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Complex fault rupture behaviour in the 2007 Aysen Seismic sequence: Liquiñe-Ofqui Fault System, Chilean Patagonia

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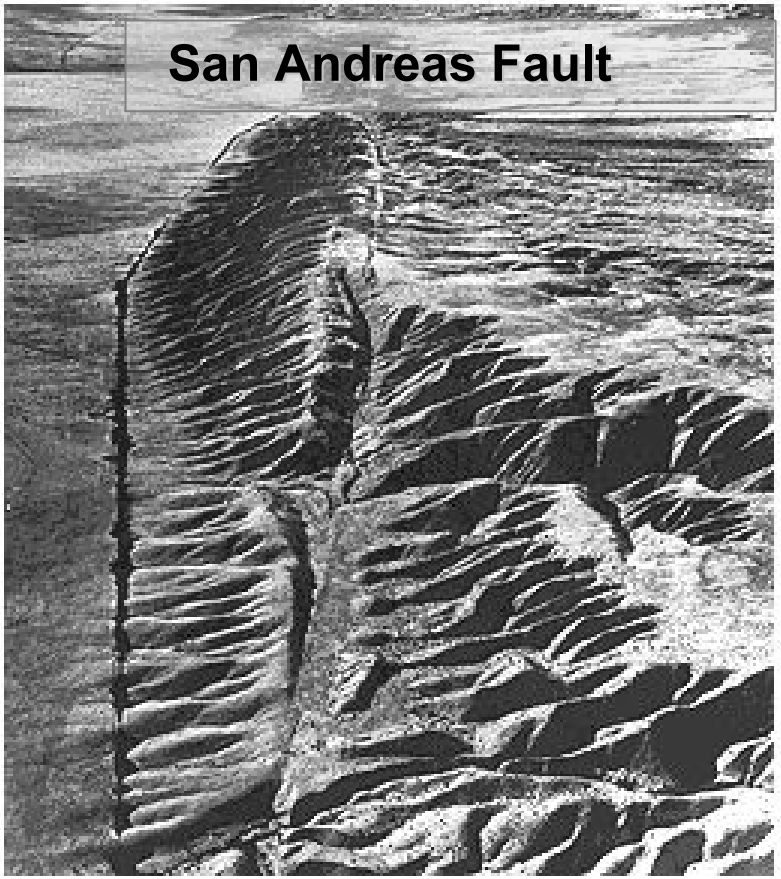
SERVICIO HIDROGRÁFICO Y OCEANOGRÁFICO ARMADA DE CHILE

