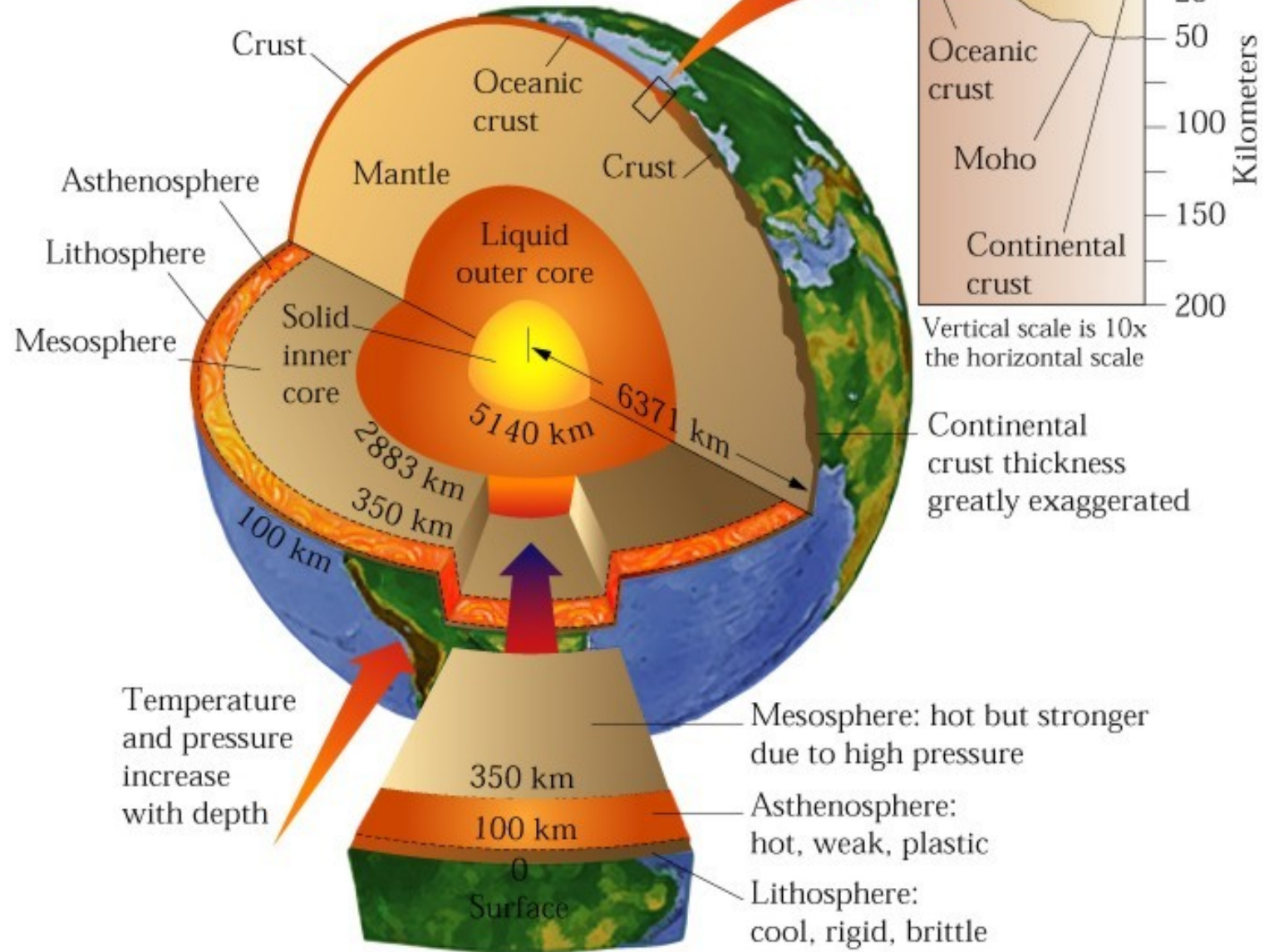
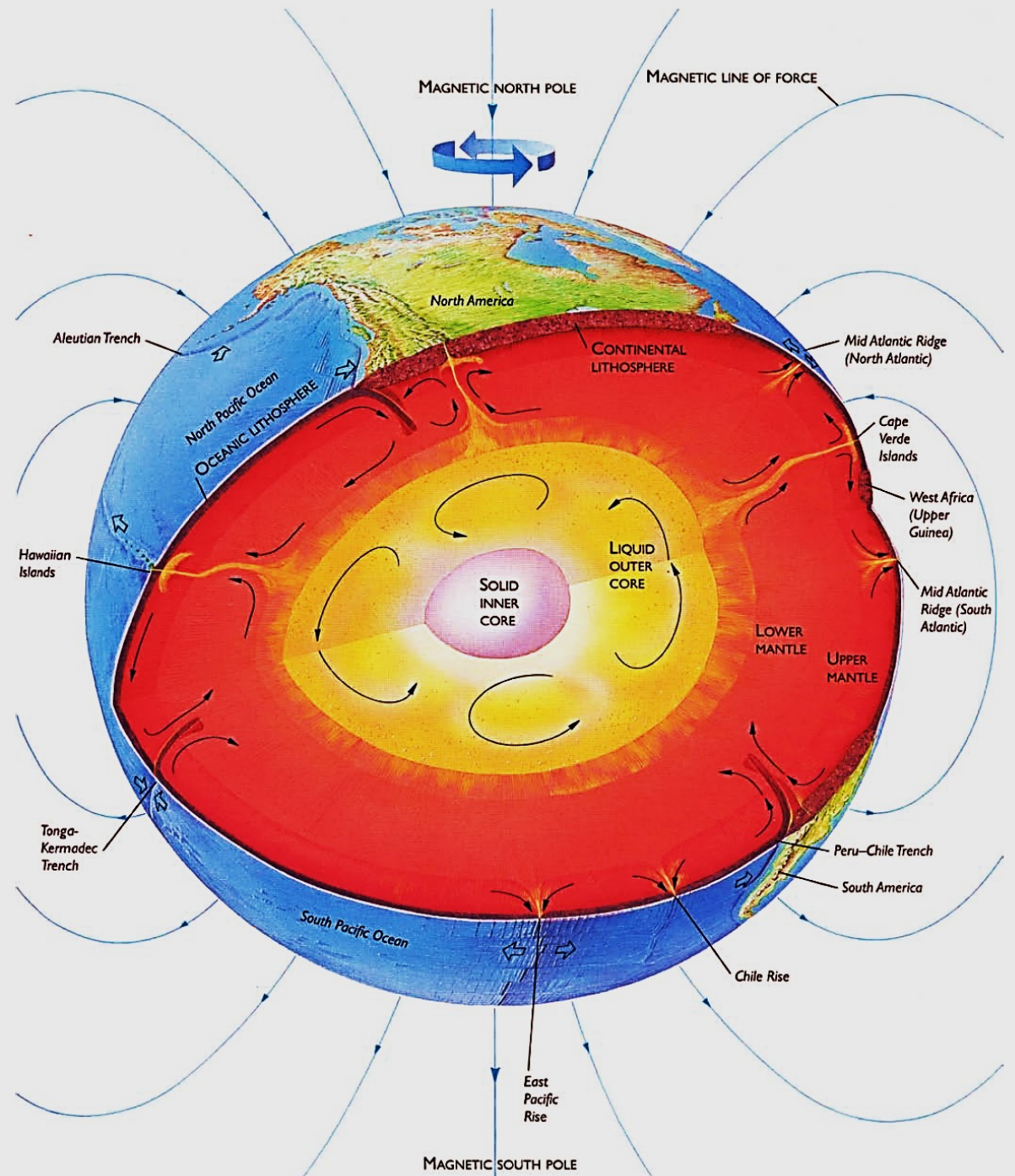


