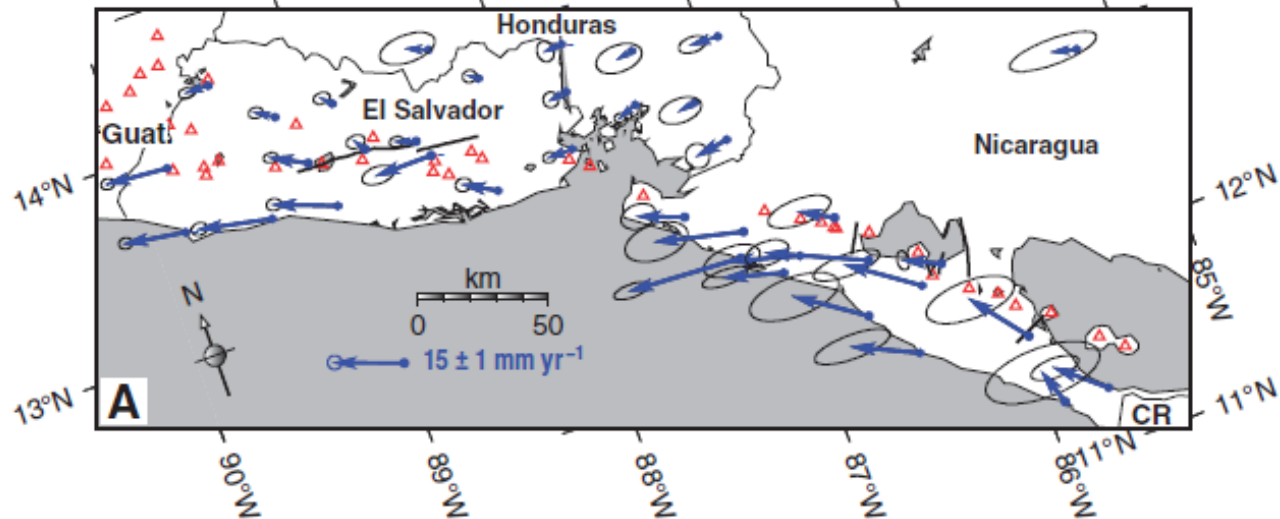
Seismicity of Central America 1900-2015 (M>7)



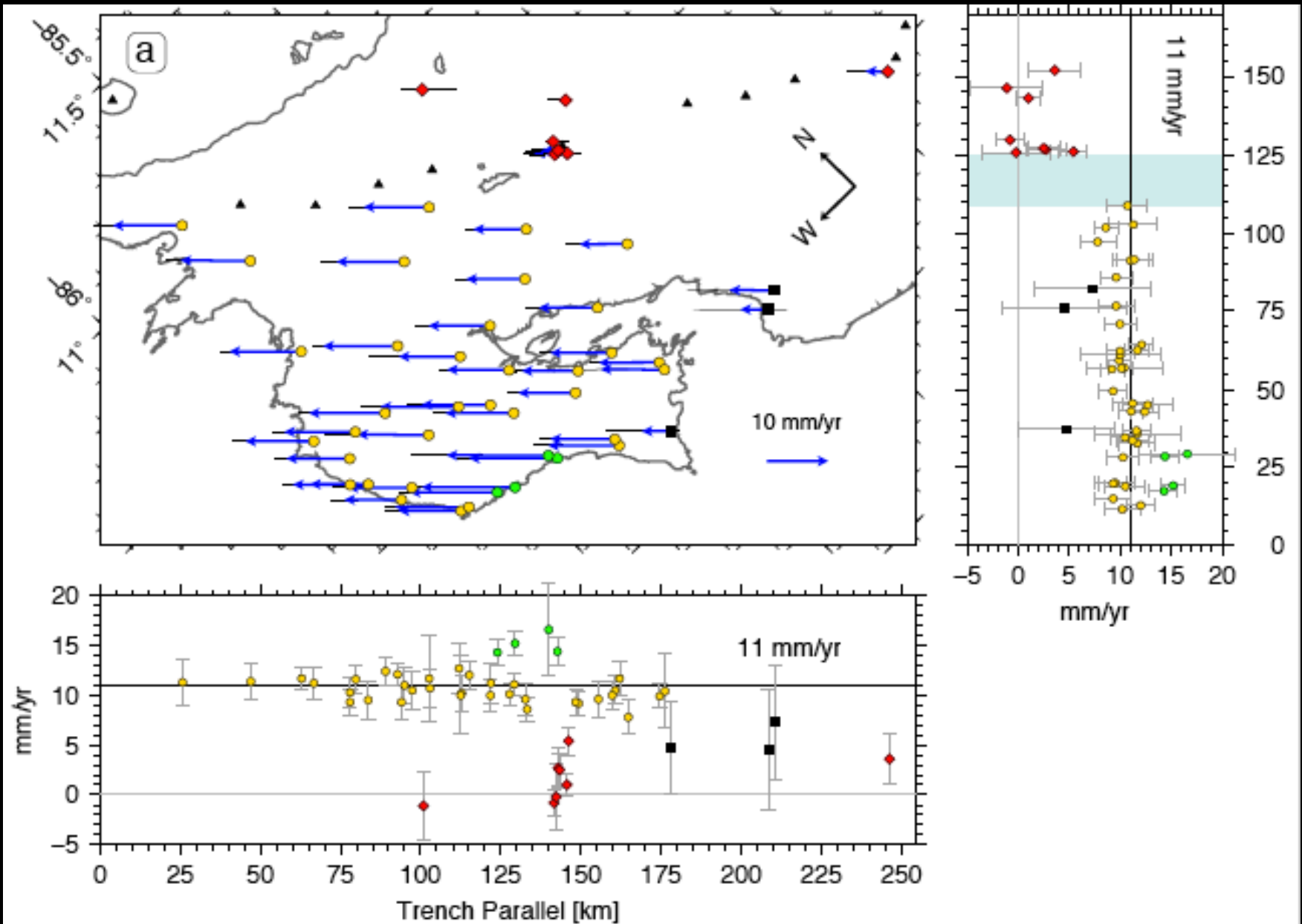
A coastal microplate by Lyon-Caen et al., 2006



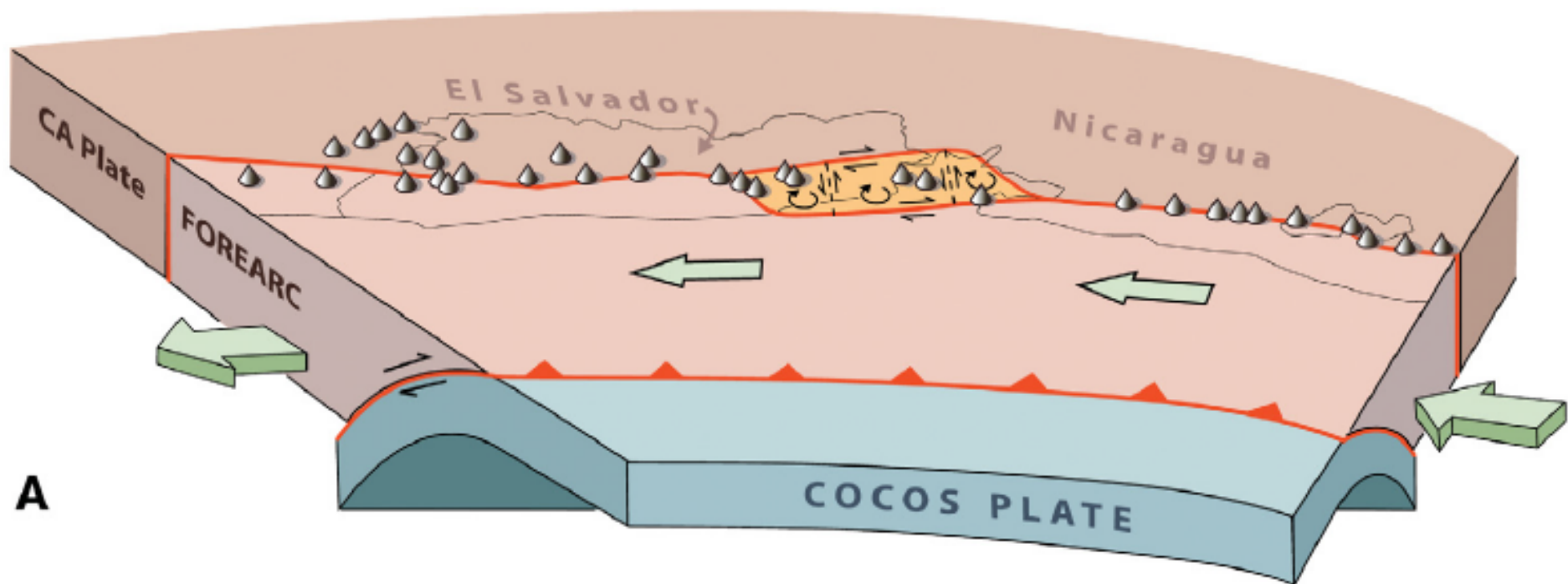
Sliver motion from Alvarado et al., 2010