GOBIERNO REGIONAL Y SU CONSEJO
PATAGONIA AYSEN

Airphoto Art contrasting California & Patagonia



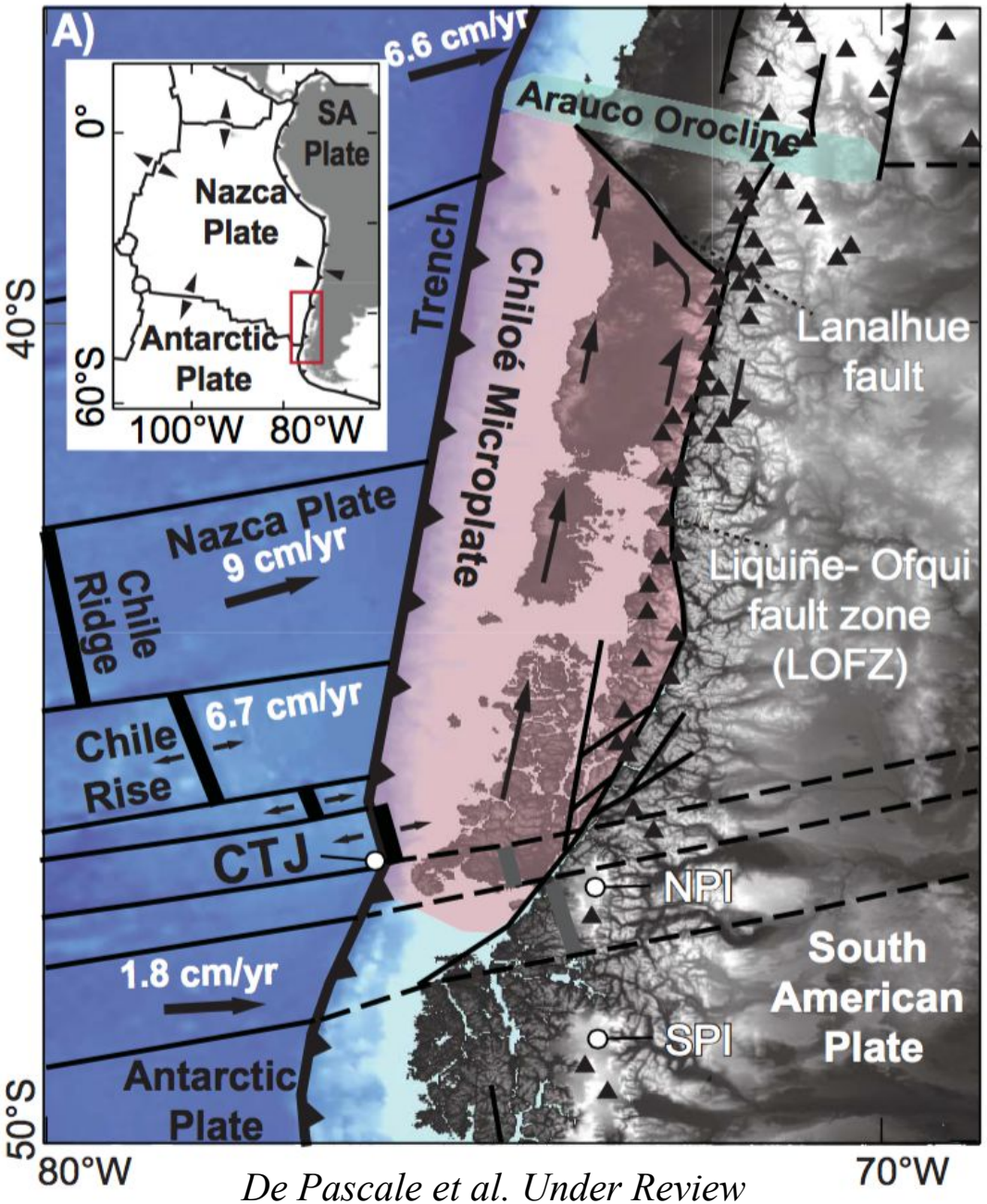
Vs

Airphoto: USGS

Drone photo: De Pascale

Liquiñe-Ofqui Fault

- driven by oblique subduction
- 1200 km dextral reverse *(Herve 1976)*
- 2007 Mw 6.2 event along minor fault 2007 *(Vargas et al., 2013)*
- glaciers, volcanoes, rain (3-10 m/yr)



De Pascale et al. Under Review

Liquiñe-Ofqui Fault

Dextral Slip Rates

- *Nuvel-1a Plate motion*
  28 mm/yr (DeMets et al)
- *GPS model* **>6.8 mm/yr**
  (*Wang et al. 2007*)

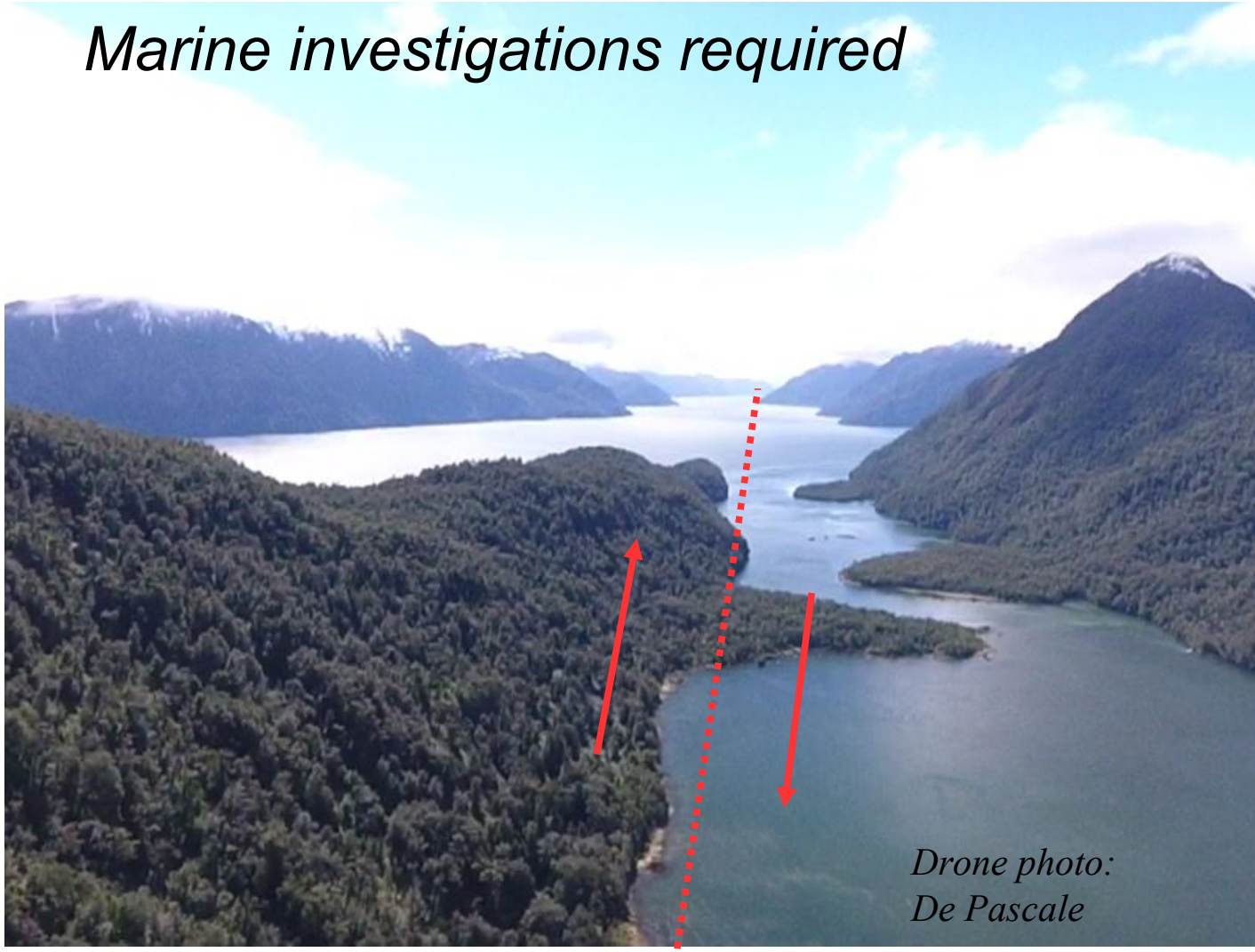
- *Late-Cenozoic Separations*
  3.6–18.9 mm/yr
- *Late-Quaternary Offsets*
  11.6–24.6 mm/yr
  (De Pascale et al., Under Review)