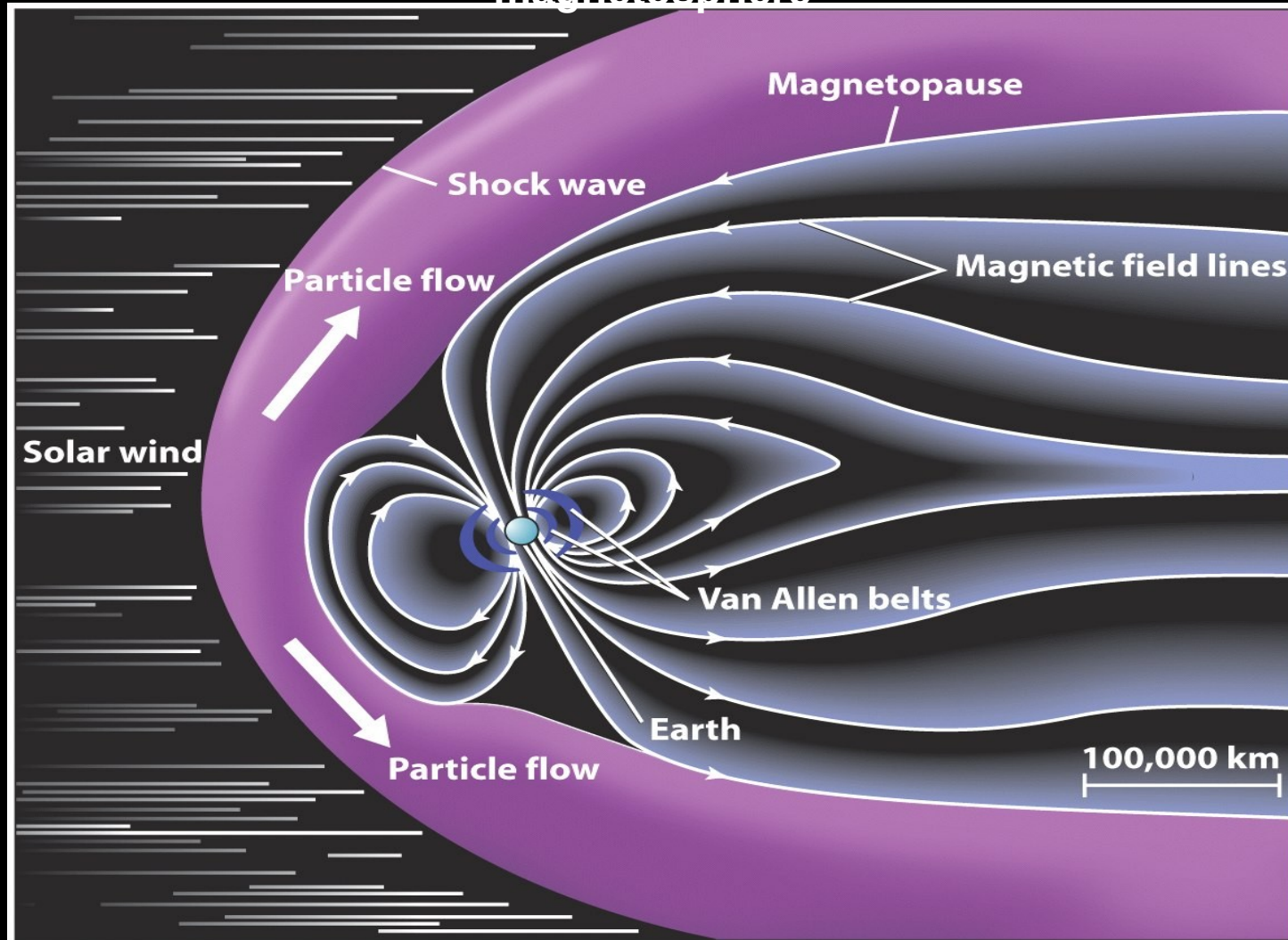
# Deep structure of the Earth

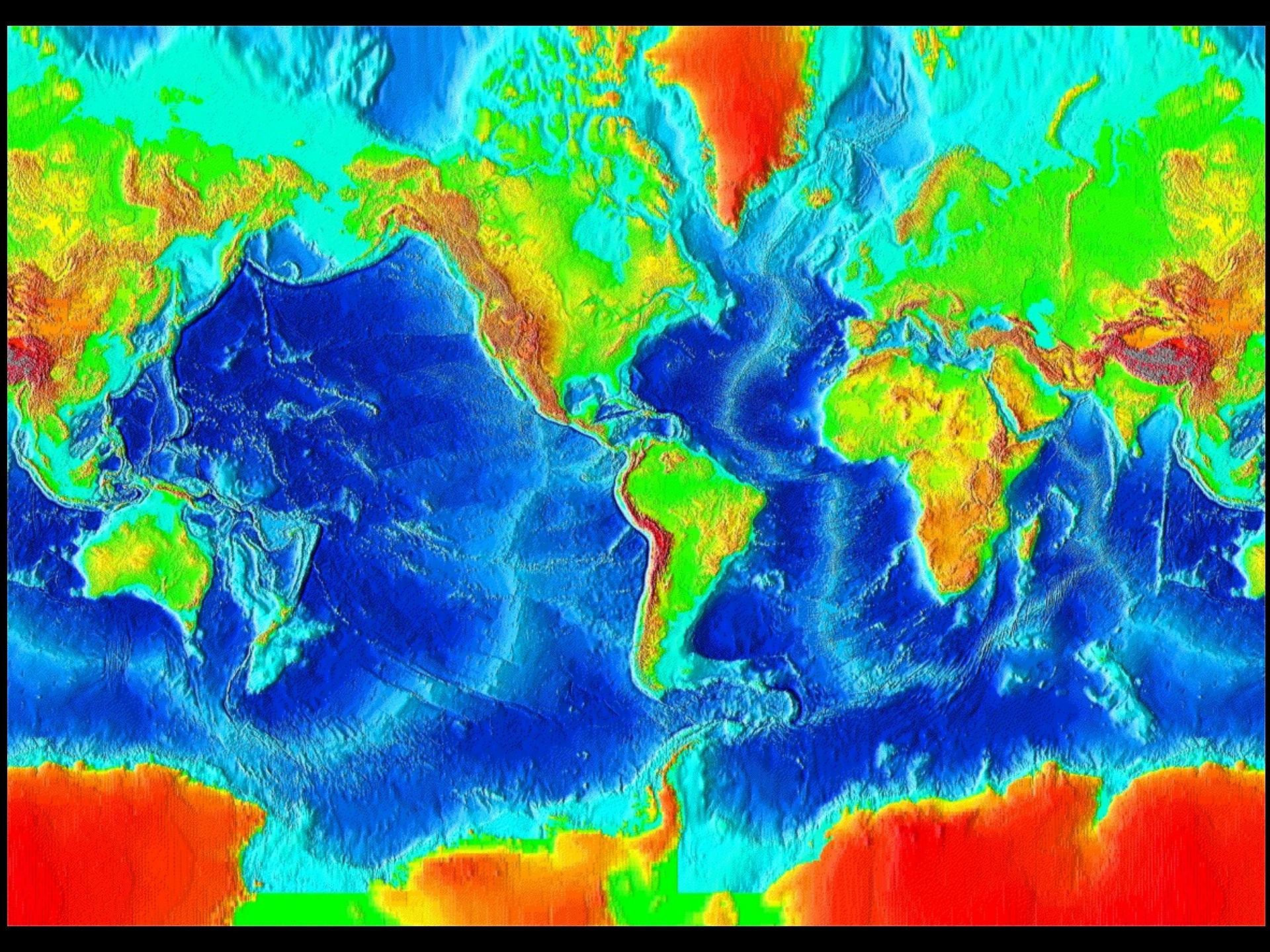


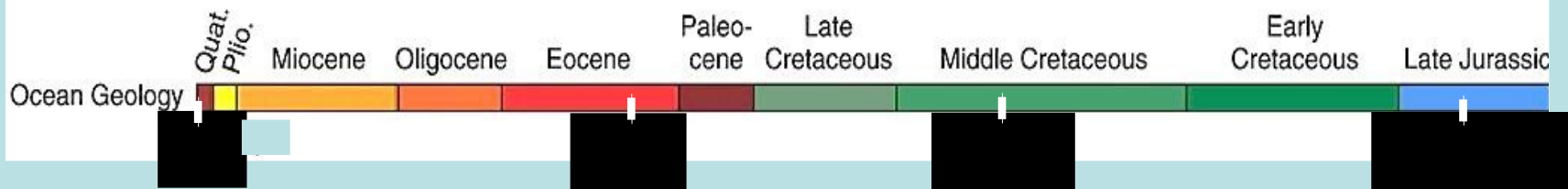
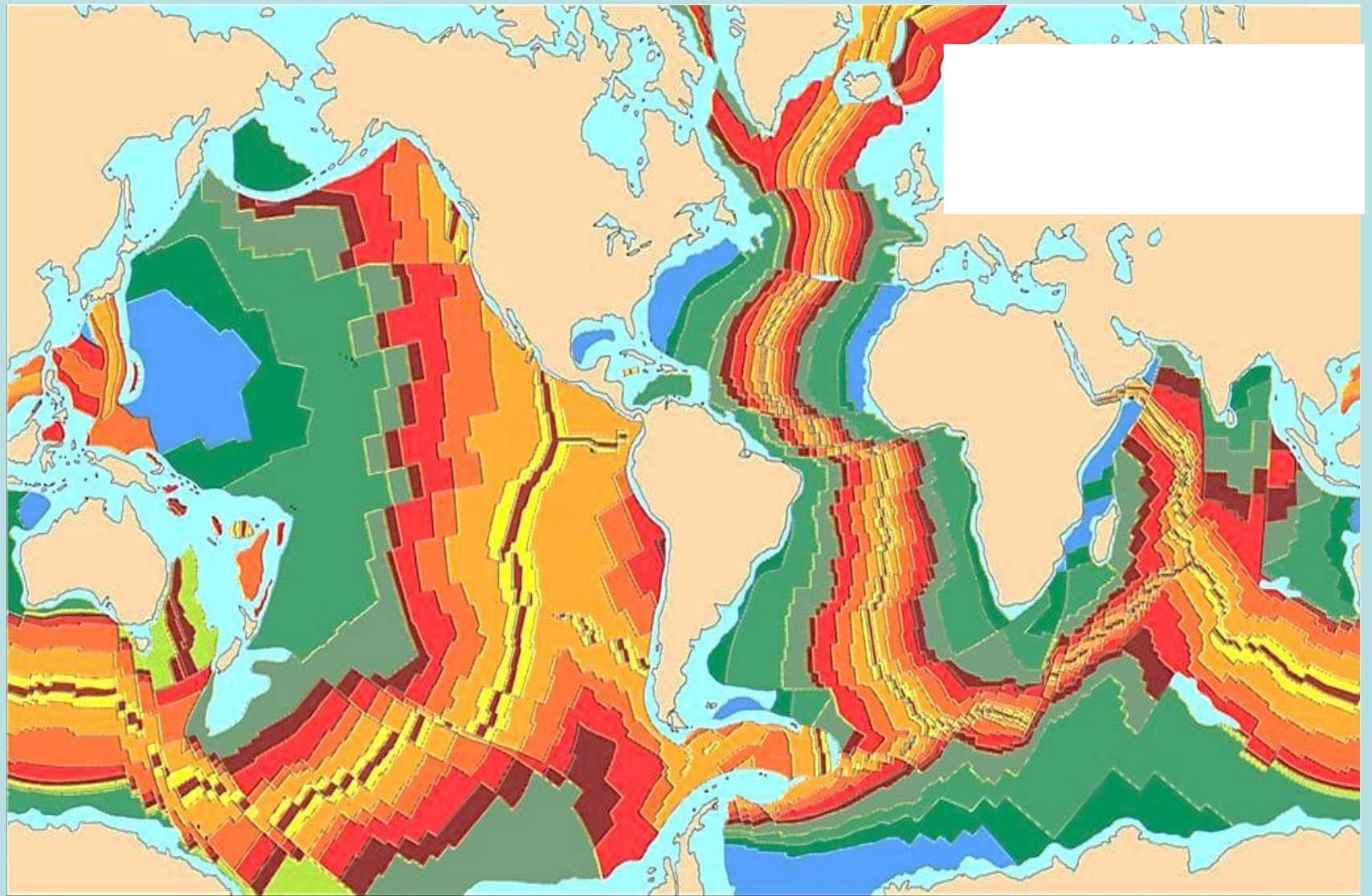


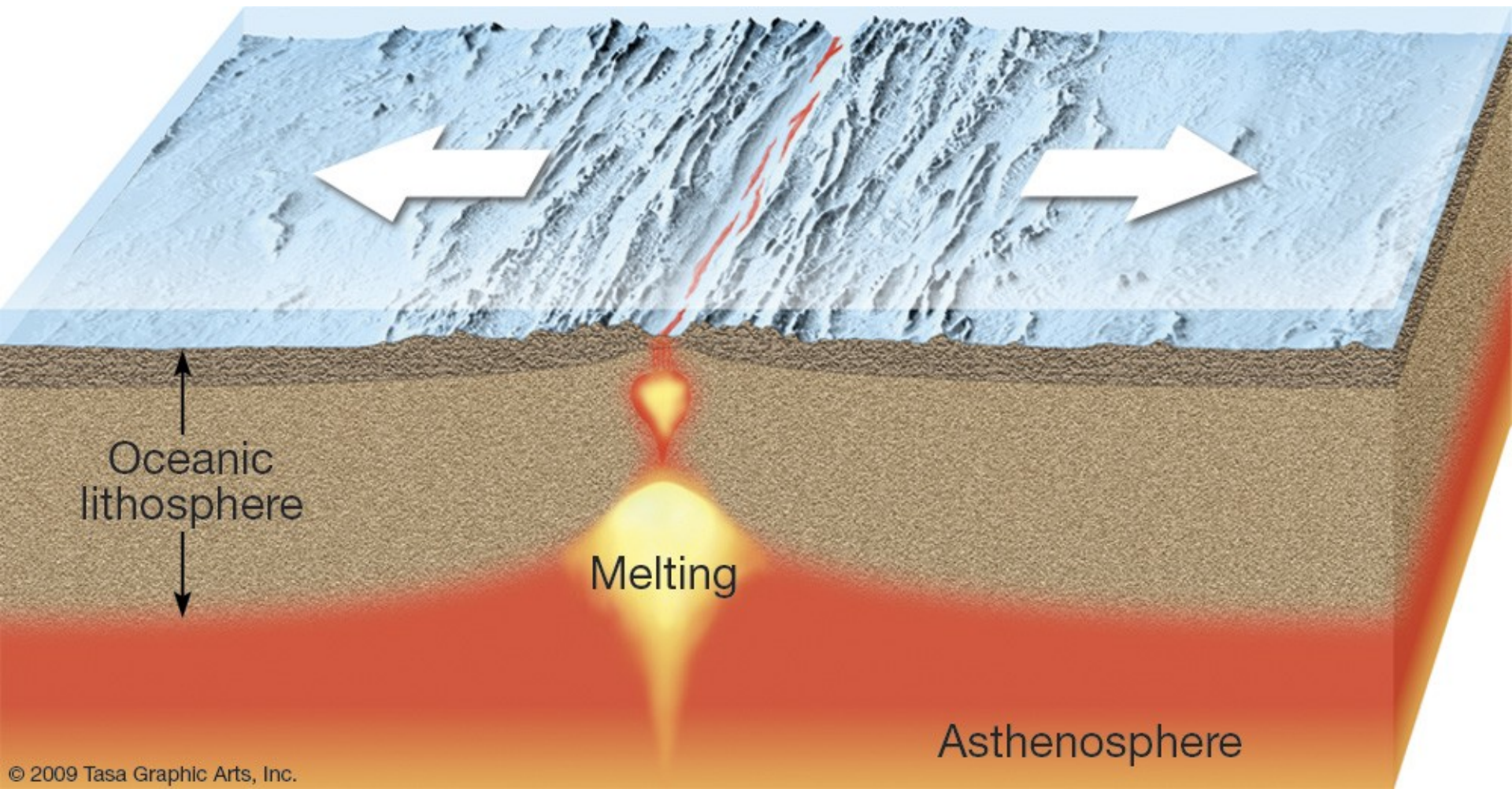
# The Earth's Magnetosphere

A bow-shaped shock wave, where the supersonic solar wind is abruptly slowed to subsonic speeds, marks the outer boundary of the magnetosphere







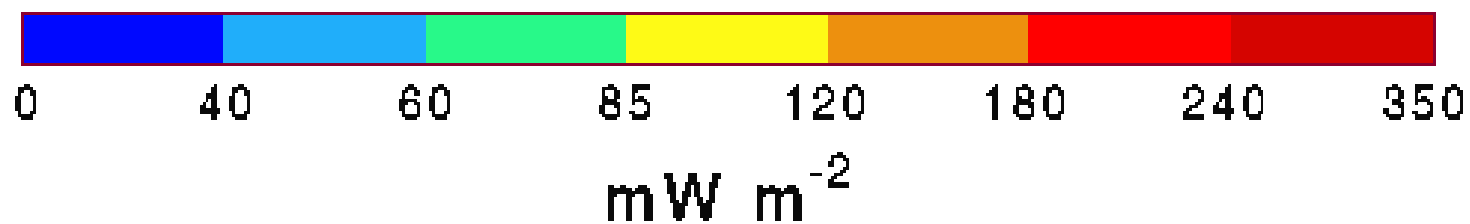
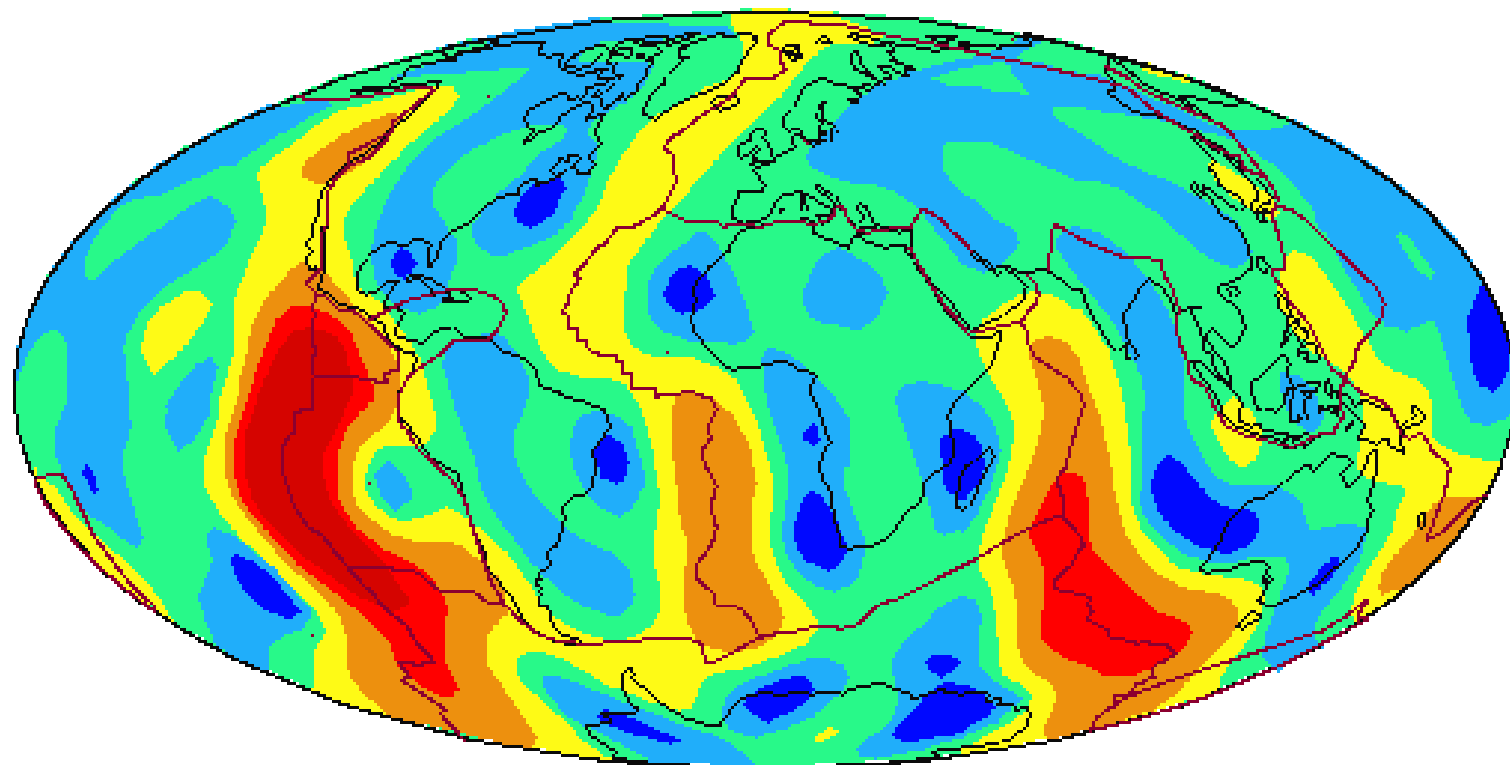


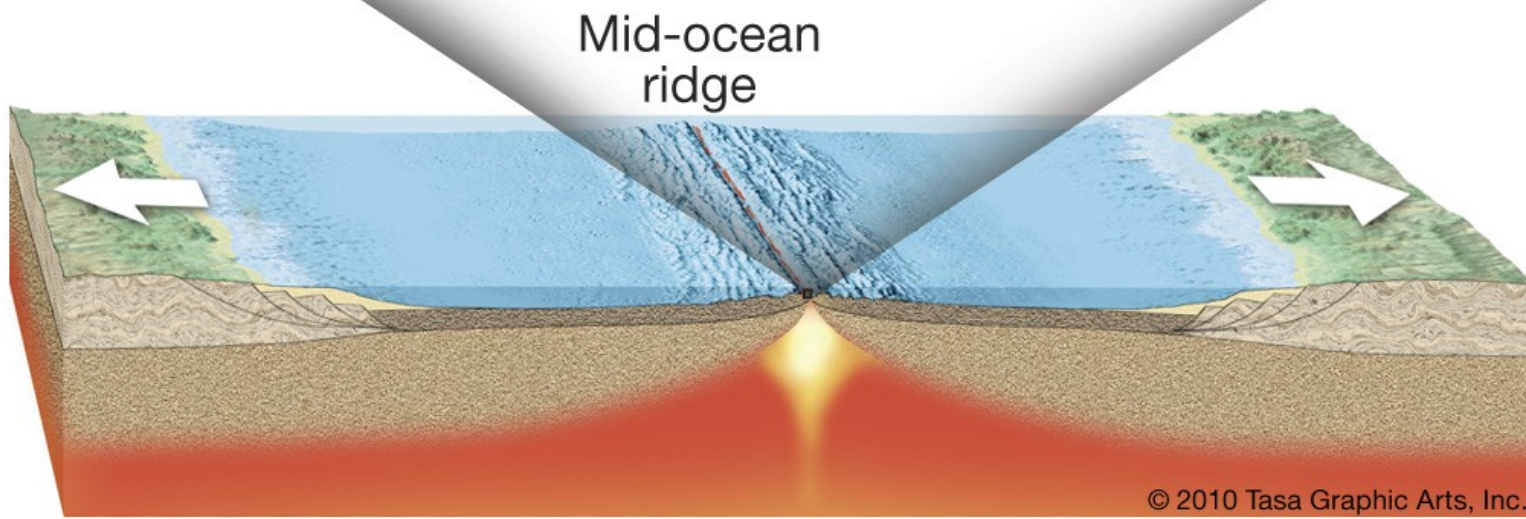
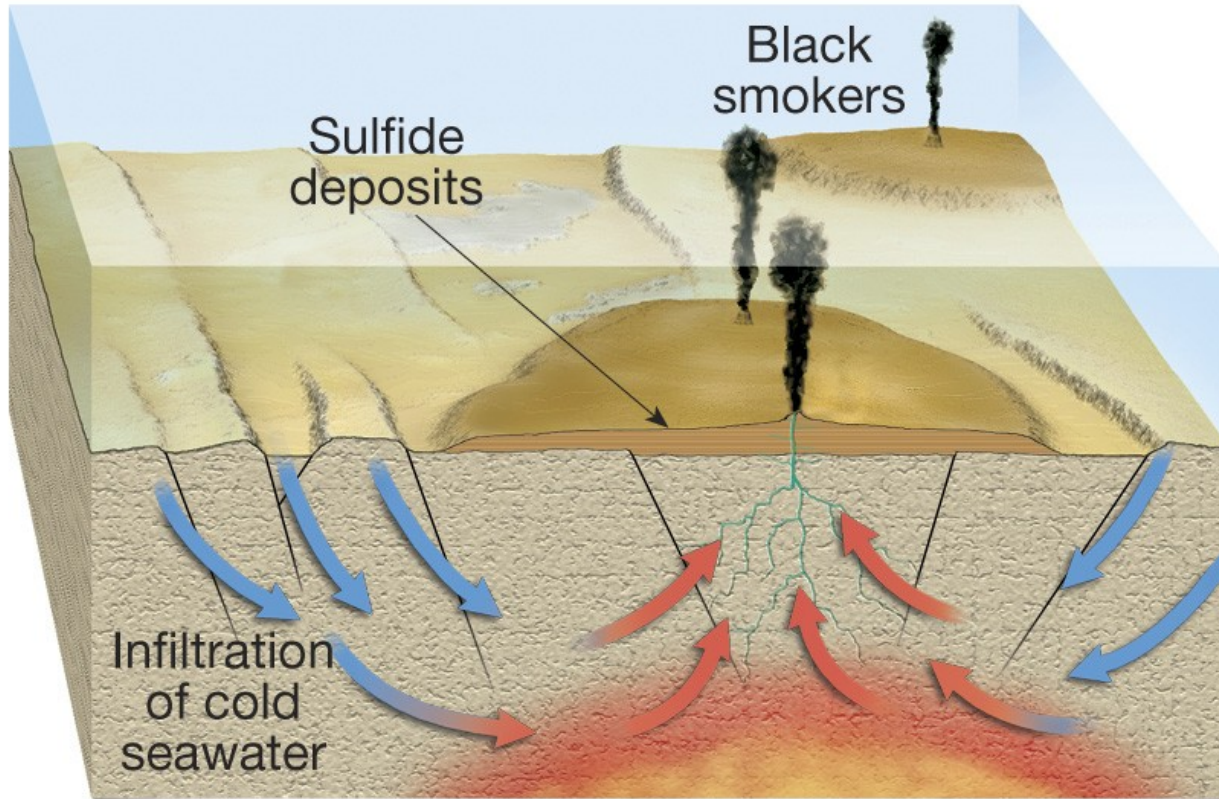
Oceanic lithosphere