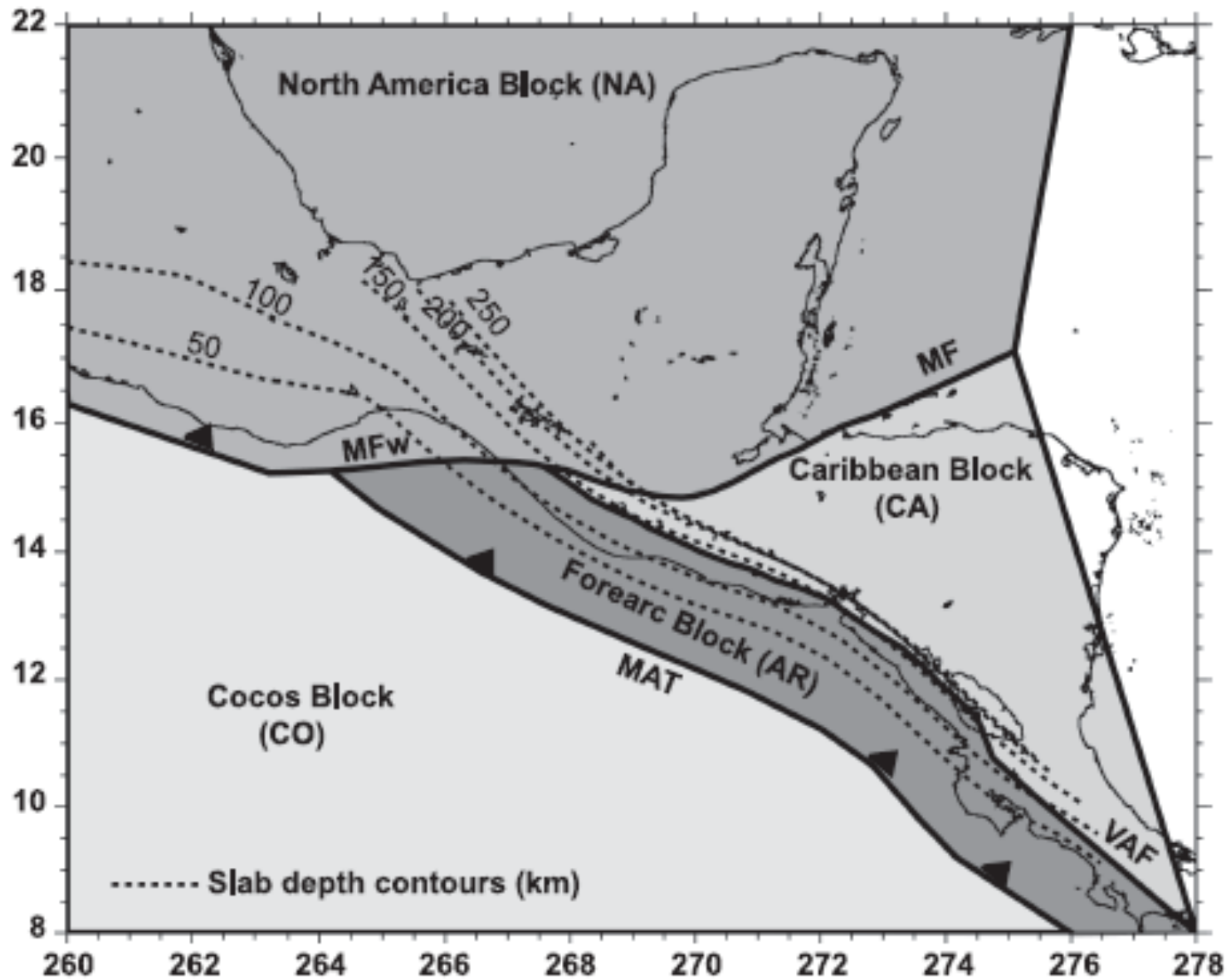
Sliver motion from Feng et al., 2012



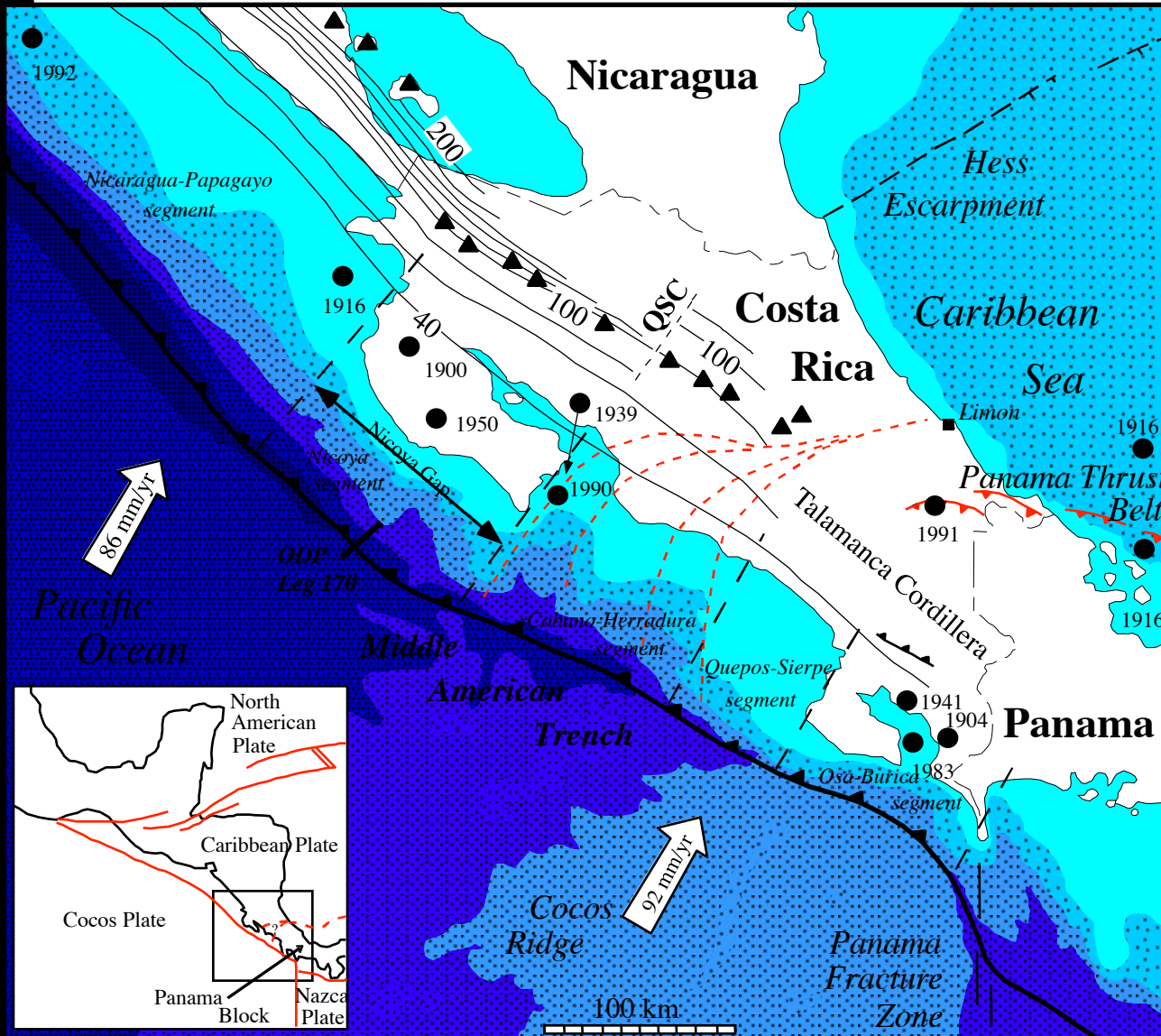
Pull-apart interpretation for the Gulf of Fonseca (Alvarado et al., 2010)