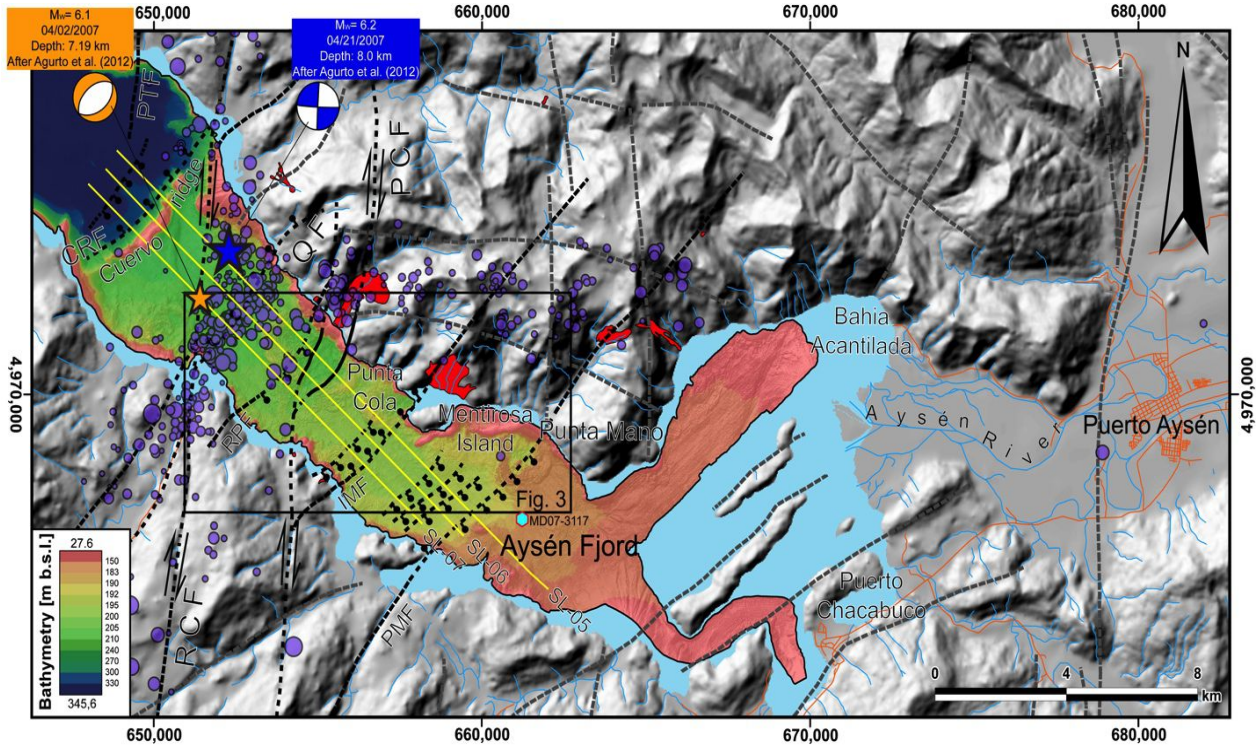
- *better constrained rates in 2021*

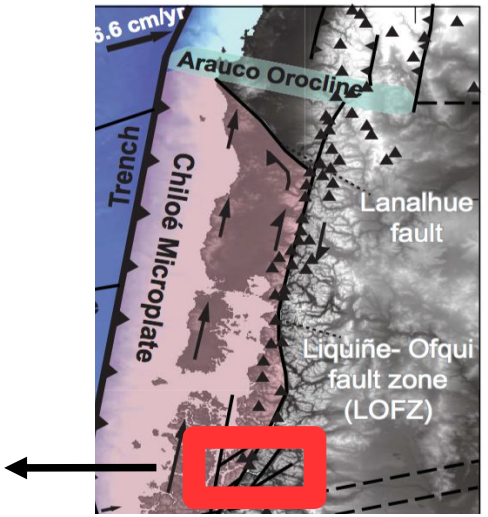
Perroud MSc
In Prep

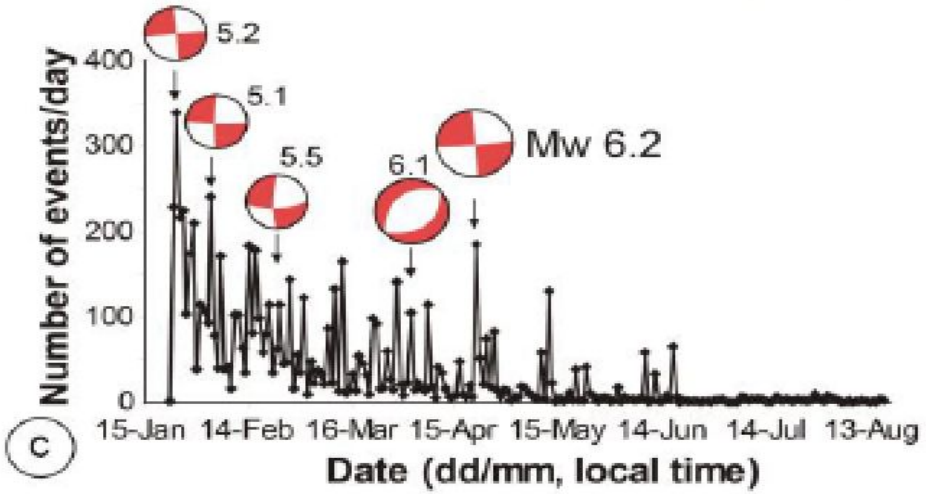