Melting

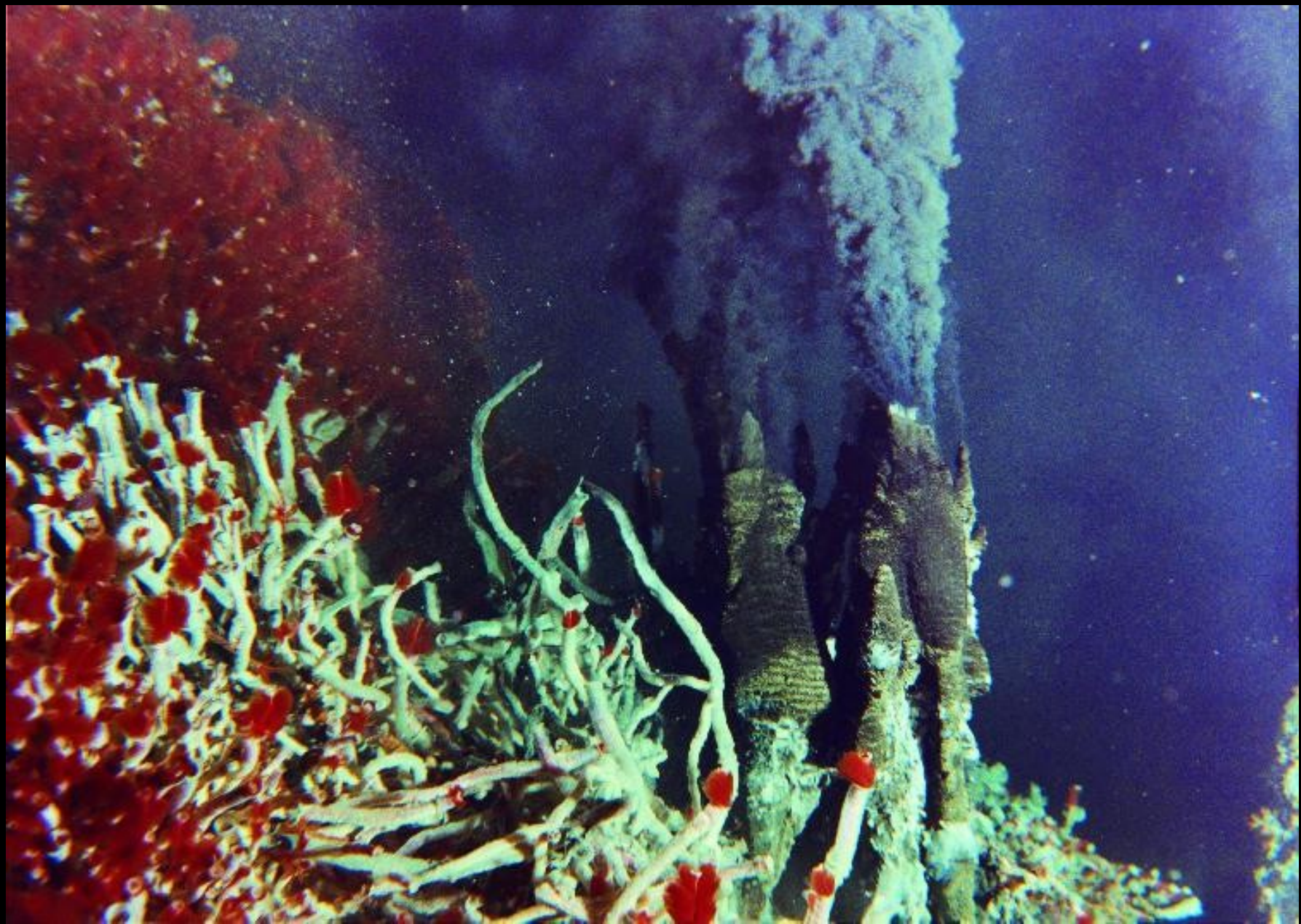
Asthenosphere

# Heat Flow



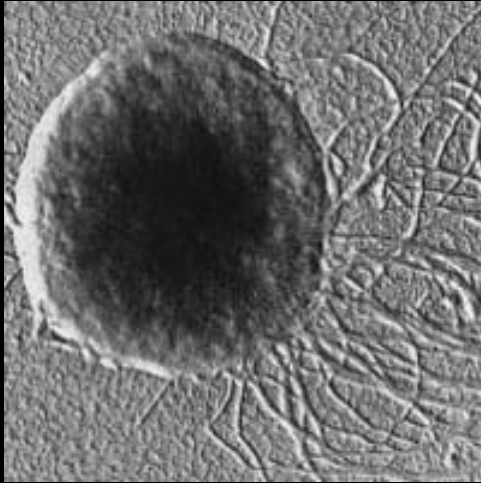




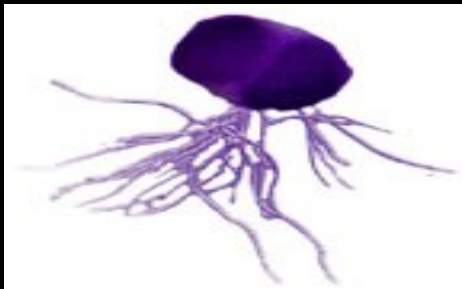


# Hydrothermal Vent Ecosystems: Prokaryotes

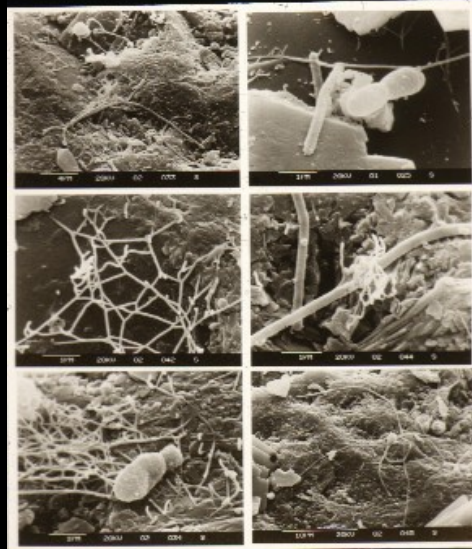
## Archaea



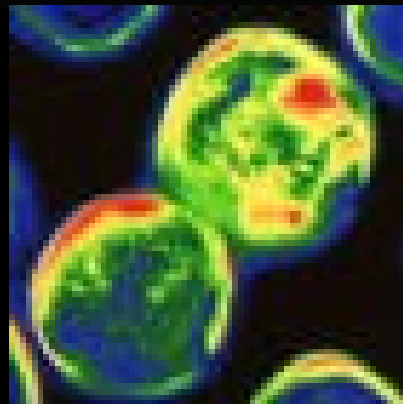
*Methanococcus janaschii* (85°C)



*Pyrococcus furiosus* (100°C)



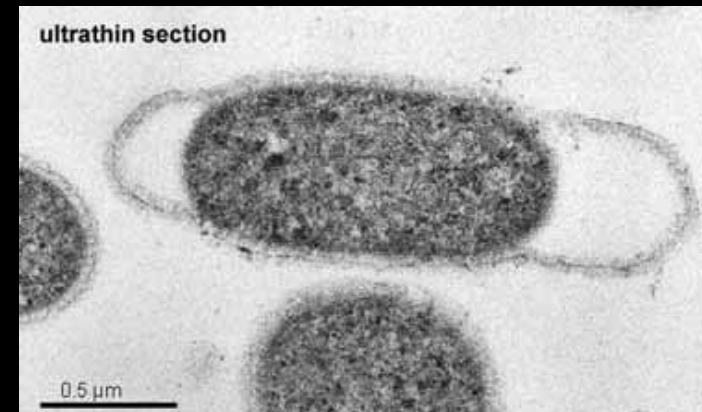
*Archaeoglobus fulgidus* (83°C)



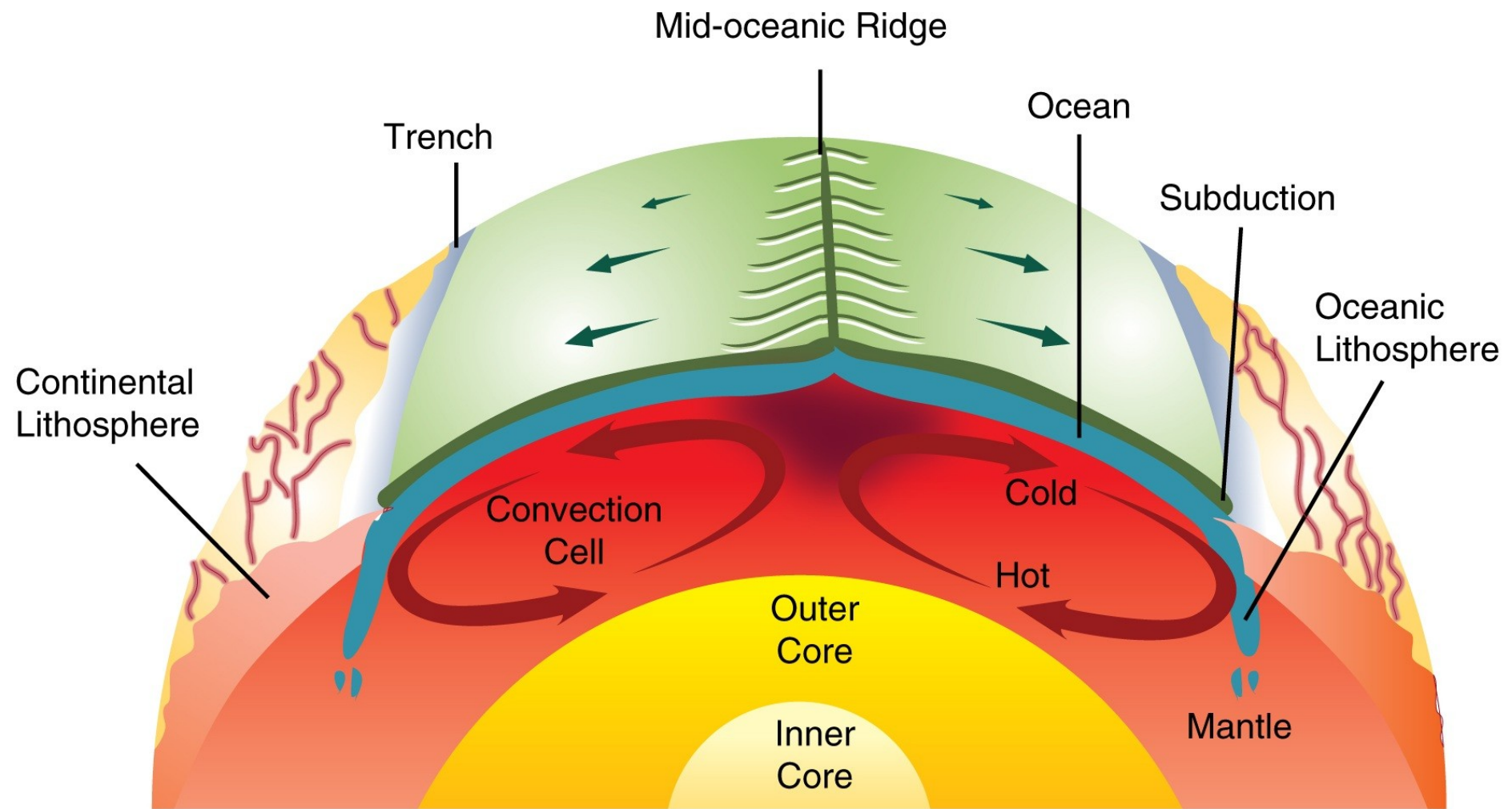
## Bacteria



*Aquifex aeolicus* (95°C)