Regional sliver(?) (Franco et al., 2012)



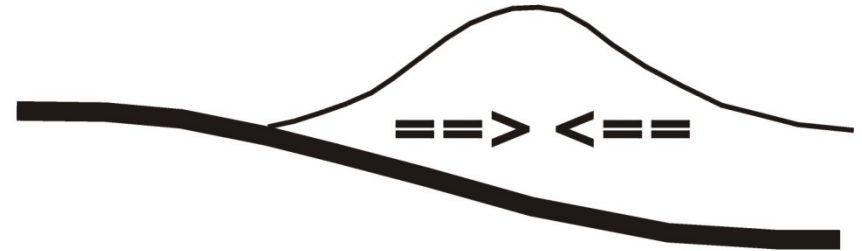
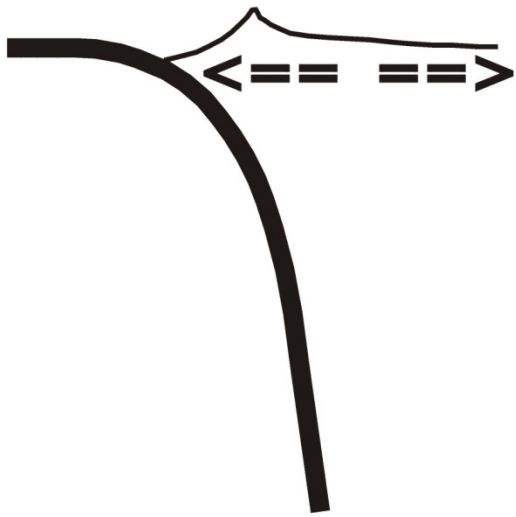
Tectonic Setting of Costa Rica