Vegetation Challenges

Only ~25% of the fault is onshore





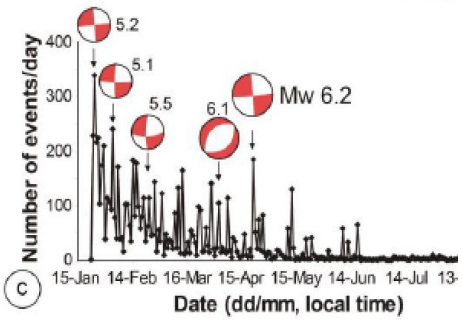


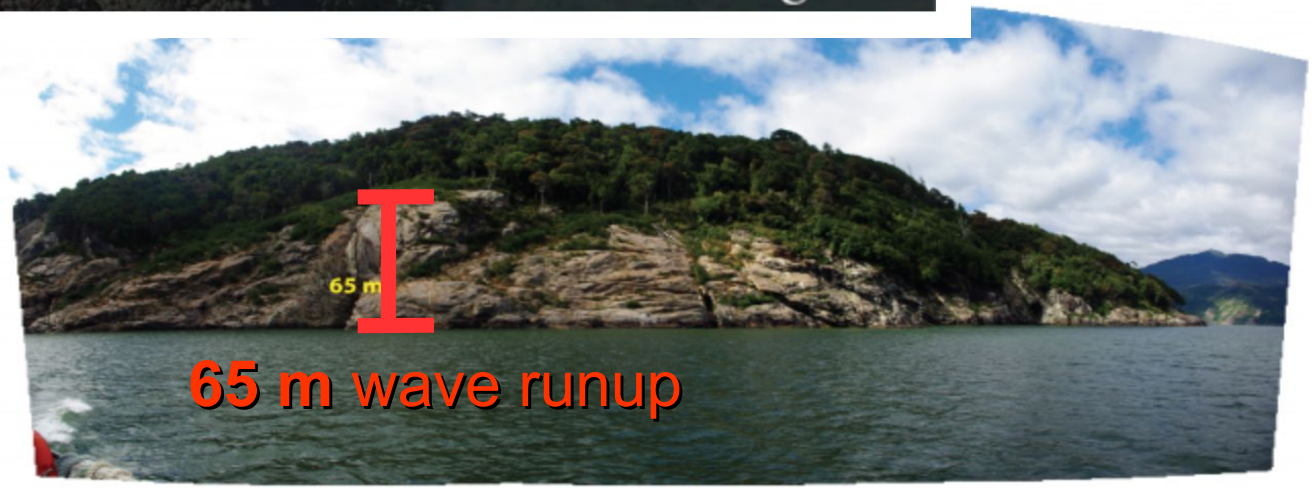


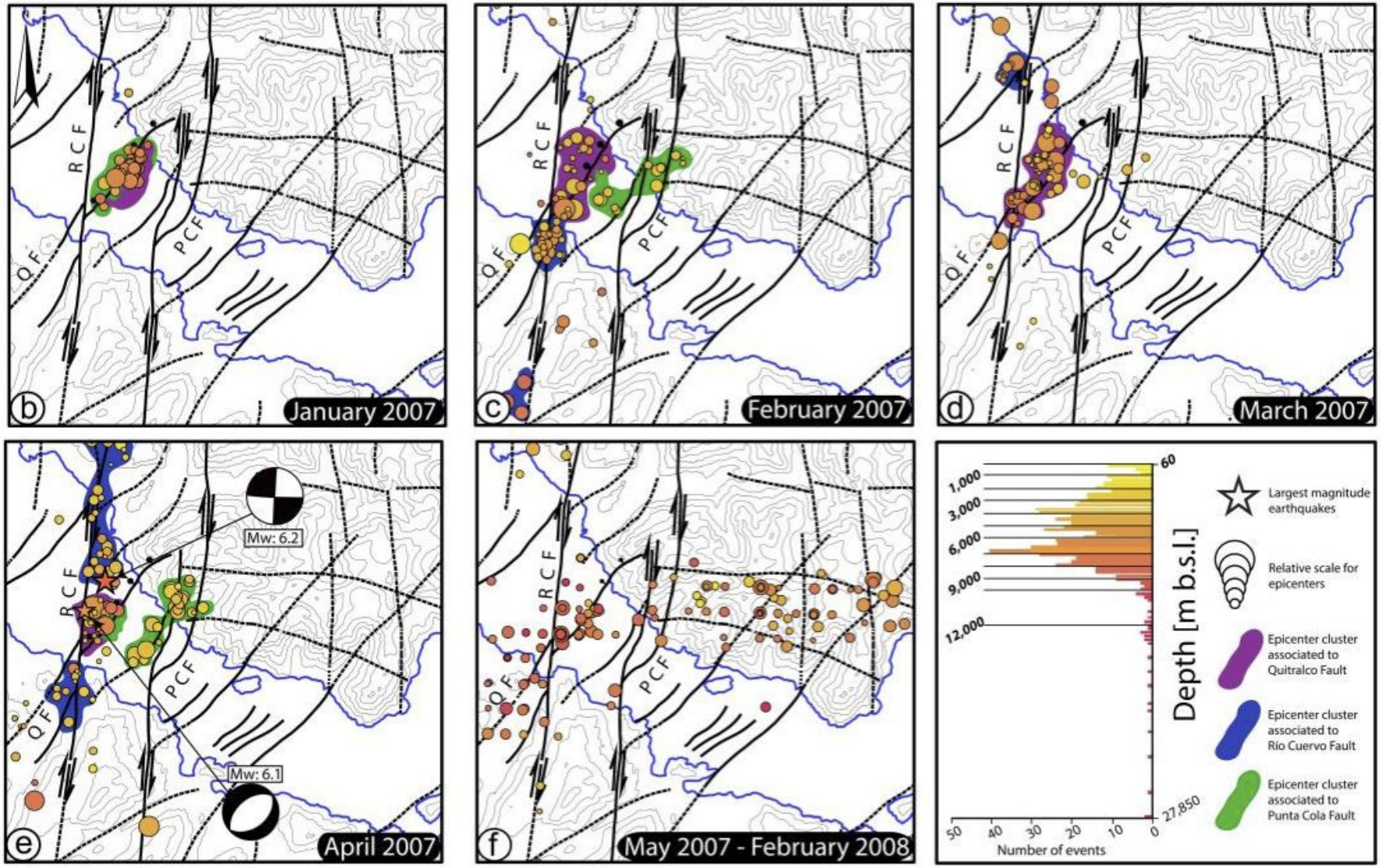