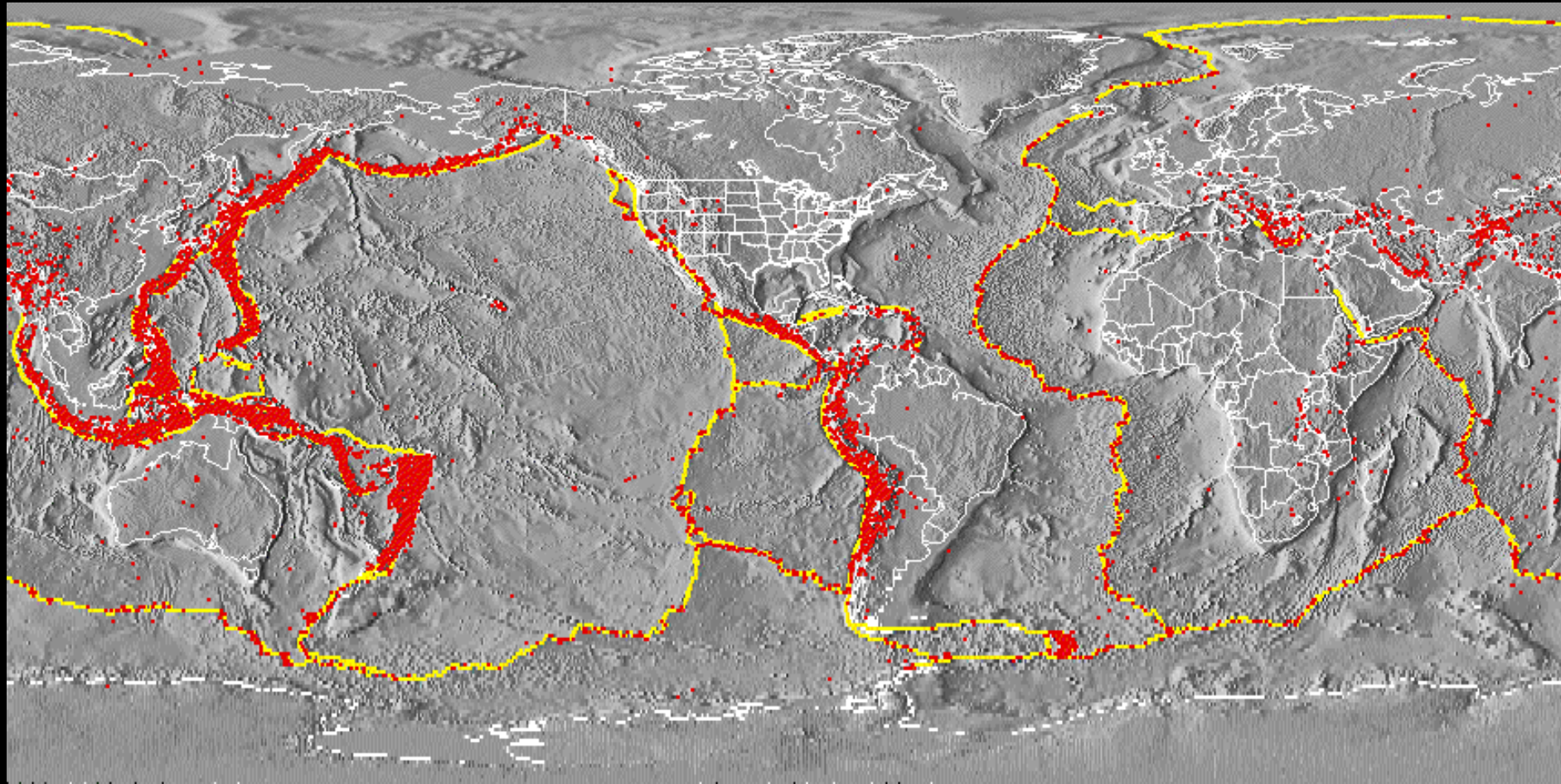


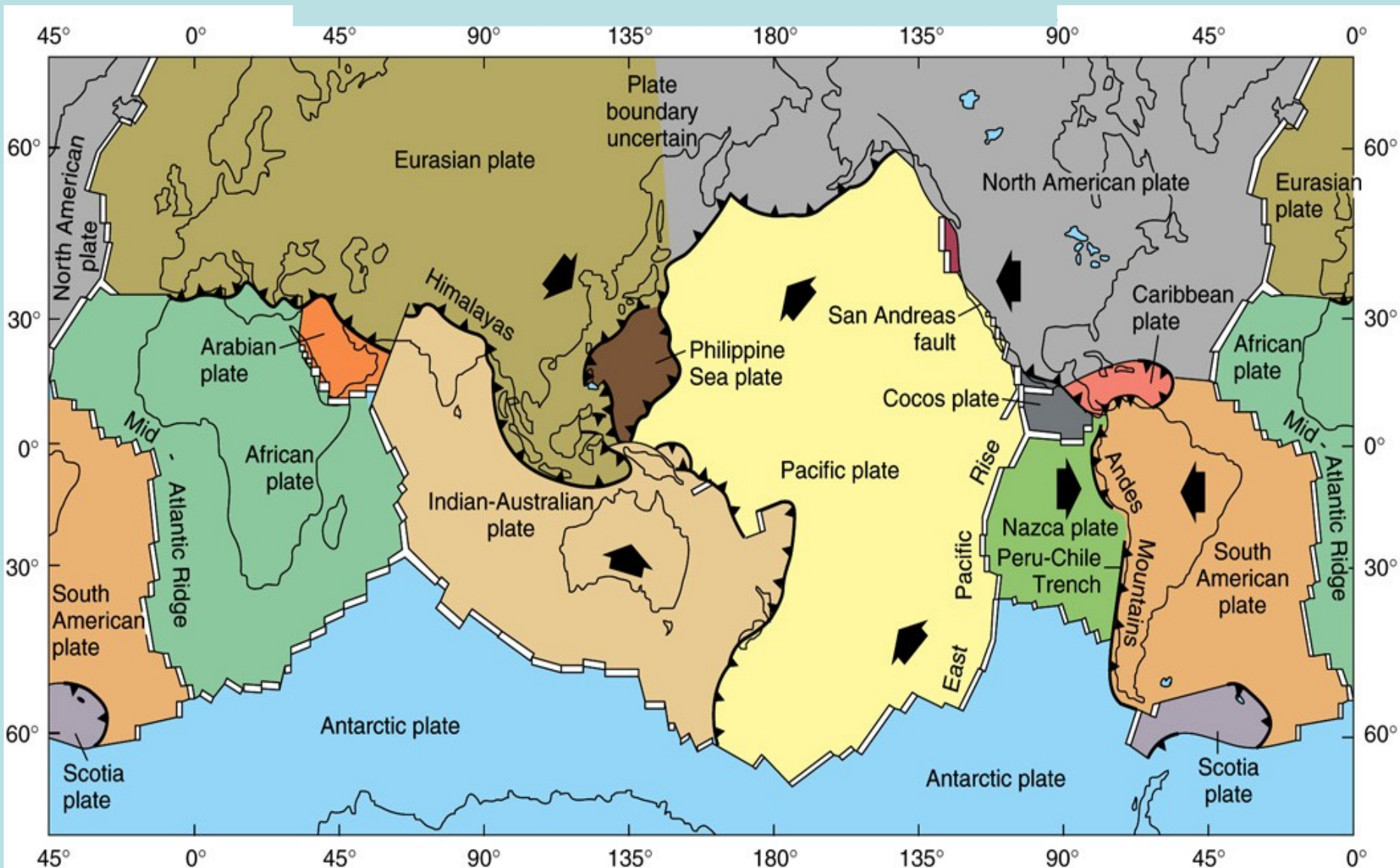
*Thermotoga maritima* (90°C)

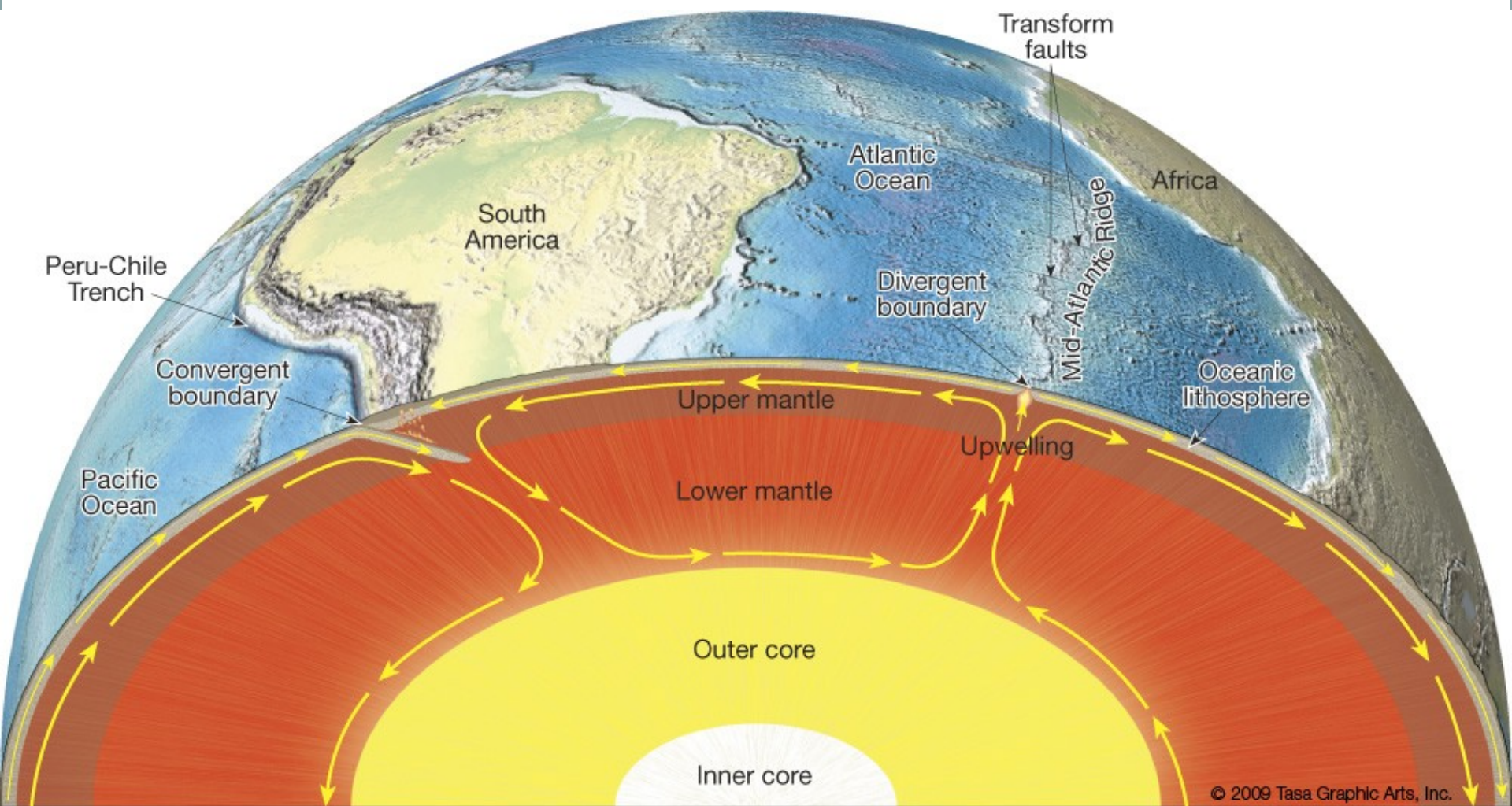


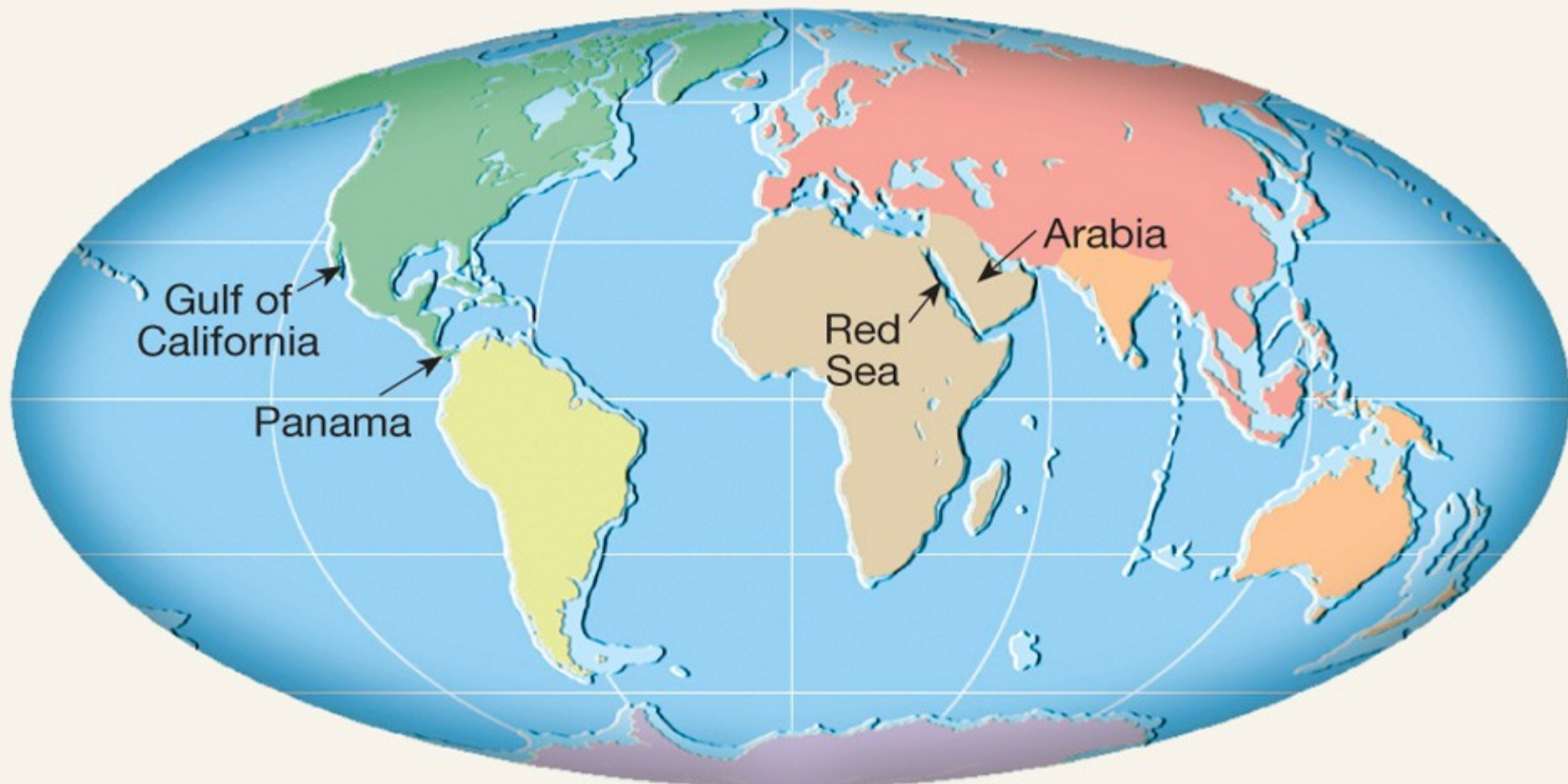
# Tectónica de Placas

-La distribución de terremotos y volcanes indica que la envoltura externa de la Tierra sólida es tectónicamente activa y está subdividida en un número pequeño de placas (relativamente) rígidas que se desplazan unas con respecto a otras