MARIANAS

vs

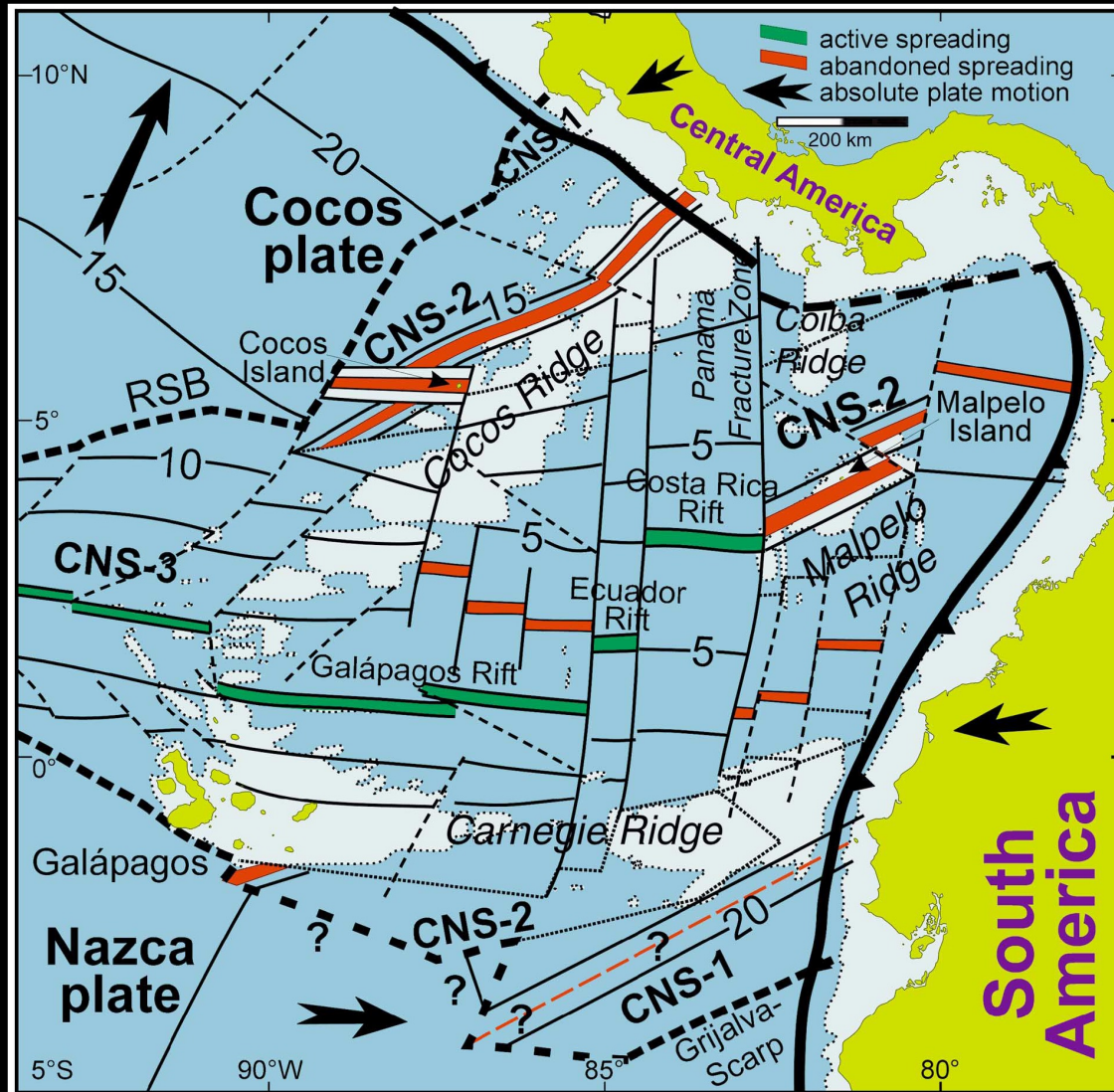
CHILE



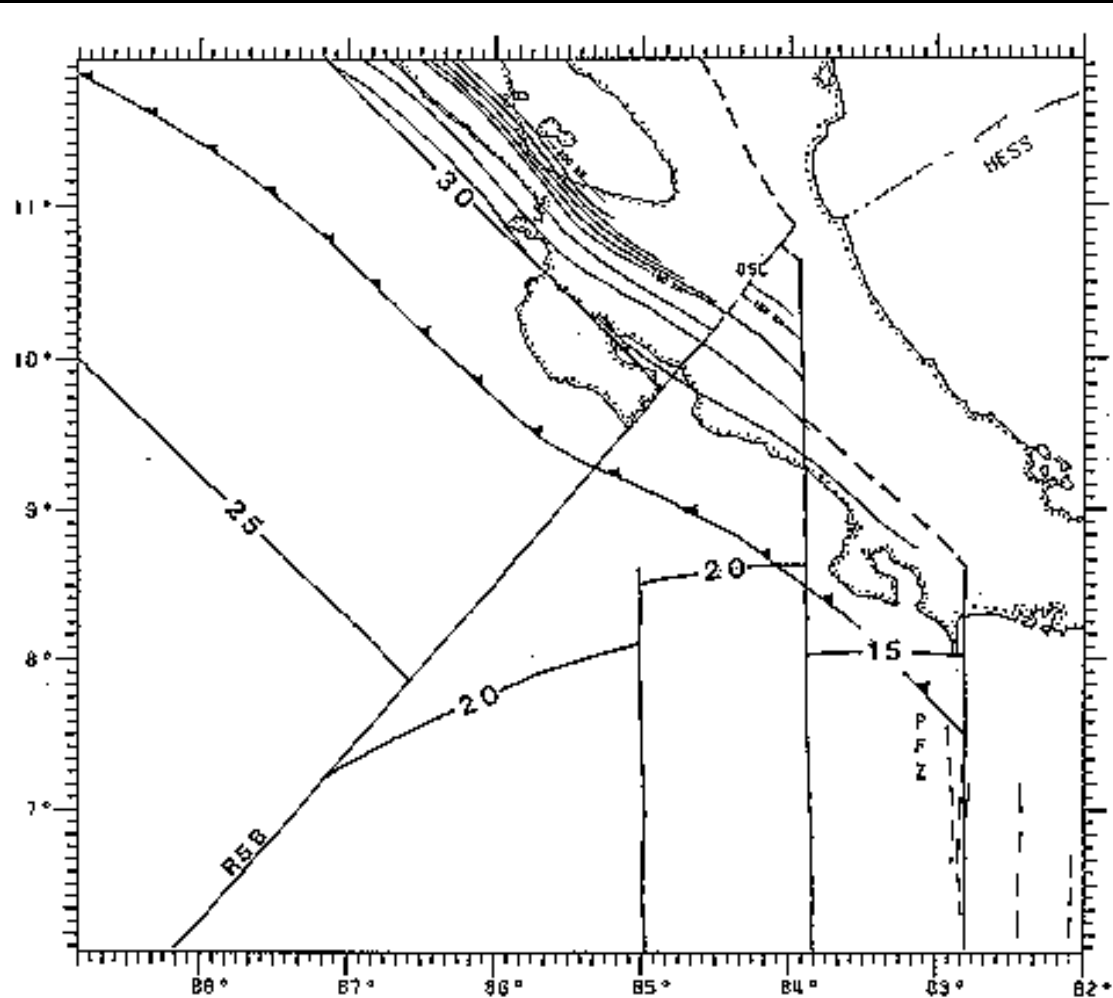
Nicaragua

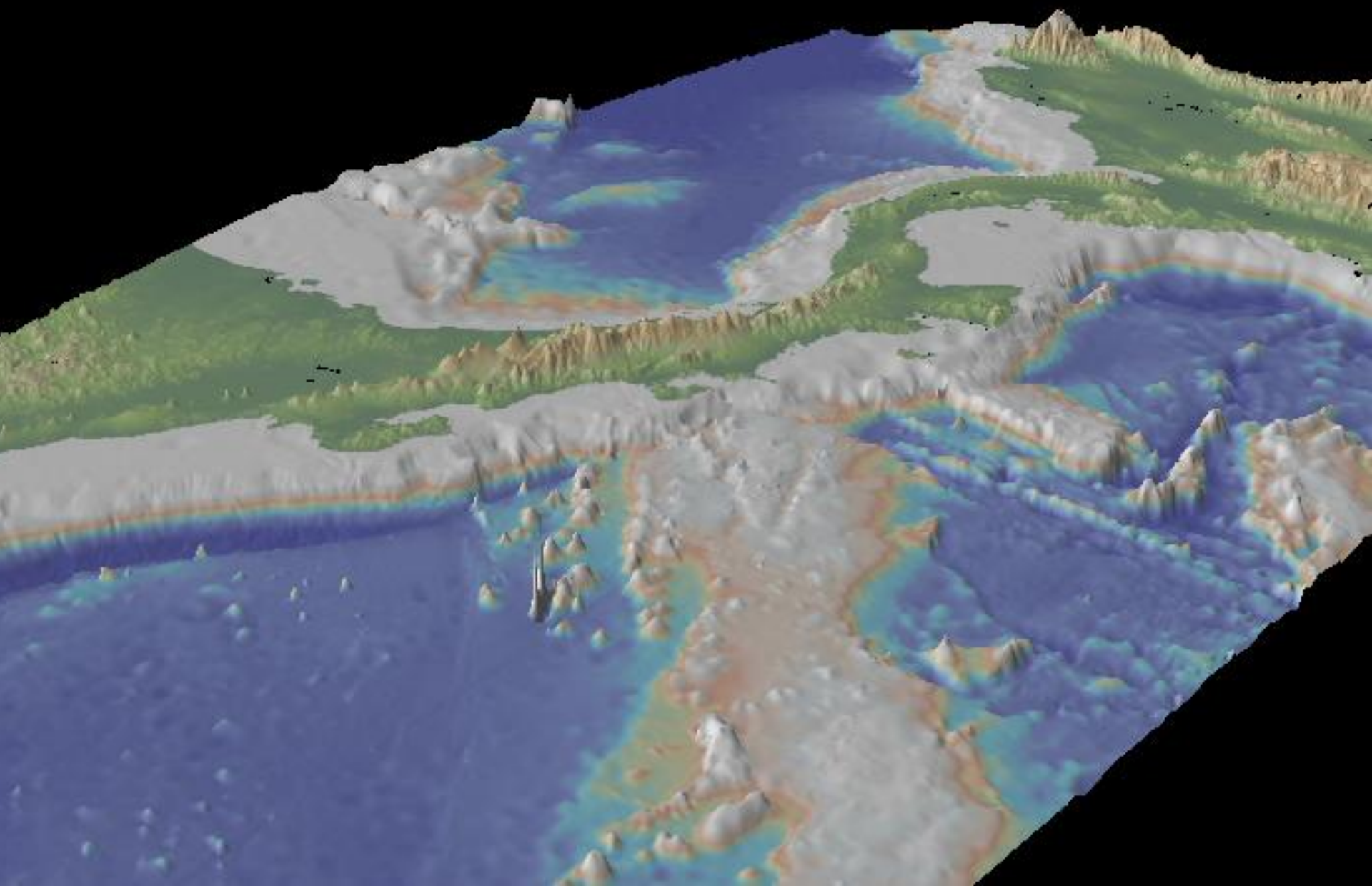
vs S Costa Rica