2007 Aysen (Chile) Seismic Sequence

Villalobos et al., 2020 - JGR

Mw 6.2 Coseismic Landslides







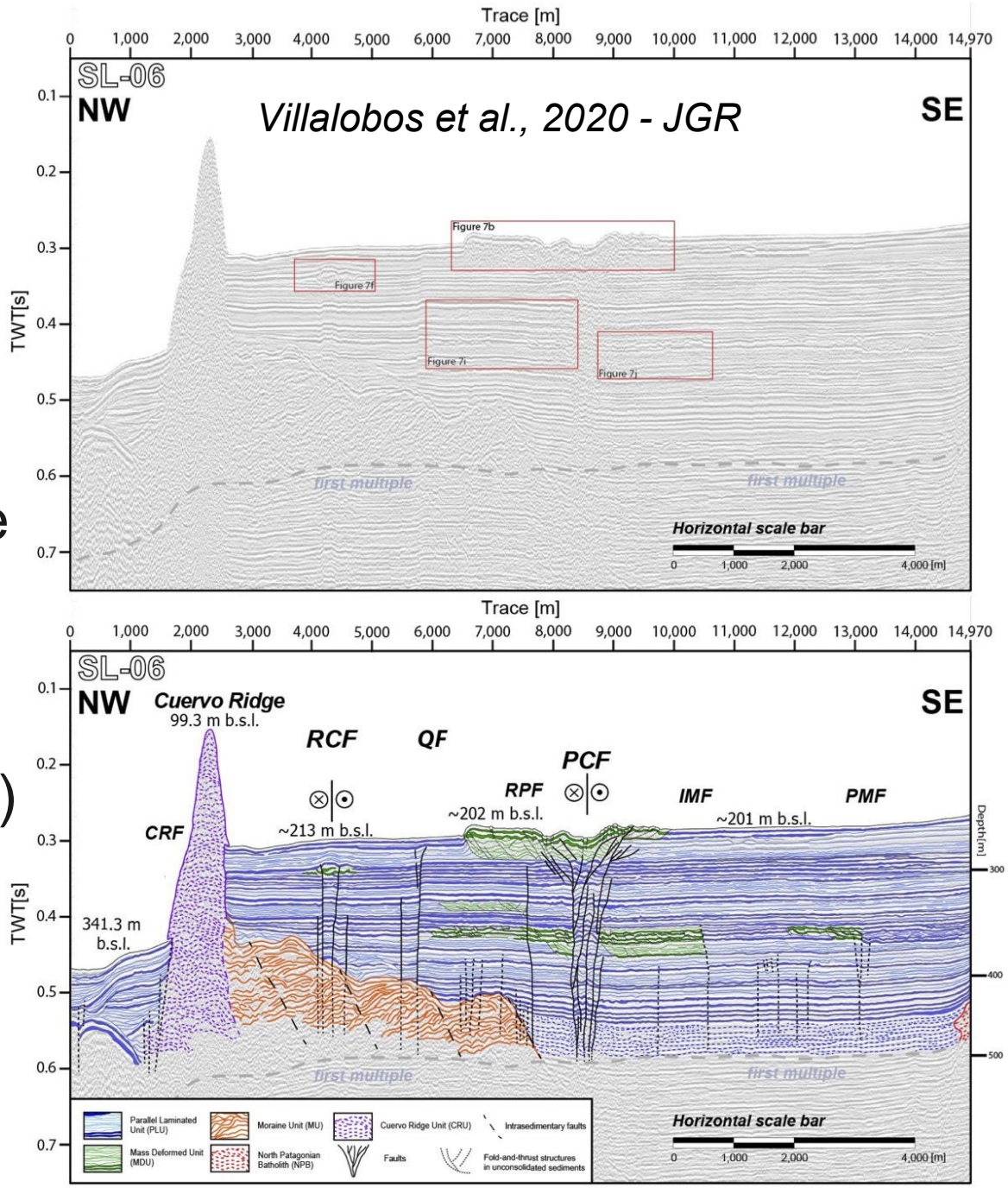
Villalobos et al., 2020 - JGR