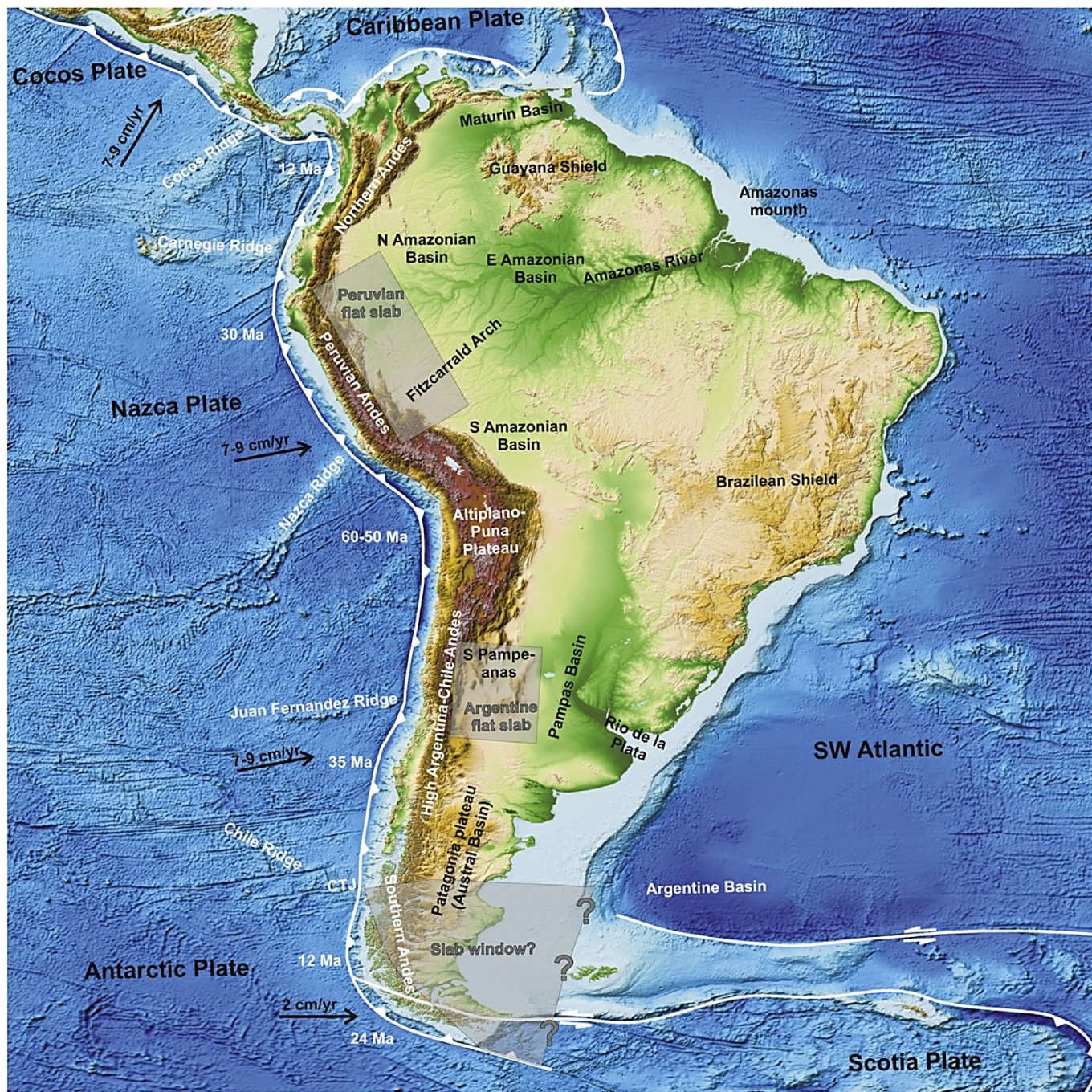


Present



**Donde Vivimos??**





**Dorsal de Galápagos**

Placa de Cocos

Placa Caribe

**Dorsal del Pacífico Oriental**

Placa de Nazca

Placa Sudamericana

*Microplaca de Pascua*

*Microplaca Juan Fernández*

**Dorsal de Chile**

**Punto Triple del Sur de Chile**

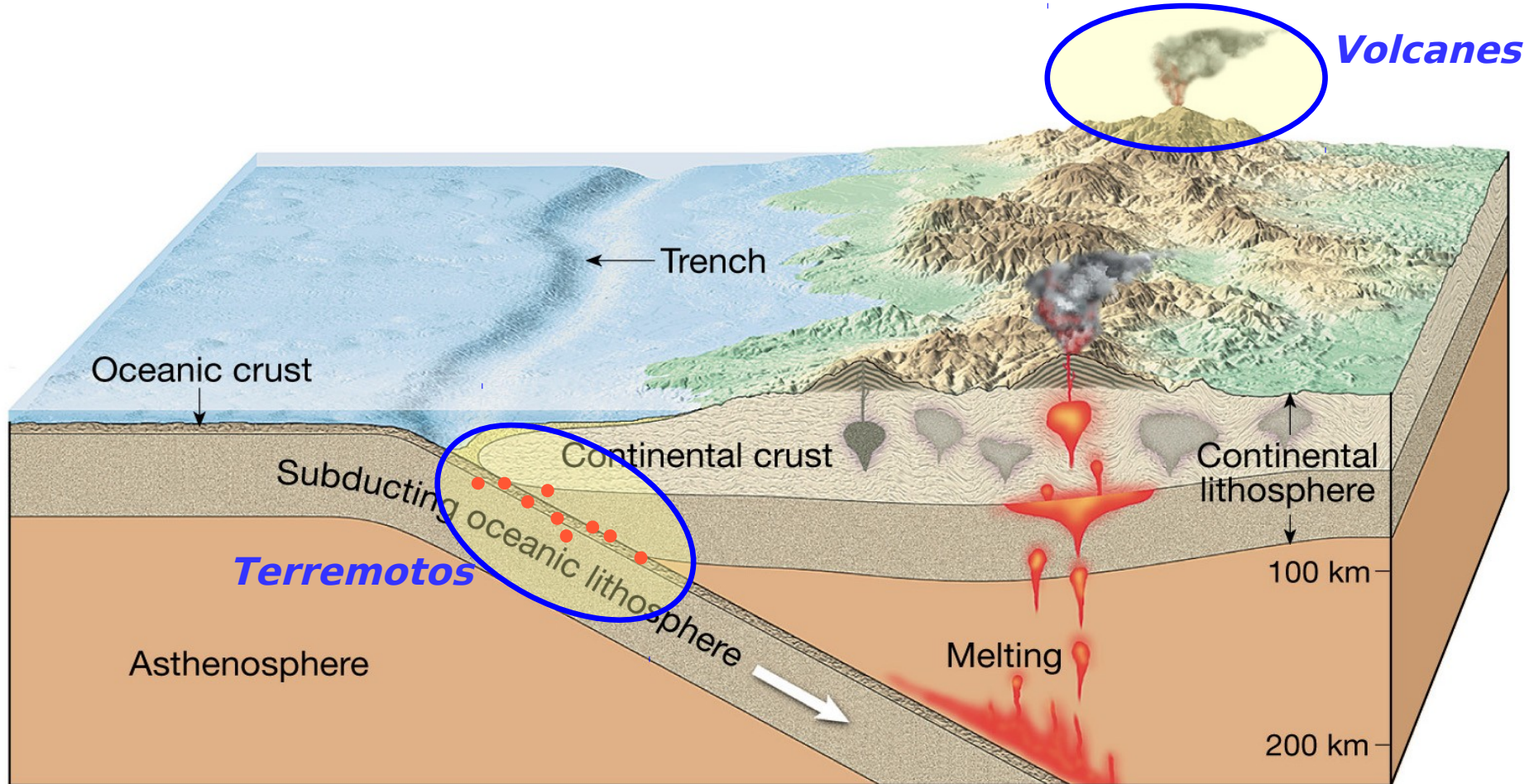
Placa Antártica

Placa de Scotia

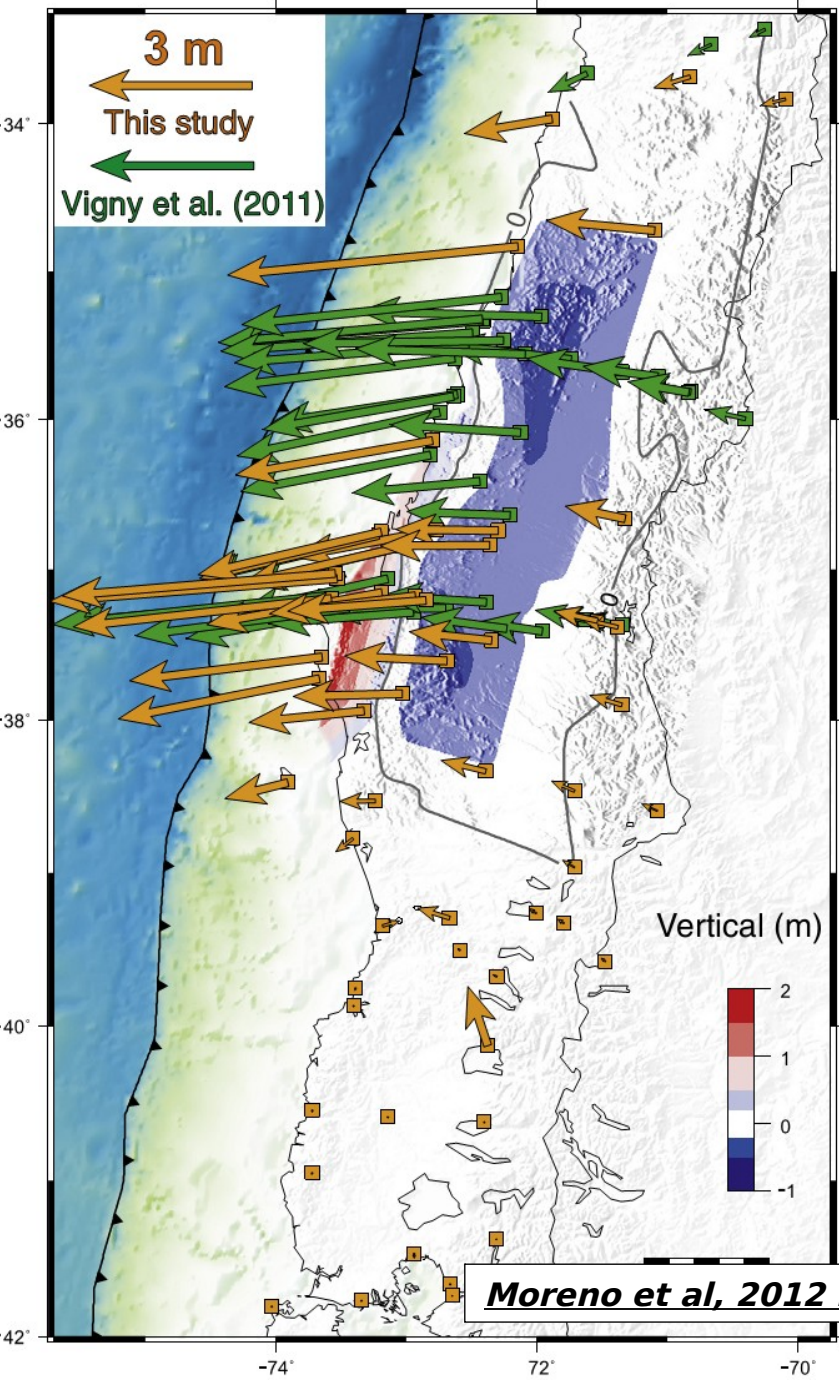


## Fosa de Chile-Perú

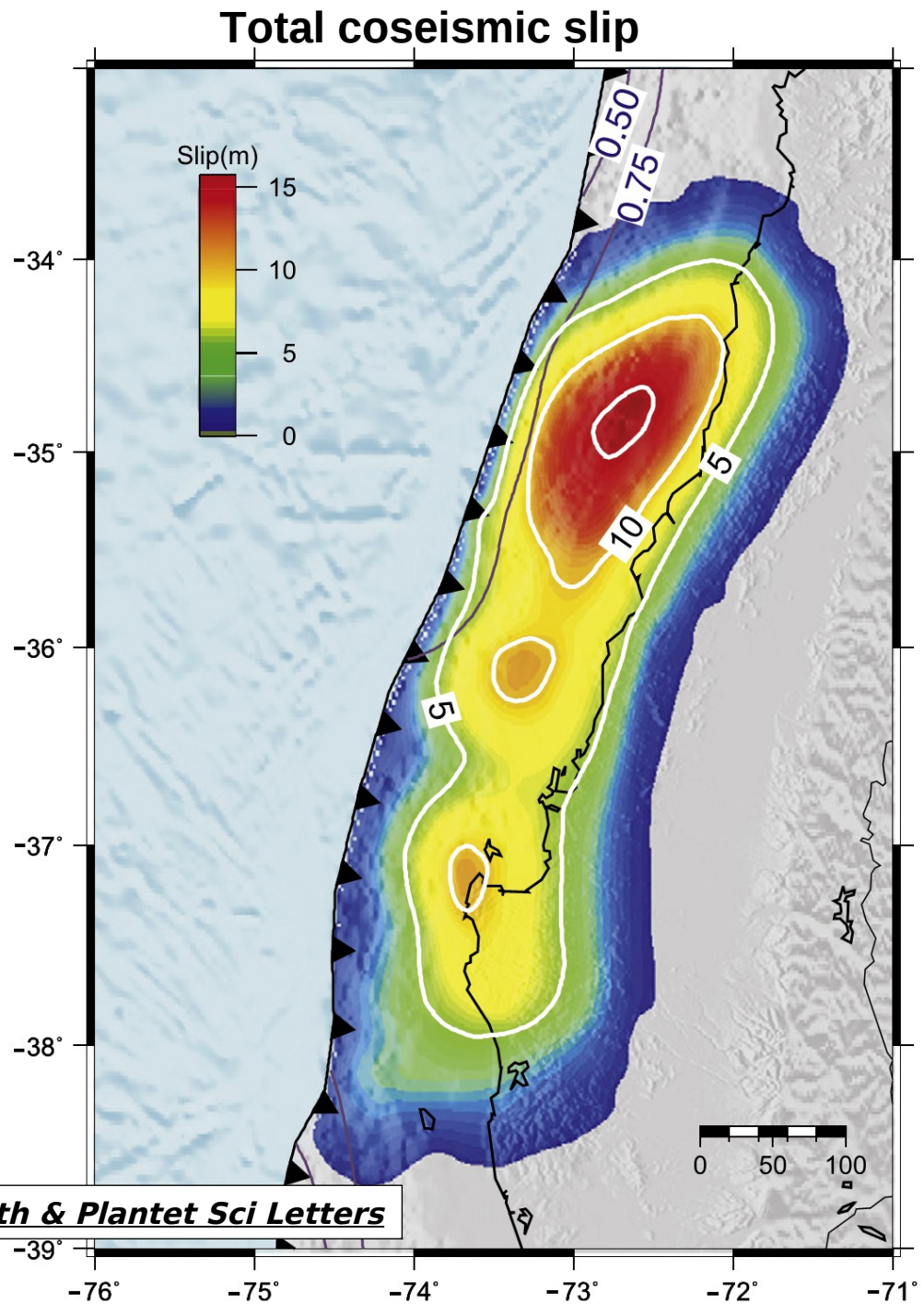
## Cordillera de los Andes

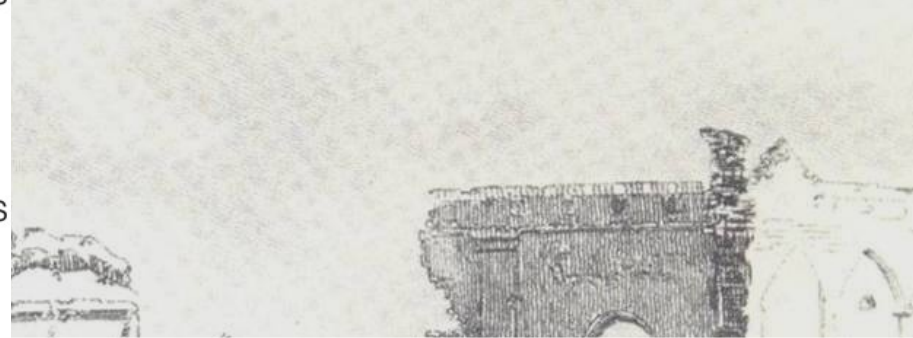
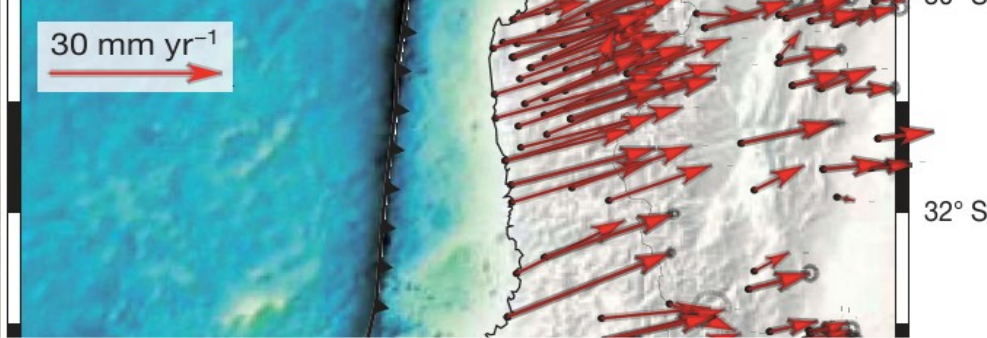


Chile: País sobre un margen convergente de placas:  
Una de las zonas geológicamente más activas del planeta