Age of the Oceanic Cocos Plate

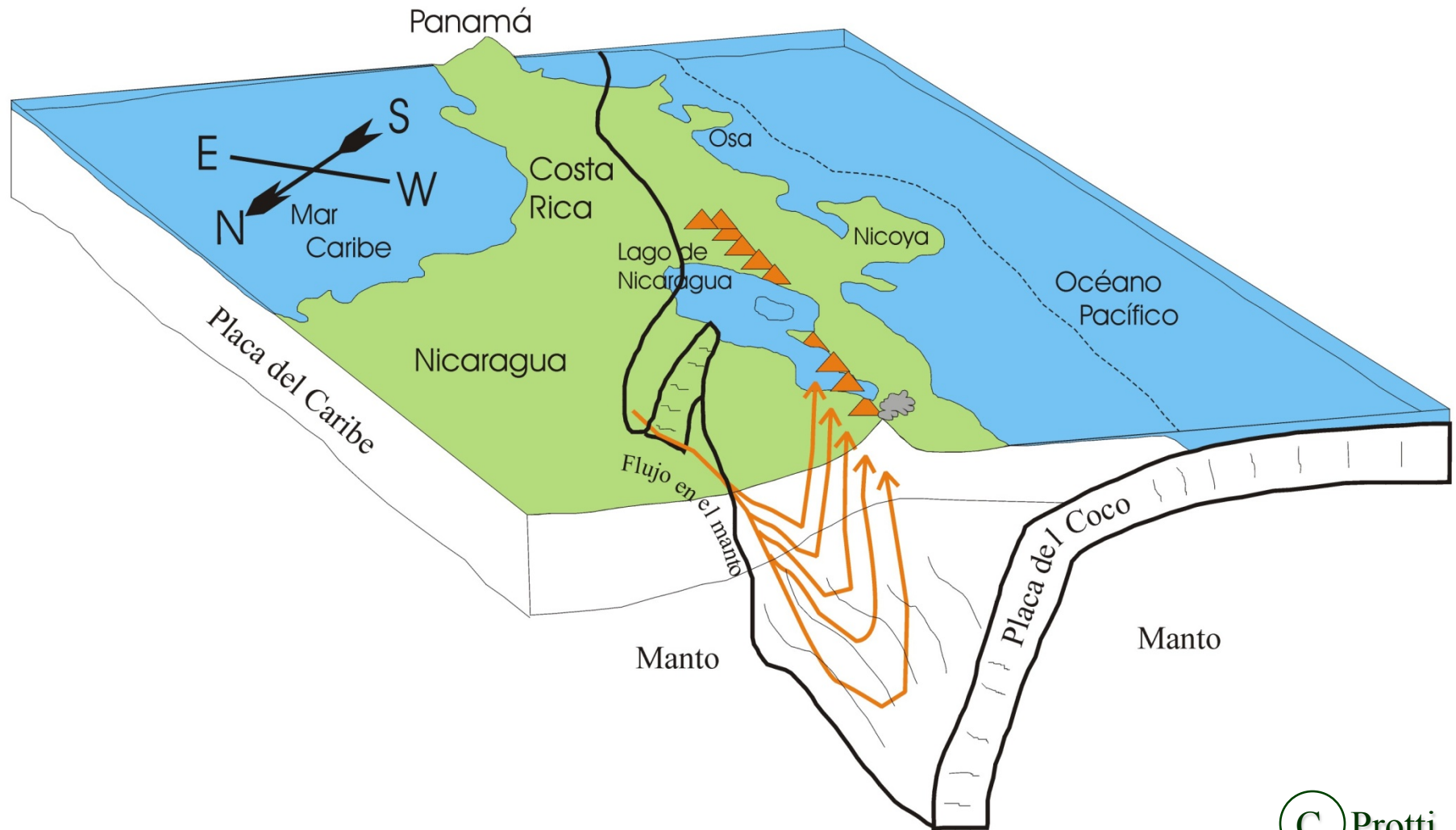


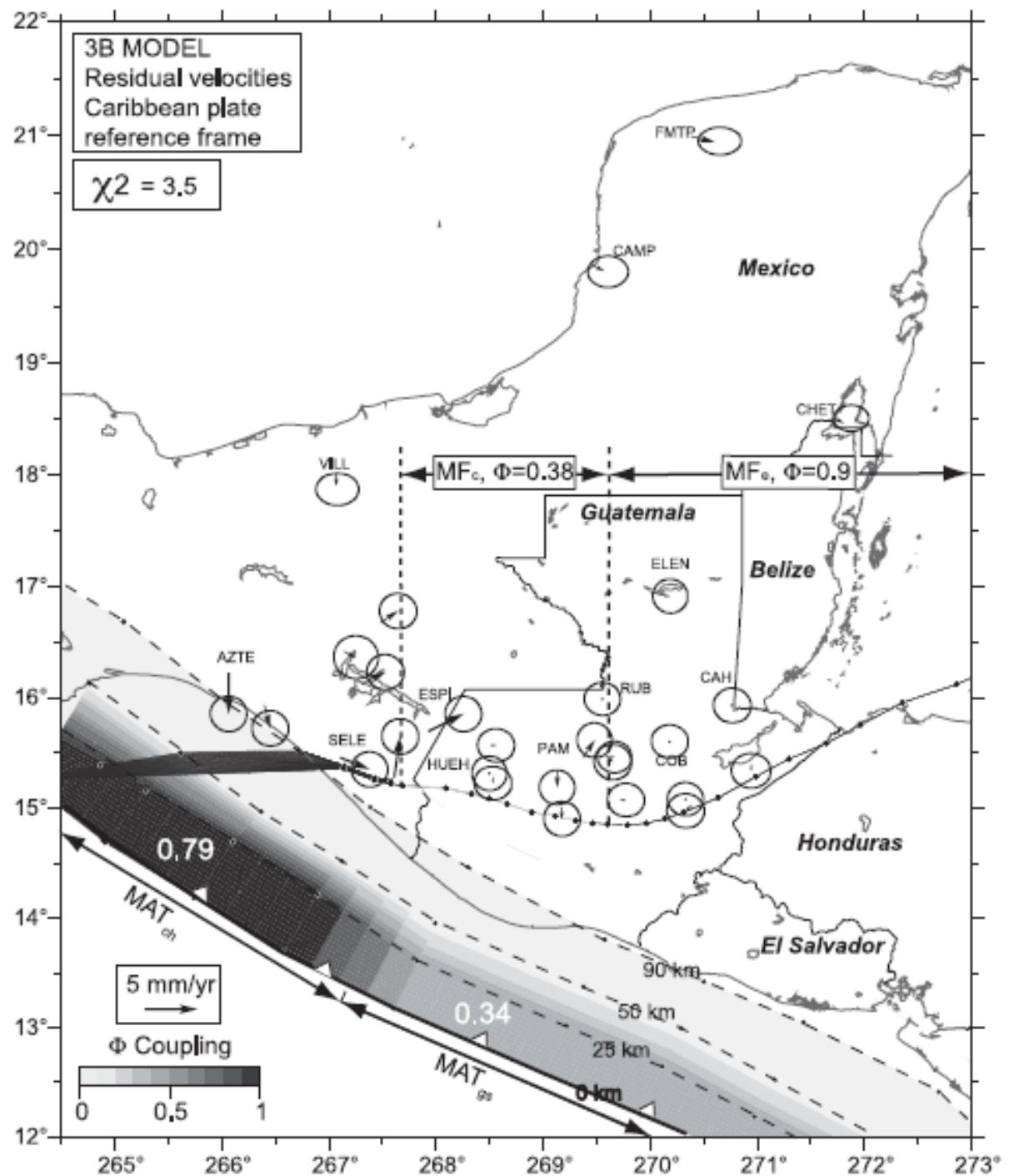
Correlation between the age and geometry of the subducting Cocos plate