2007 Aysen Eqs

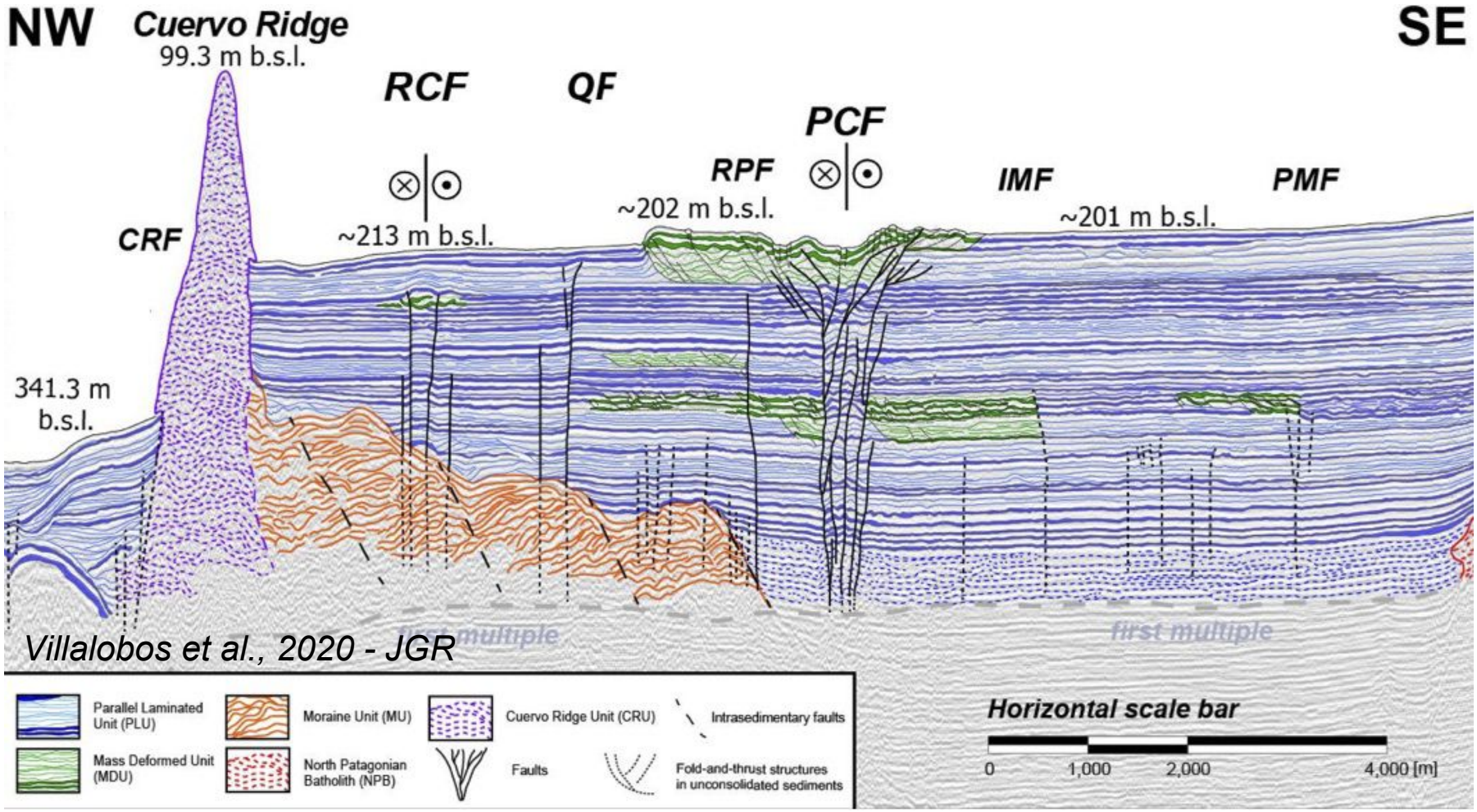
- **Rio Cuervo** Mw 6.2
  Main LF
  No surface rupture
  (i.e. partial rupture)
  full ruptures evidence
  (i.e. 2 rupture modes)