*Moreno et al, 2012 Earth & Planet Sci Letters*

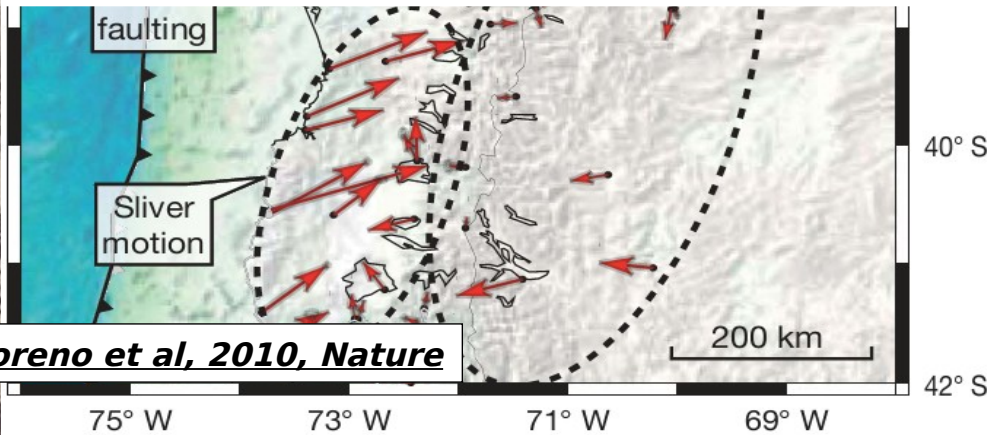




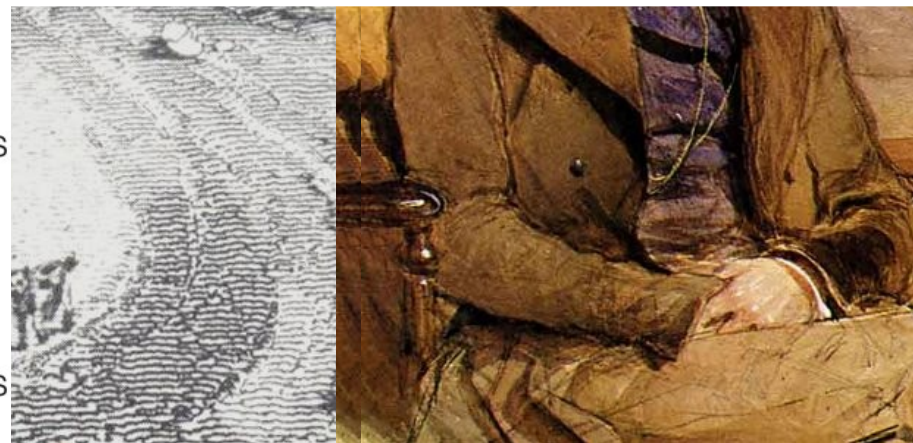
Horizontal velocities have formal uncertainties in the range of 1–3 mm/year and vertical velocities around 3–6 mm/year. Surface deformation in this area of South Central Chile is consistent with a fully coupled elastic loading on the subduction interface at depth. The best fit to our data is obtained with a dip of  $16 \pm 3^\circ$ , a locking depth of  $55 \pm 5$  km and a dislocation corresponding to 67 mm/year oriented  $78^\circ$ N. However in the northern area of our network the fit is improved locally by using a lower dip around  $13^\circ$ . Finally a convergence motion of about 68 mm/year represents more than 10 m of displacement accumulated since the last big interplate subduction event in this area over 170 years ago (1835 earthquake described by Darwin). Therefore, in a worst case scenario, the area already has a potential for an earthquake of magnitude as large as 8–8.5, should it happen in the near future.

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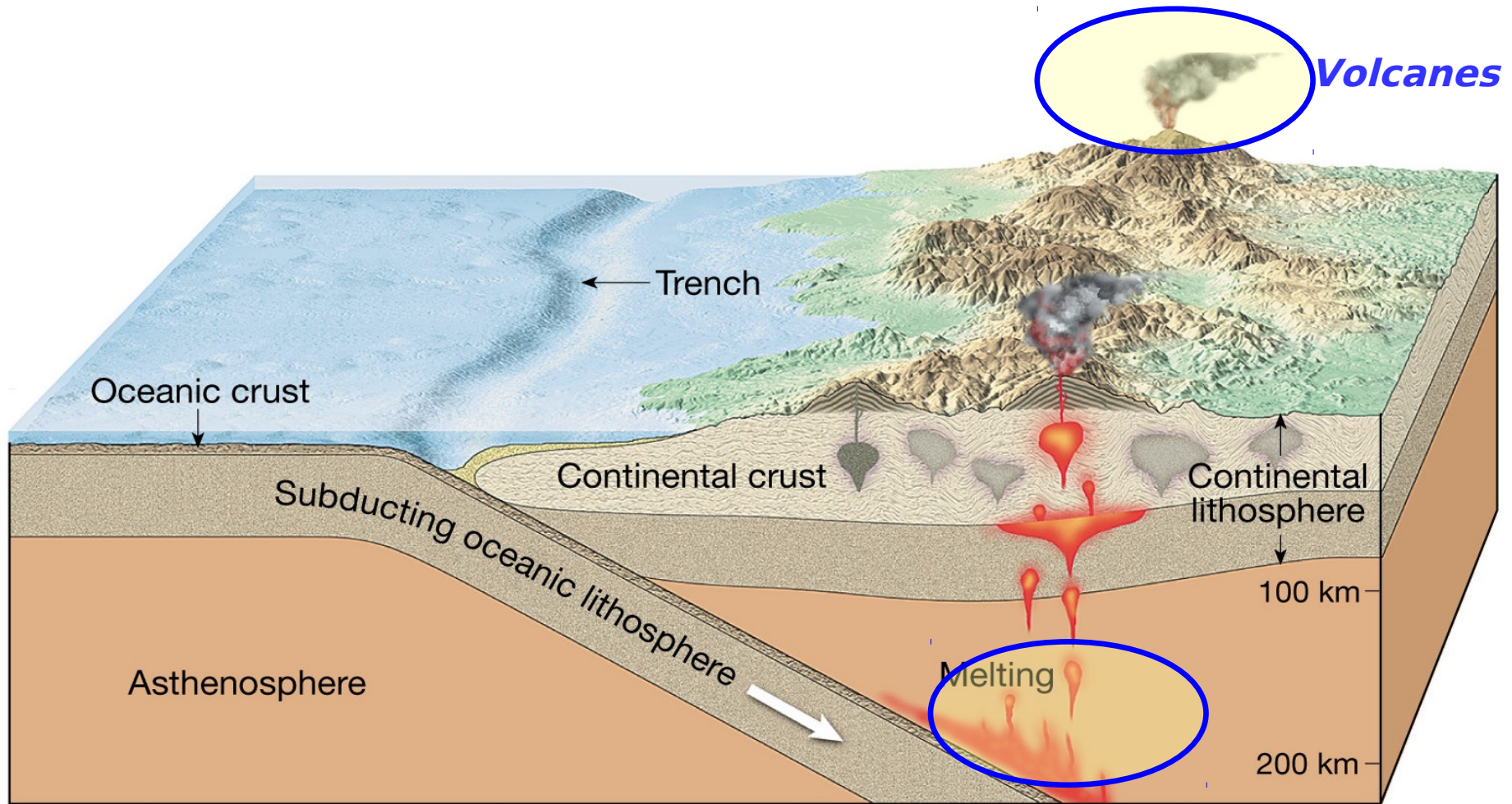
### Ruegg et al, 2009, Physics of the Earth & Planet Interiors



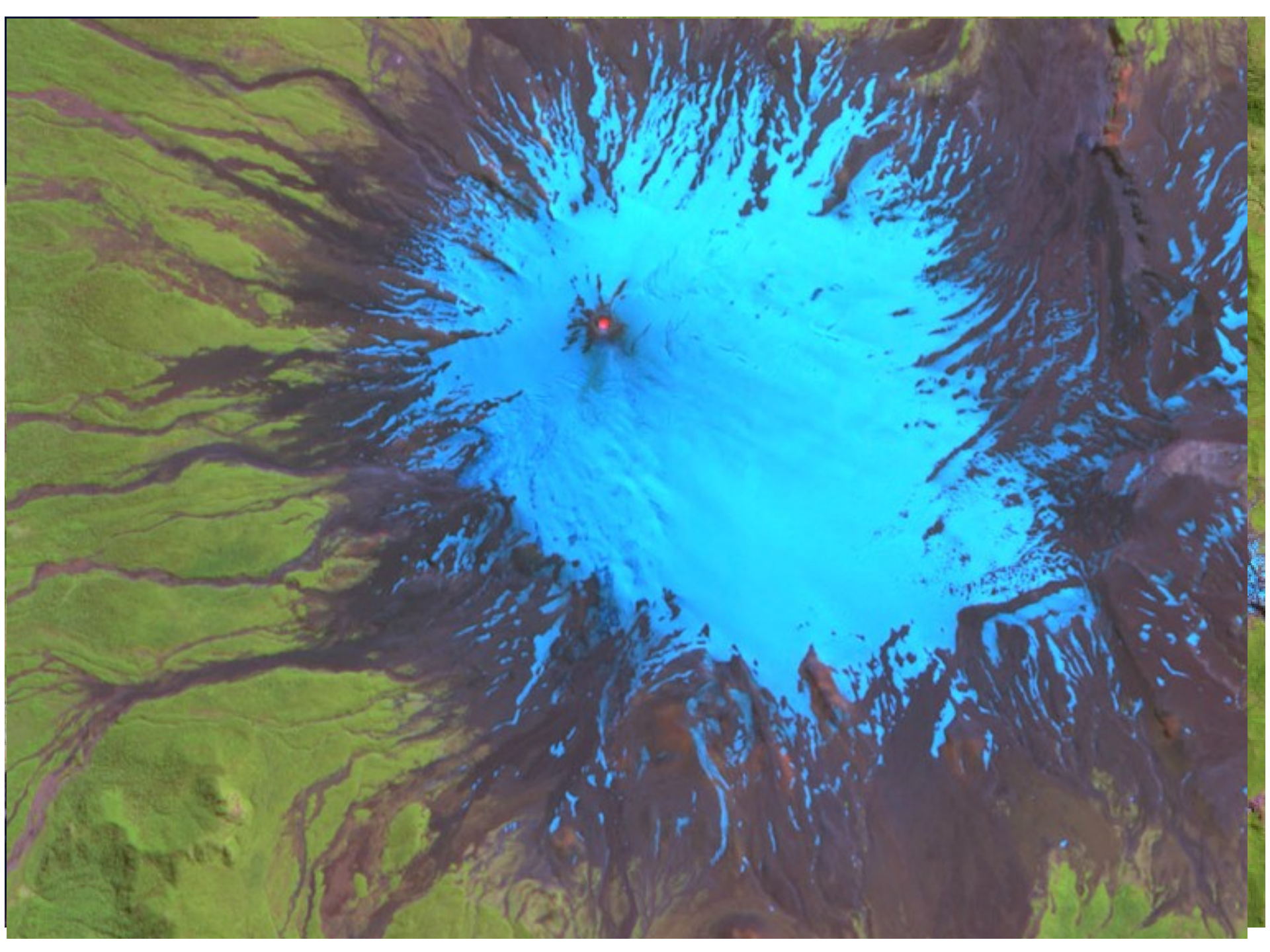
Moreno et al, 2010, Nature



2008



Llaima: Volcanismo "Basáltico" (Efusi Chaitén: Volcanismo "Félsico" (Explosivo)