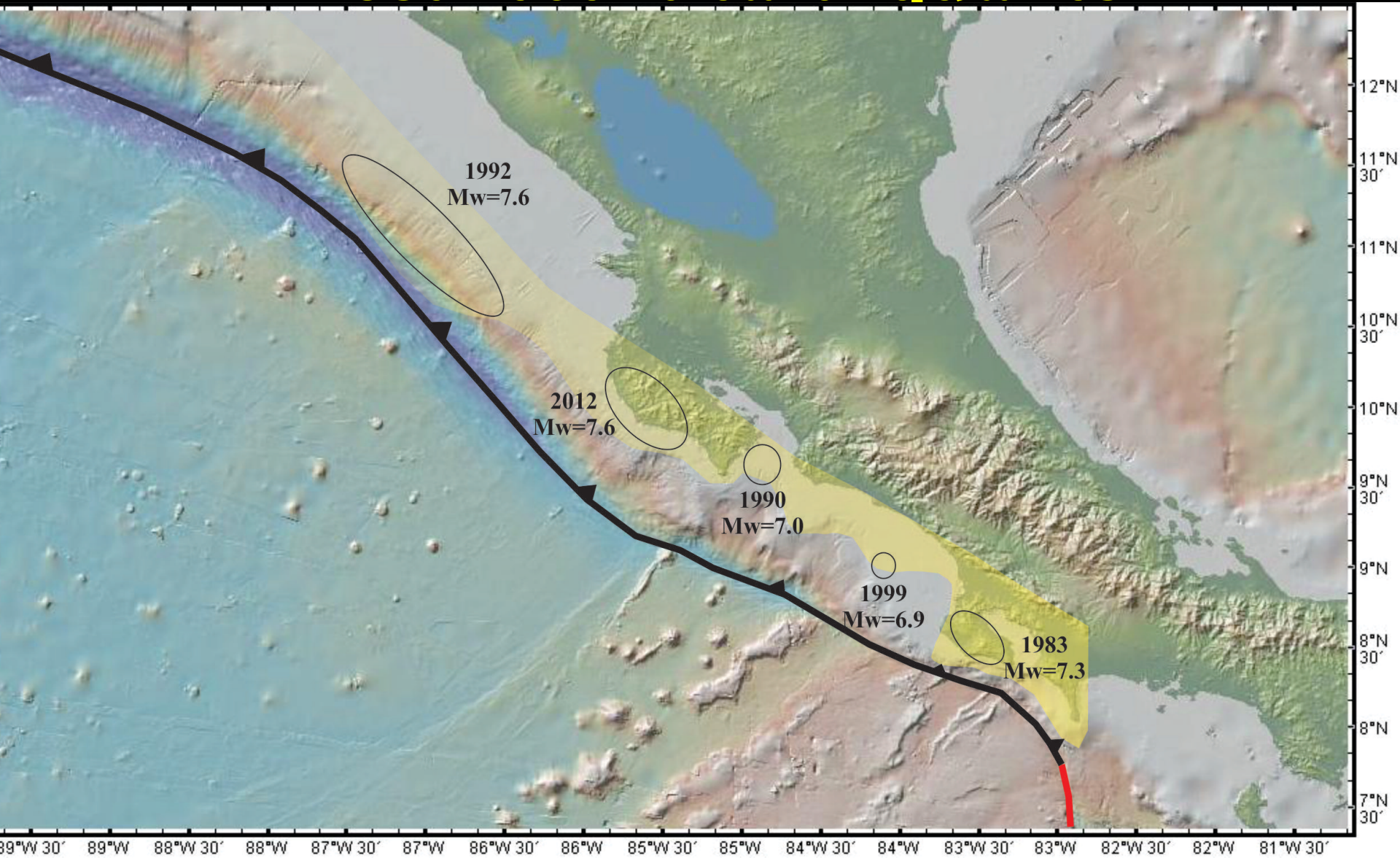


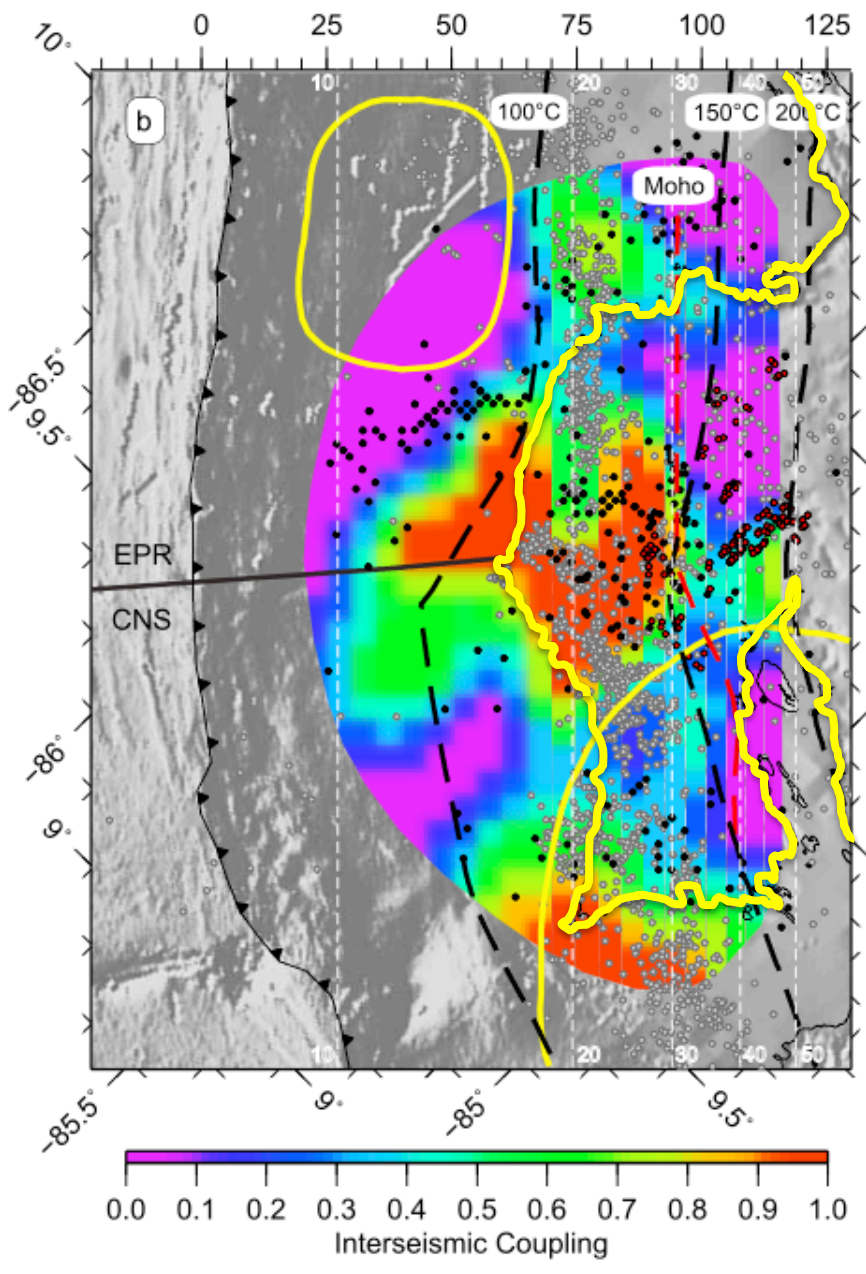
Parallel-to-the-trench mantle flow





Seismogenic zone and most