- PCF – possible rupture (but obscured)

- migration of Eqs space and t



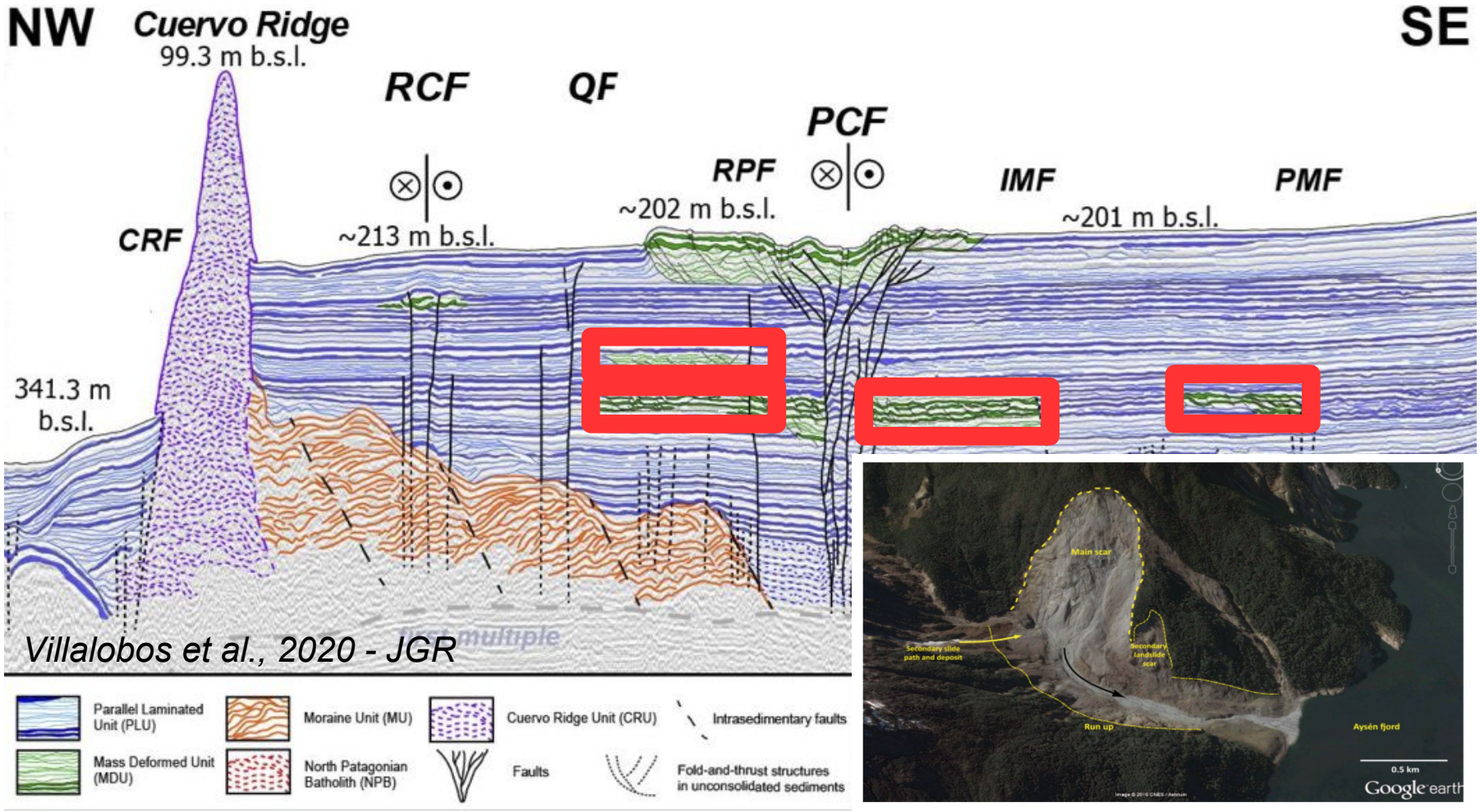
Submarine landslides as paleoseismic indicators