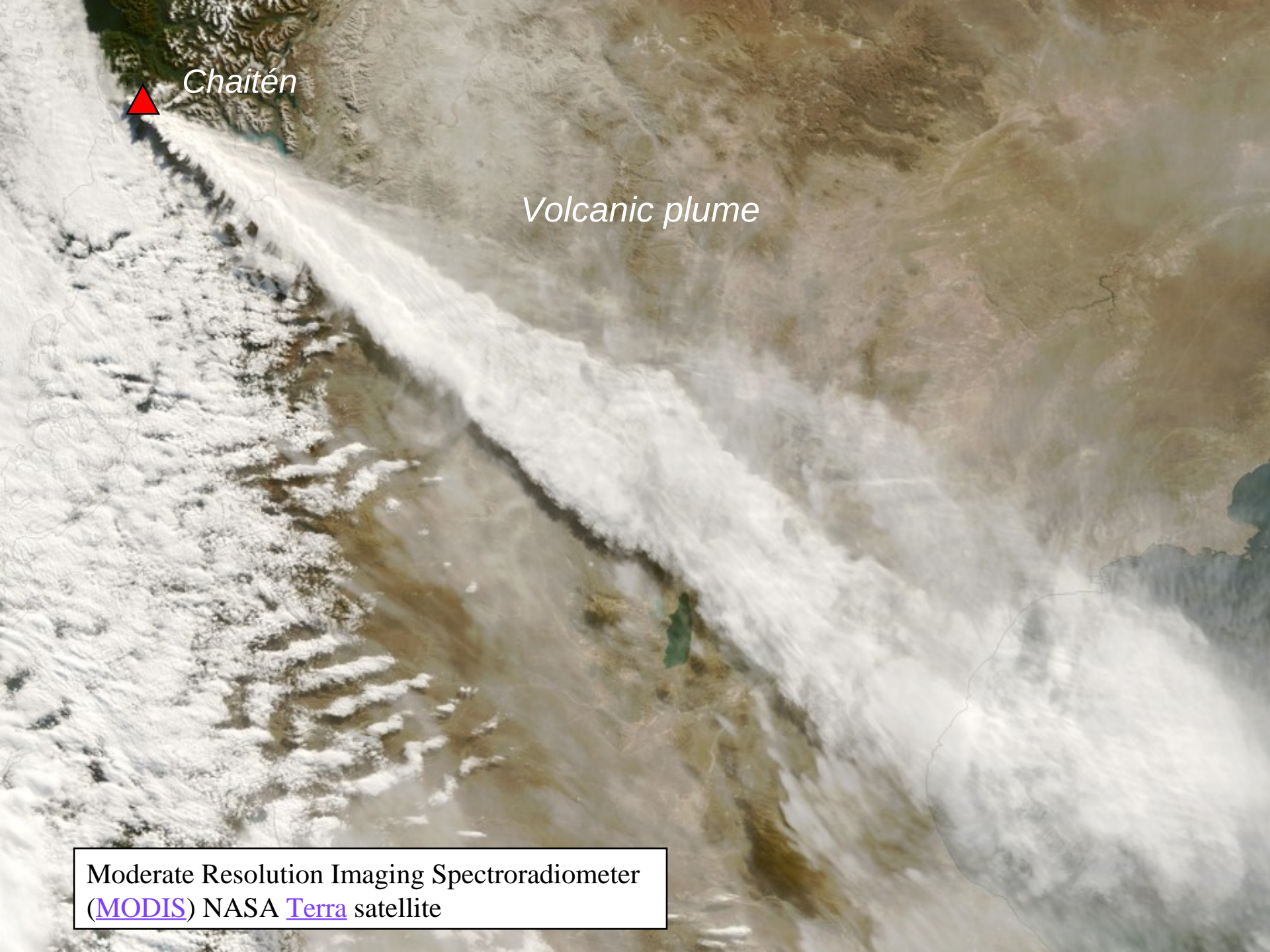








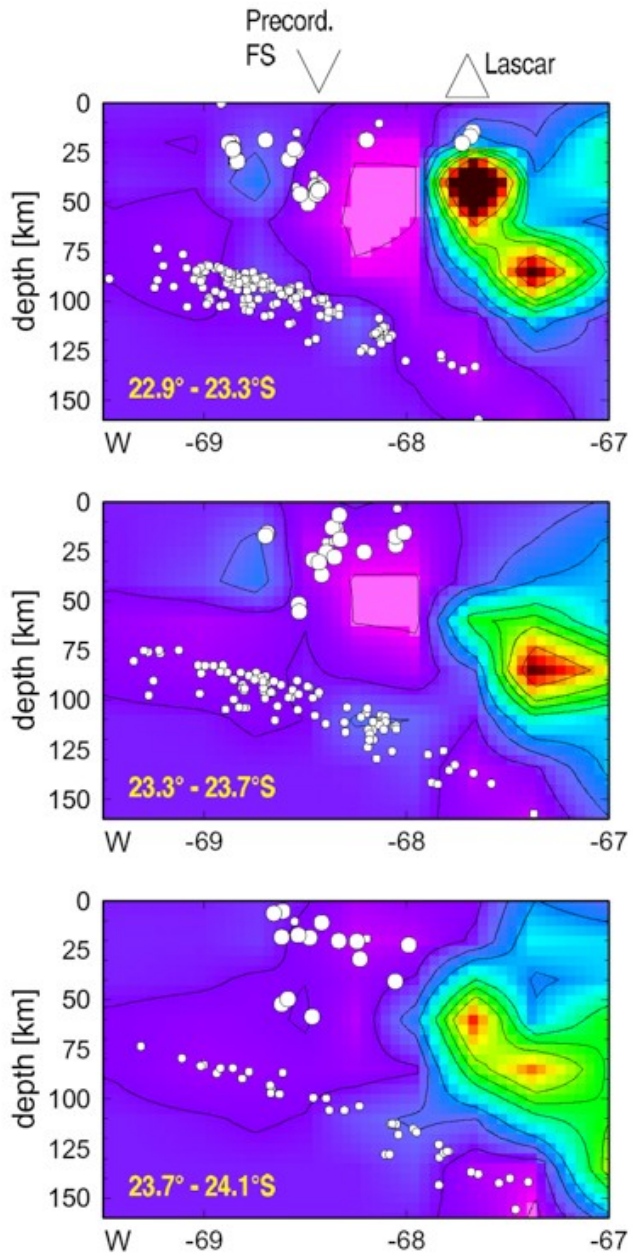
**Domo del Vn Chaitén, 2009**



Chaitén

Volcanic plume

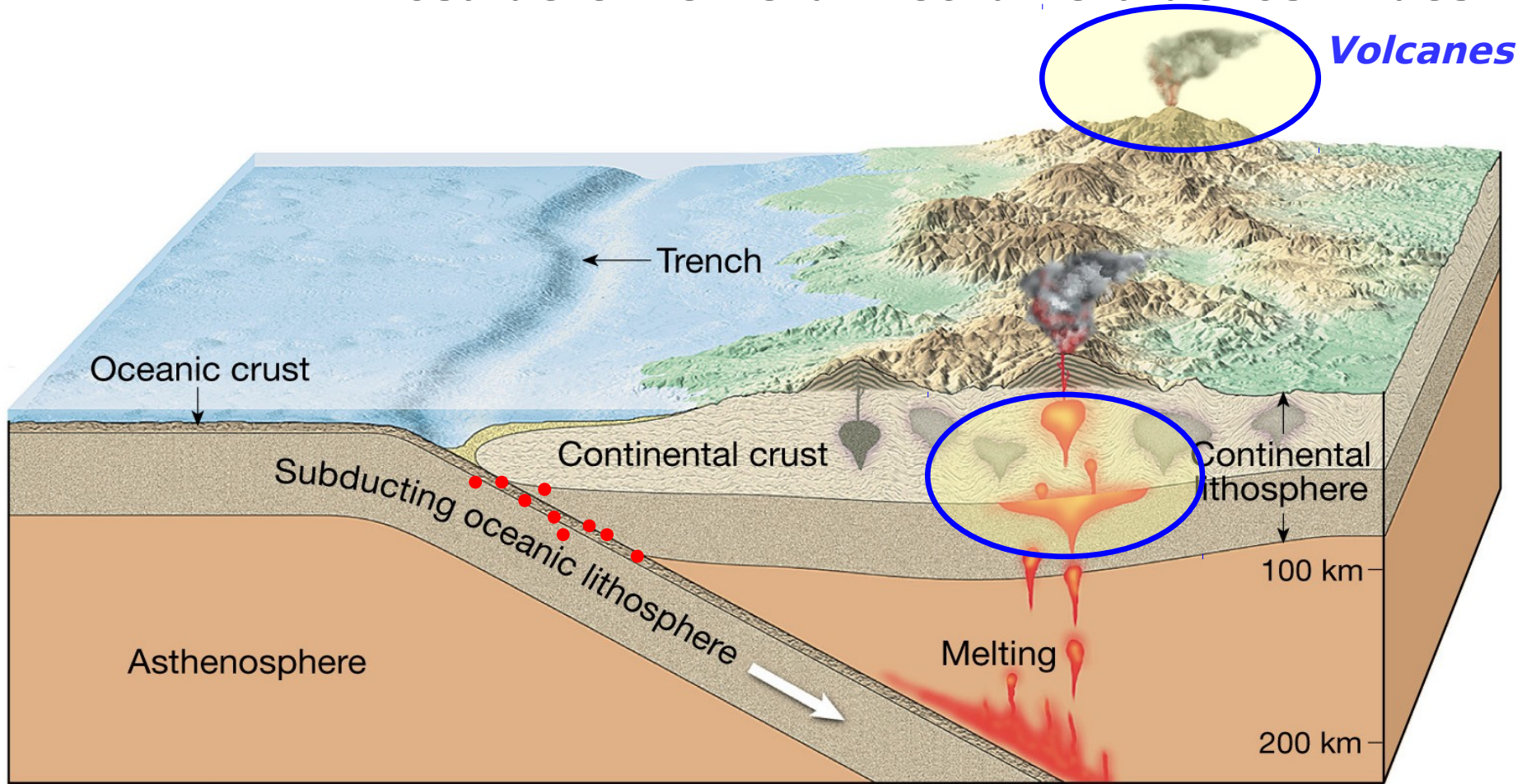
Moderate Resolution Imaging Spectroradiometer  
(MODIS) NASA Terra satellite