recent earthquakes



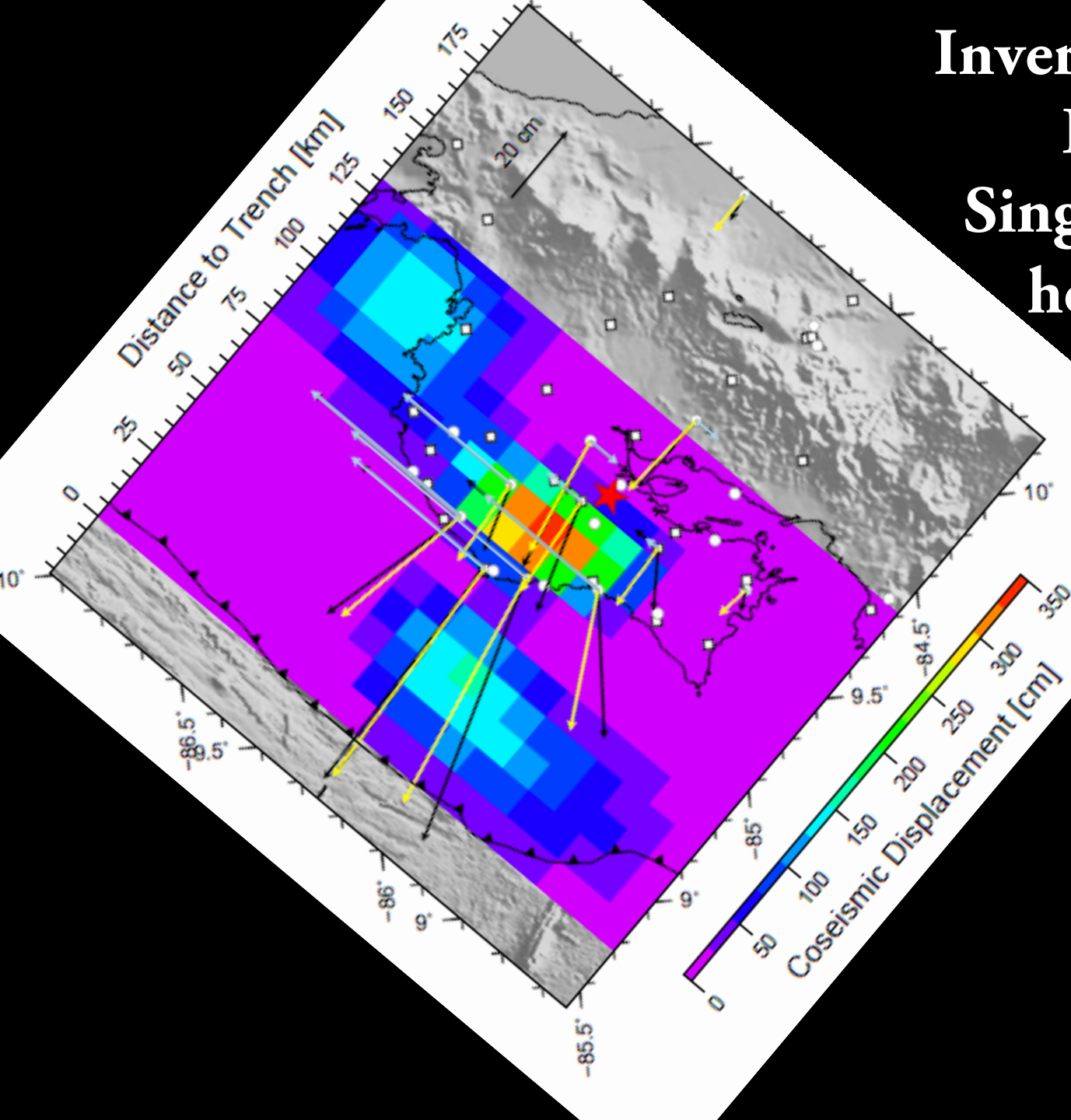


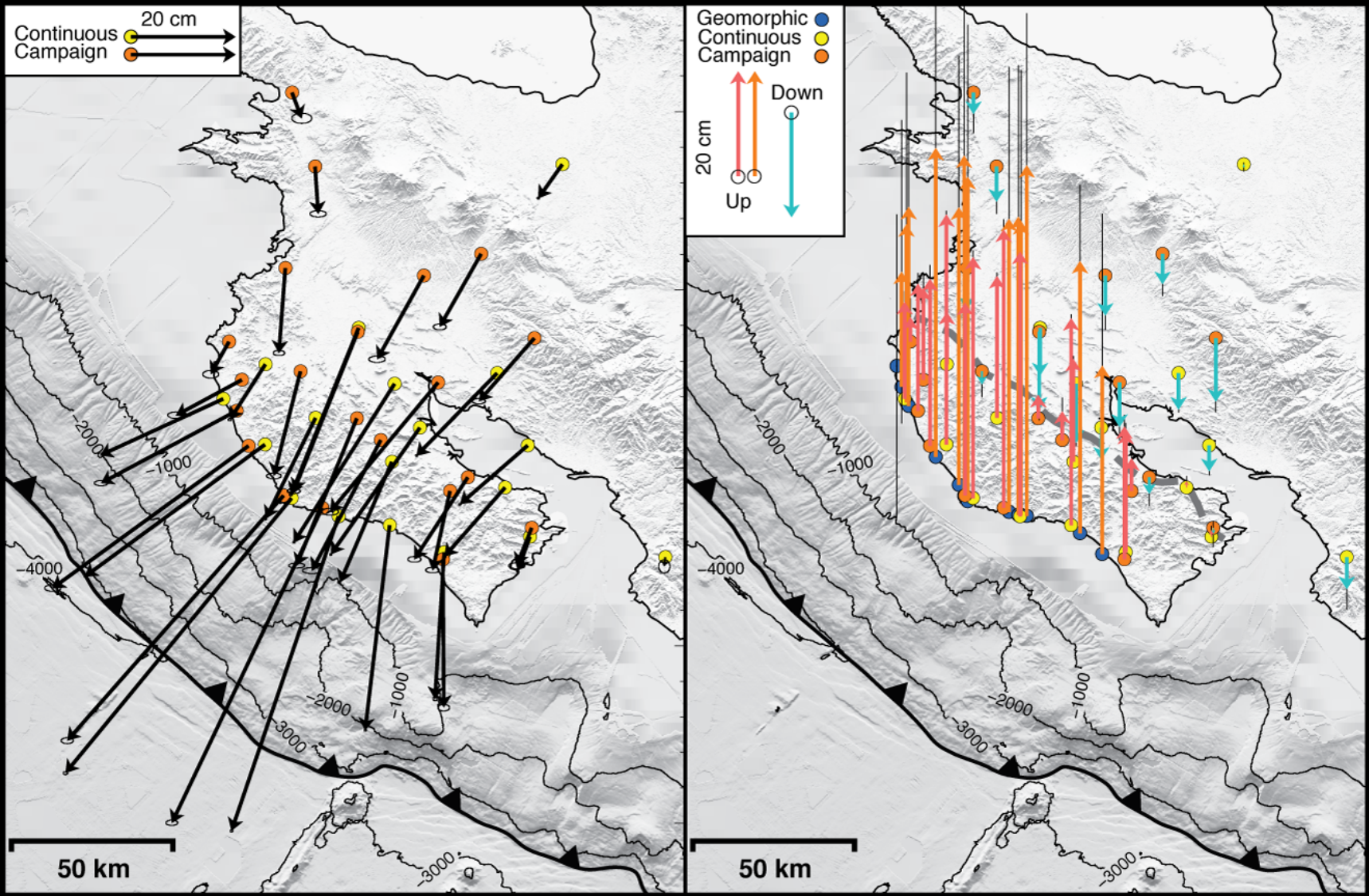
Seismic coupling (Feng et. al., May 2012)