7 packages of landslides within the fiord sediments, similar to 2007

7 major ≥ Mw 6.2 events LOF events since fiord deglaciated ca. 12 ka.

Submarine landslides as paleoseismic indicators



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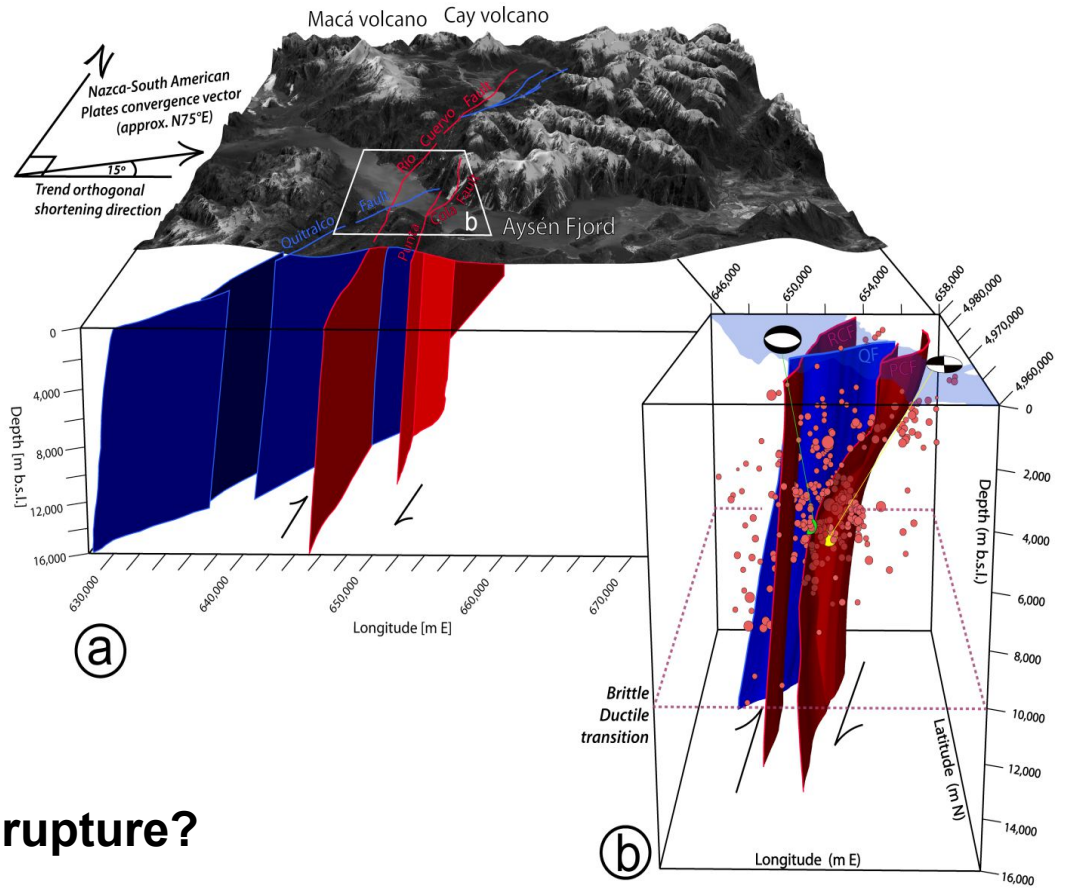
Conclusions Liquiñe-Ofqui Fault Sequence

Villalobos et al., 2020 - JGR



- Complex cascading fault interactions

- Evidence for partial (Mw 6.2) and full (Mw 7.5+) ruptures

Questions:

A) time (t) since the last **LOF full rupture?**

B) Partial LOF rupture in the slow Mw 7.7 aftershock of the Mw 9.5 Valdivia megathrust event in 1960? - *after Kanamori & Rivera, 2017*

C) During previous full ruptures (i.e. to the seafloor), **were intersecting faults involved?**

Thank you!

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