September 5th, 2012

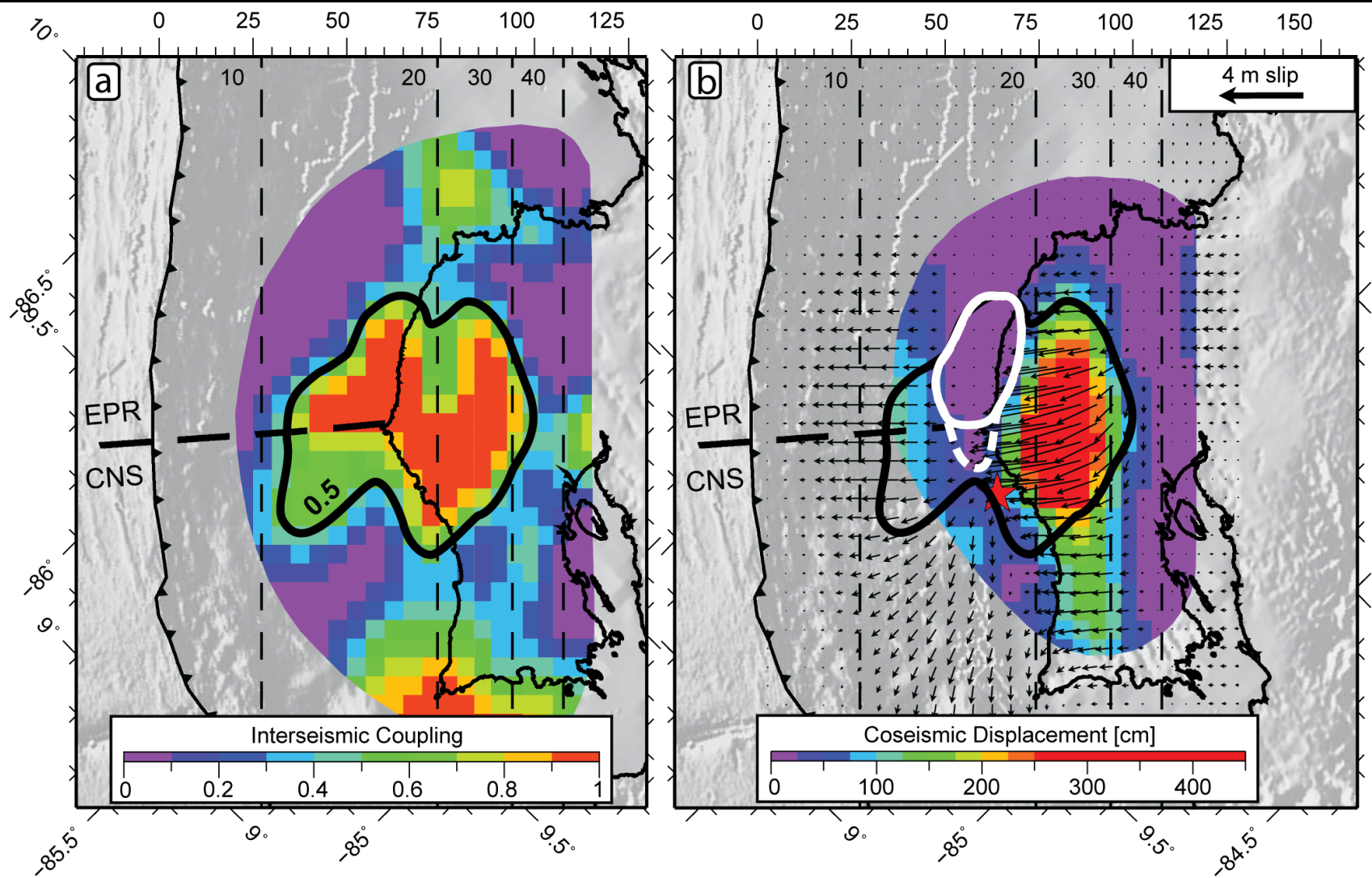
$M_w=7.6$ Nicoya Earthquake

**Inversion done by
Lujia Feng in
Singapore only 2
hours after the
earthquake**

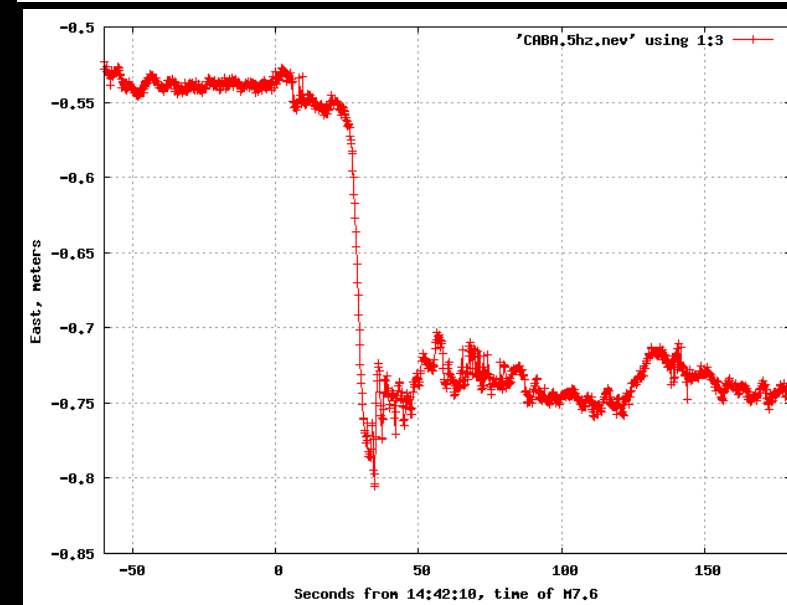
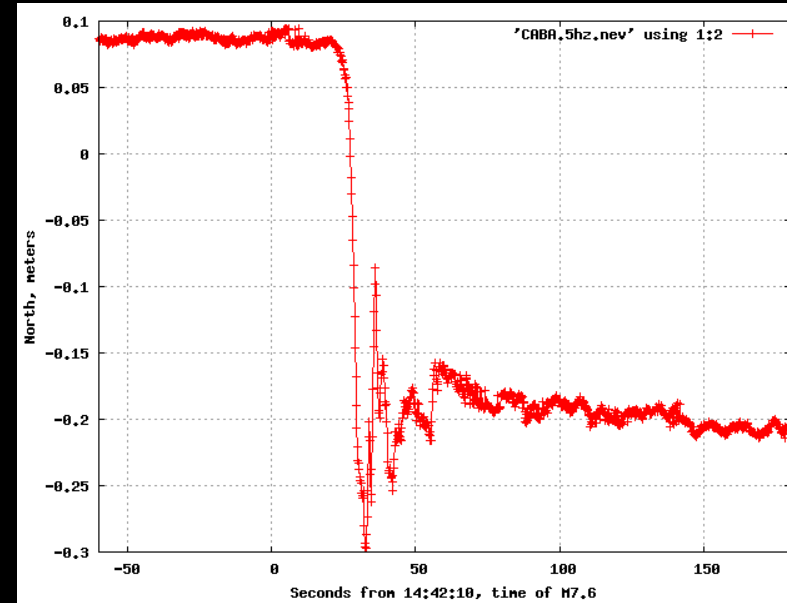
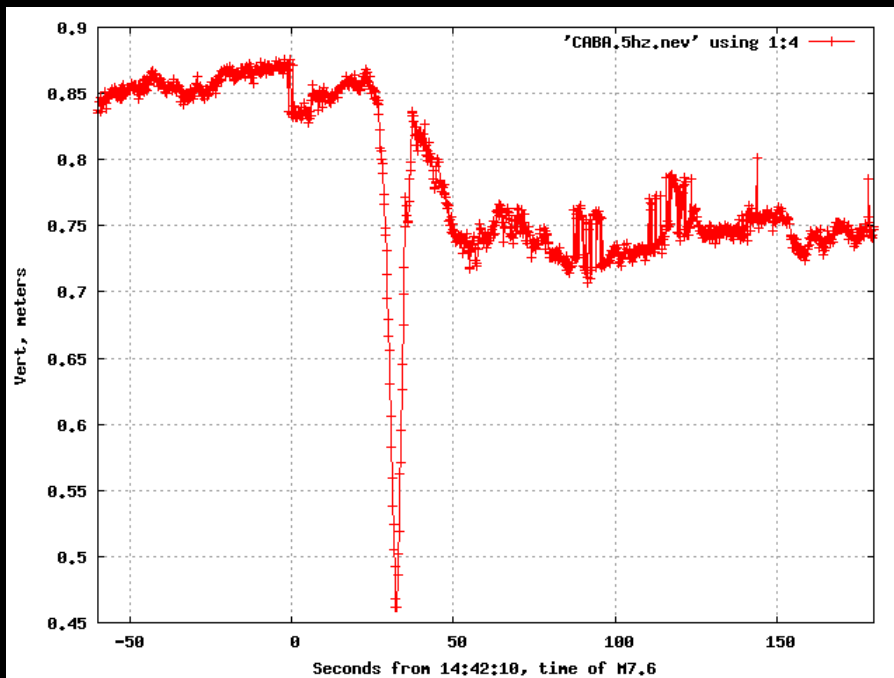




Before and after

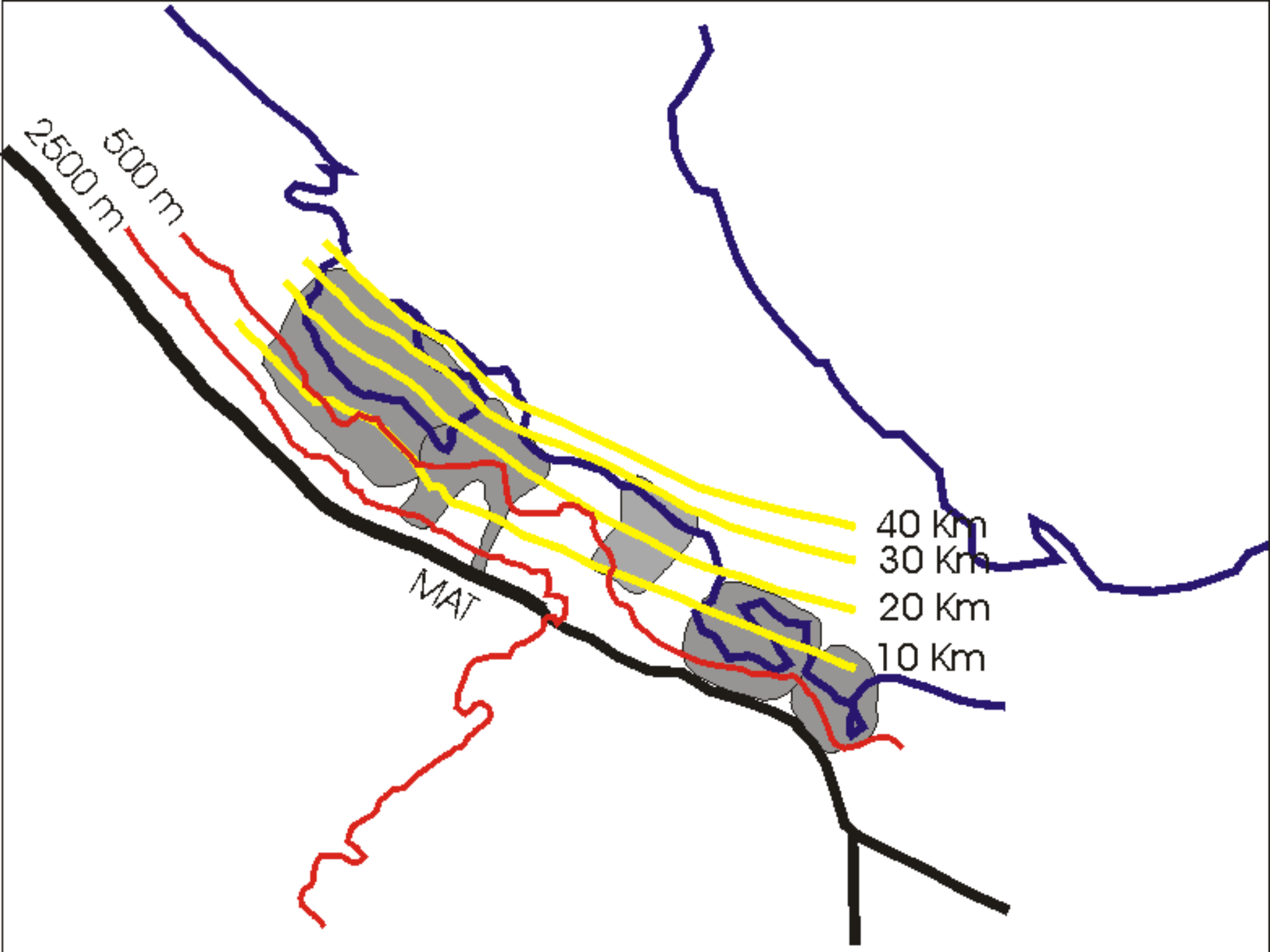


High rate (5 Hz) displacement seismograms (m)



There is more sexappeal for the MAT

Drilling the
seismogenic zone



Some issues to think about

- ◆ Where are the hidden faults under big cities? (extensive volcanic deposits and lahars)
- ◆ Can we characterized the seismic coupling off shore Central America?
- ◆ What's the potential for a major earthquake along the Hess scarpment?
- ◆ How the sliver motion behaves over an megathrust earthquake cycle?
- ◆ How local fault motion is controlled by coupling and failure of the subduction megathrust?

Central America Regional Network

- ◆ Managua, Nicaragua (June 4-5 2015)
- ◆ Hotel Neruda 6:30 PM (reunión preparatoria).

**Latin America and Caribbean
Seismological Commission
(LACSC) (IASPEI-IUGG)
Regional Assembly 2016
June 20-23, San José, Costa Rica**

<https://www.youtube.com/watch?v=QbhCpfxsod8>

Muchas gracias