**Volcán Lascar**

# Fosa de Chile-Perú

# Cordillera de los Andes



**Rocas Intrusivas**

**Río Yeso**



**Río Volcán**



**Río Maipo**

**Intrusivo de San Gabriel  
(10-11 Ma)**



01/05/2004

Cuarzo

Plagioclasa

Anfíbola

Cuarzo

Biotita

Anfíbola

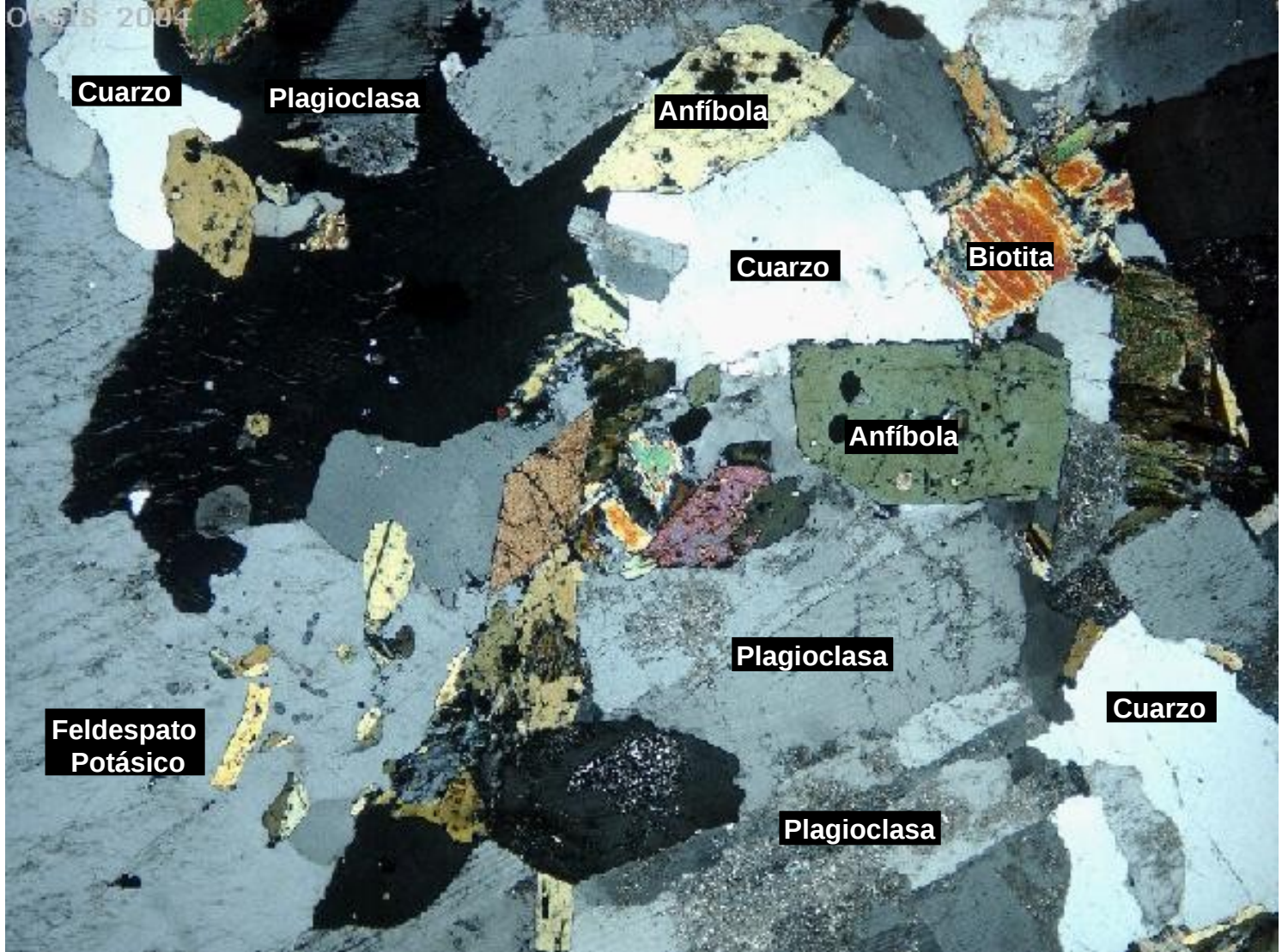
Plagioclasa

Feldespato  
Potásico

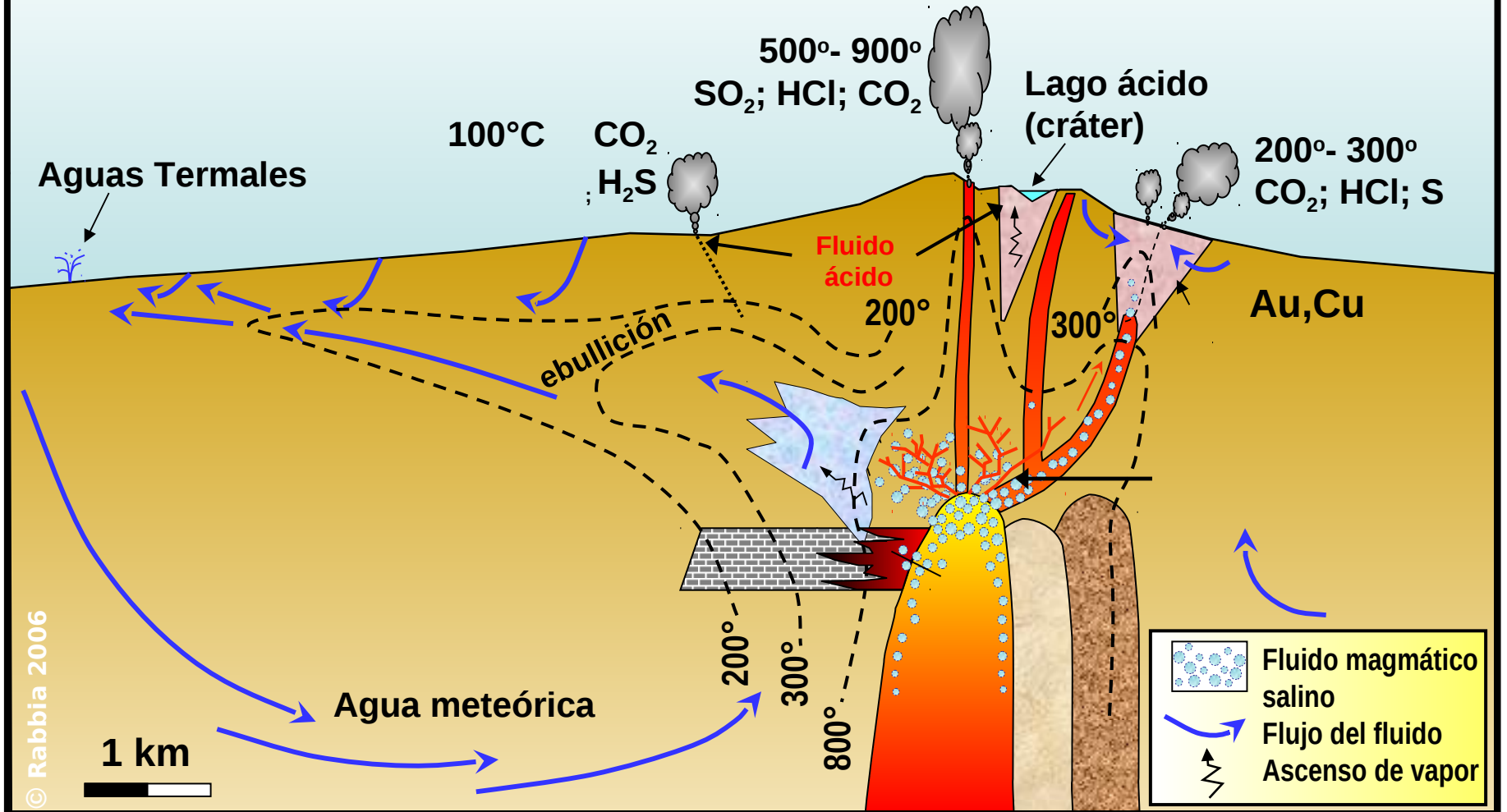
Cuarzo

Plagioclasa

In



# Sistema Volcánico-Hidrotermal,

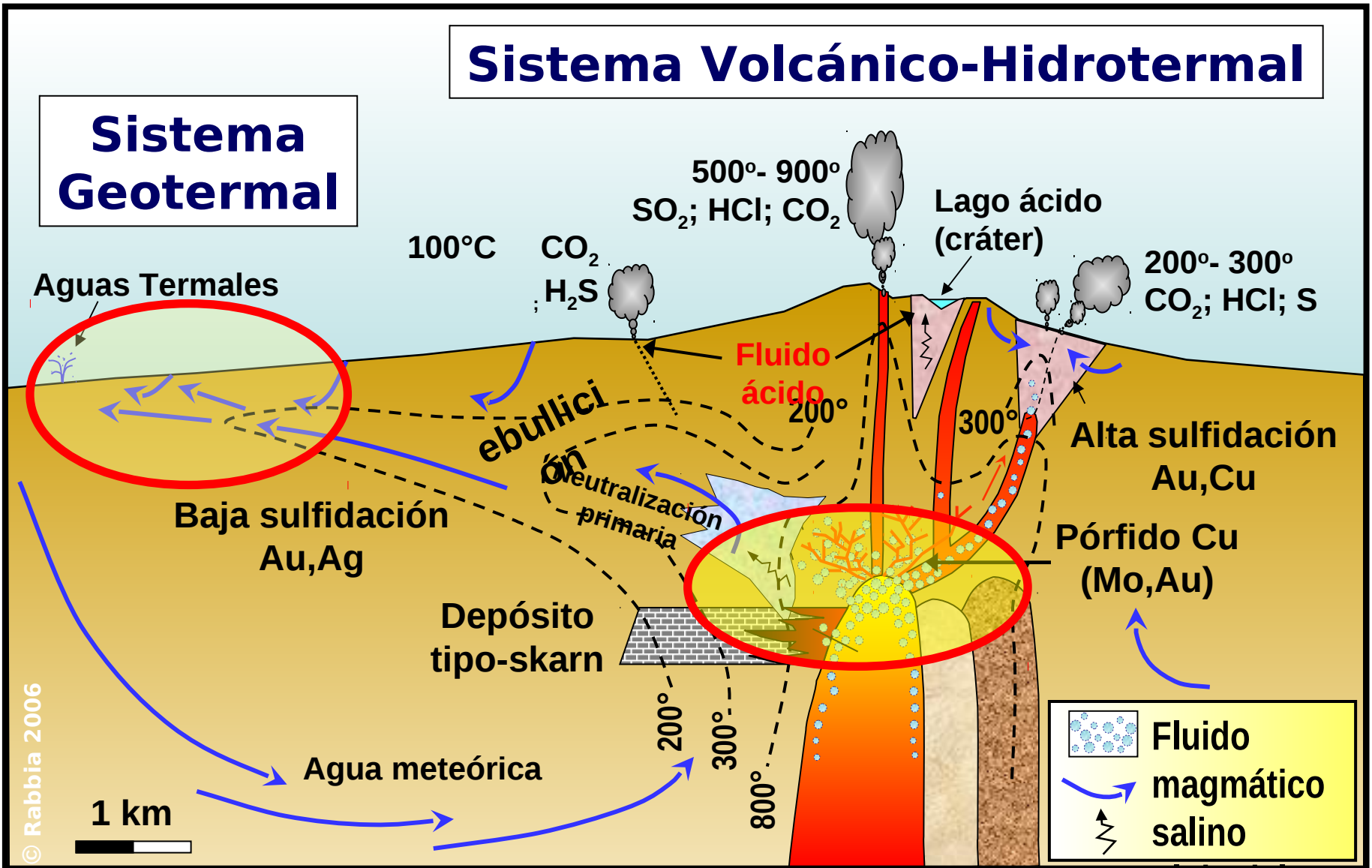






# Sistema Volcánico-Hidrotermal

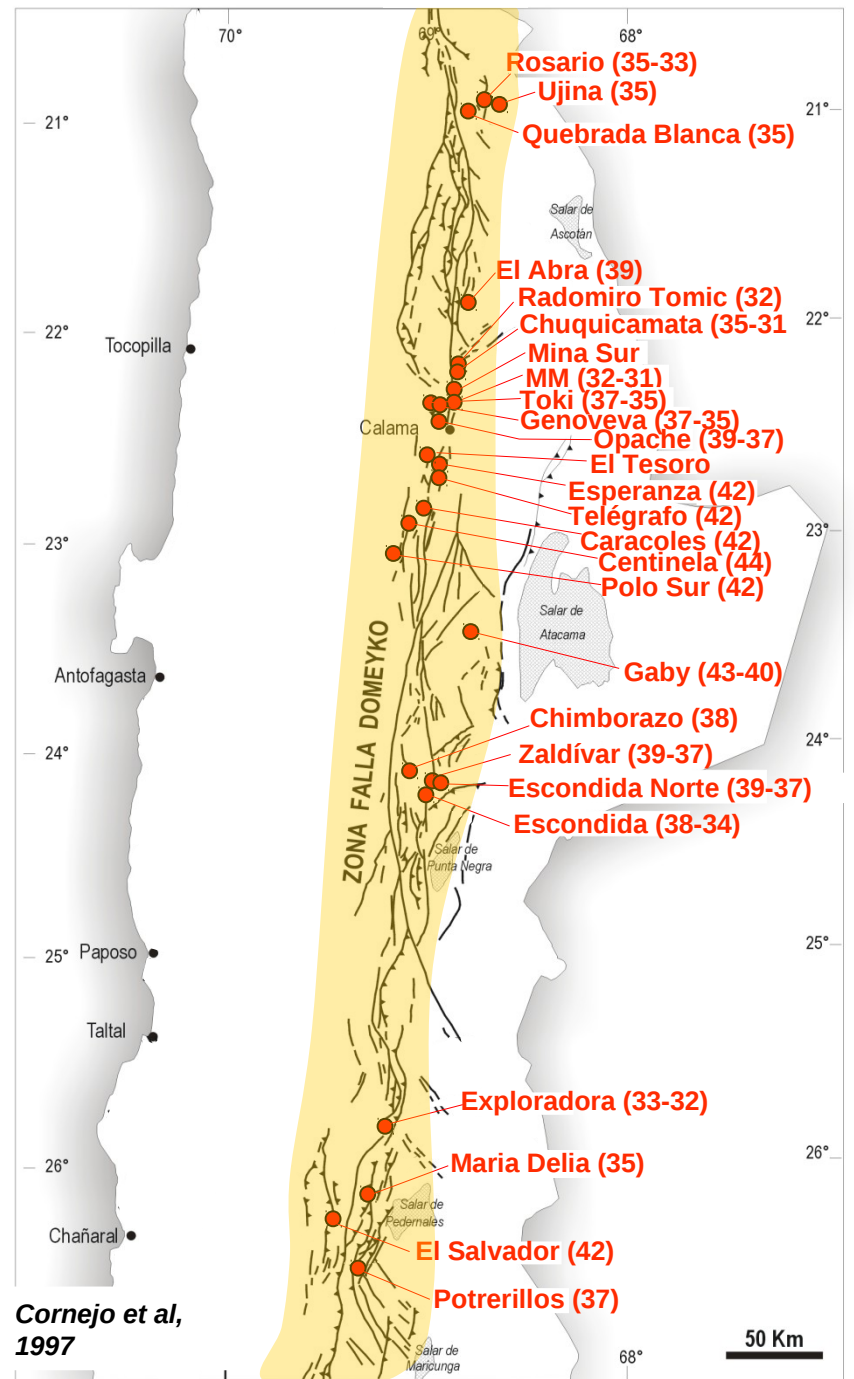
## Sistema Geotermal

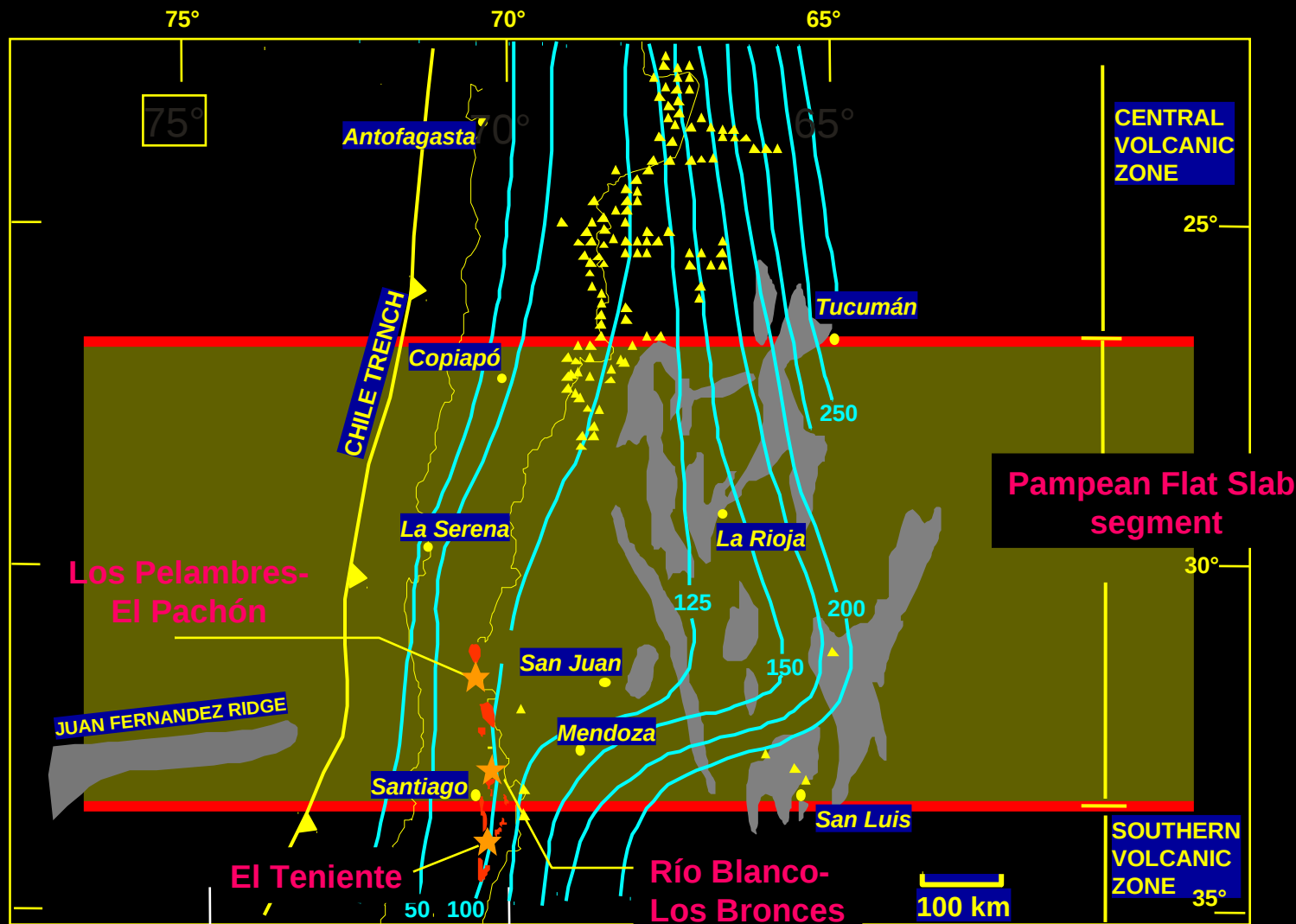


Flujo del fluido



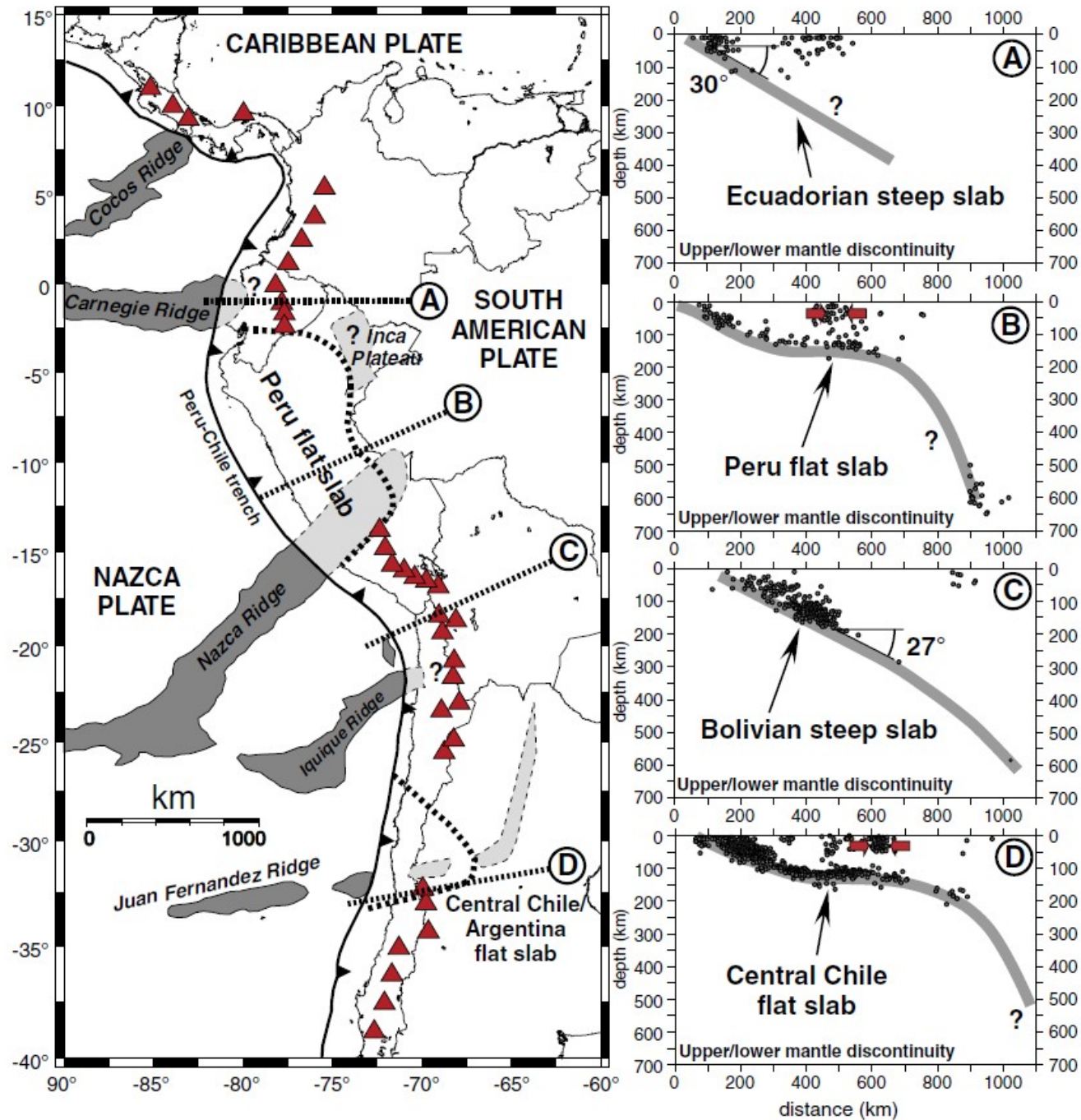
**Chuquicamata**

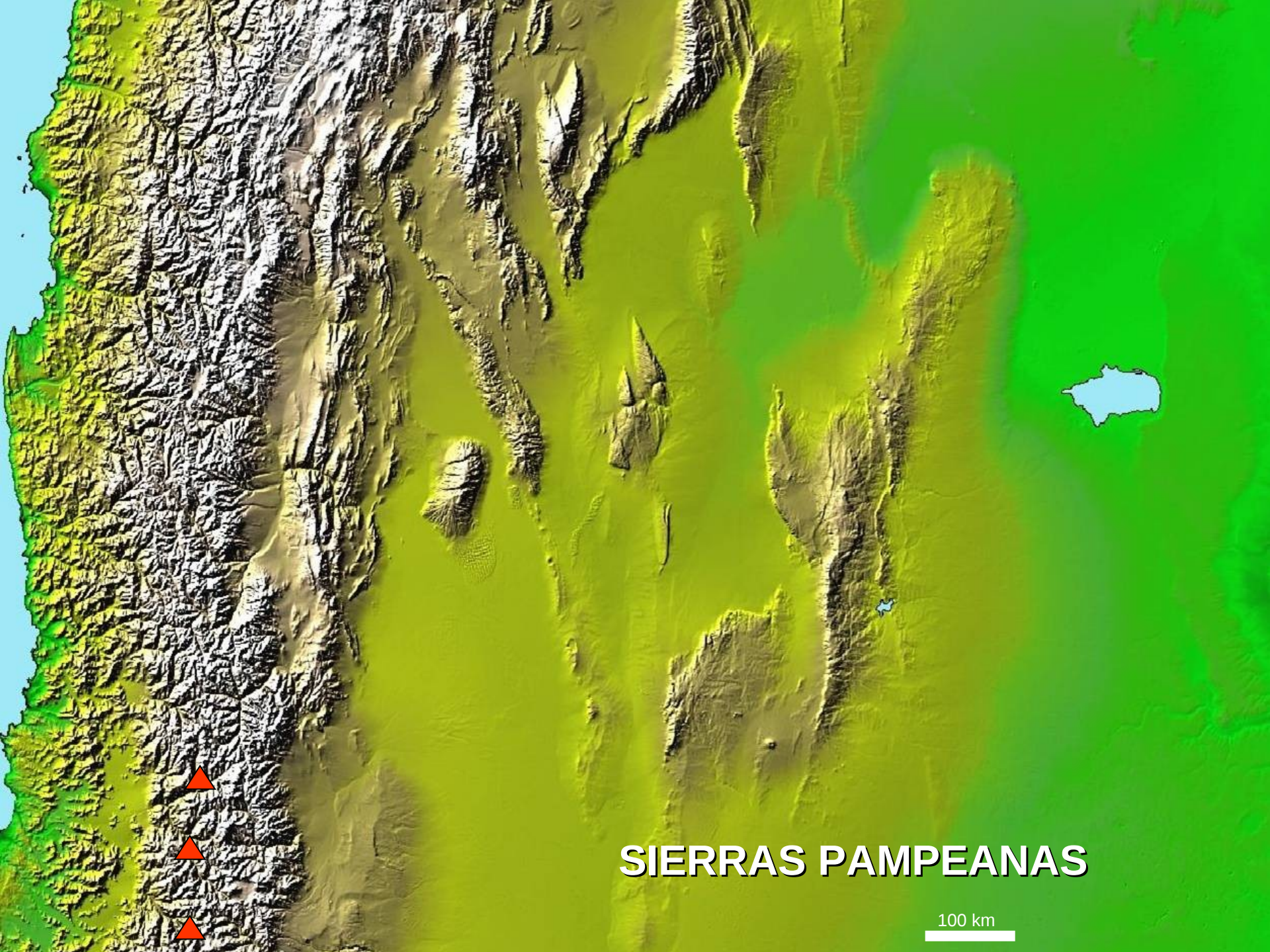




- ▲ RECENT VOLCANOES
- ◆ LATE TERTIARY BATHOLITH
- BENIOFF ZONE CONTOURS (km)
- SIERRAS PAMPEANAS
- ★ GIANT PORPHYRY COPPER DEPOSIT

Martinod et al, 2010

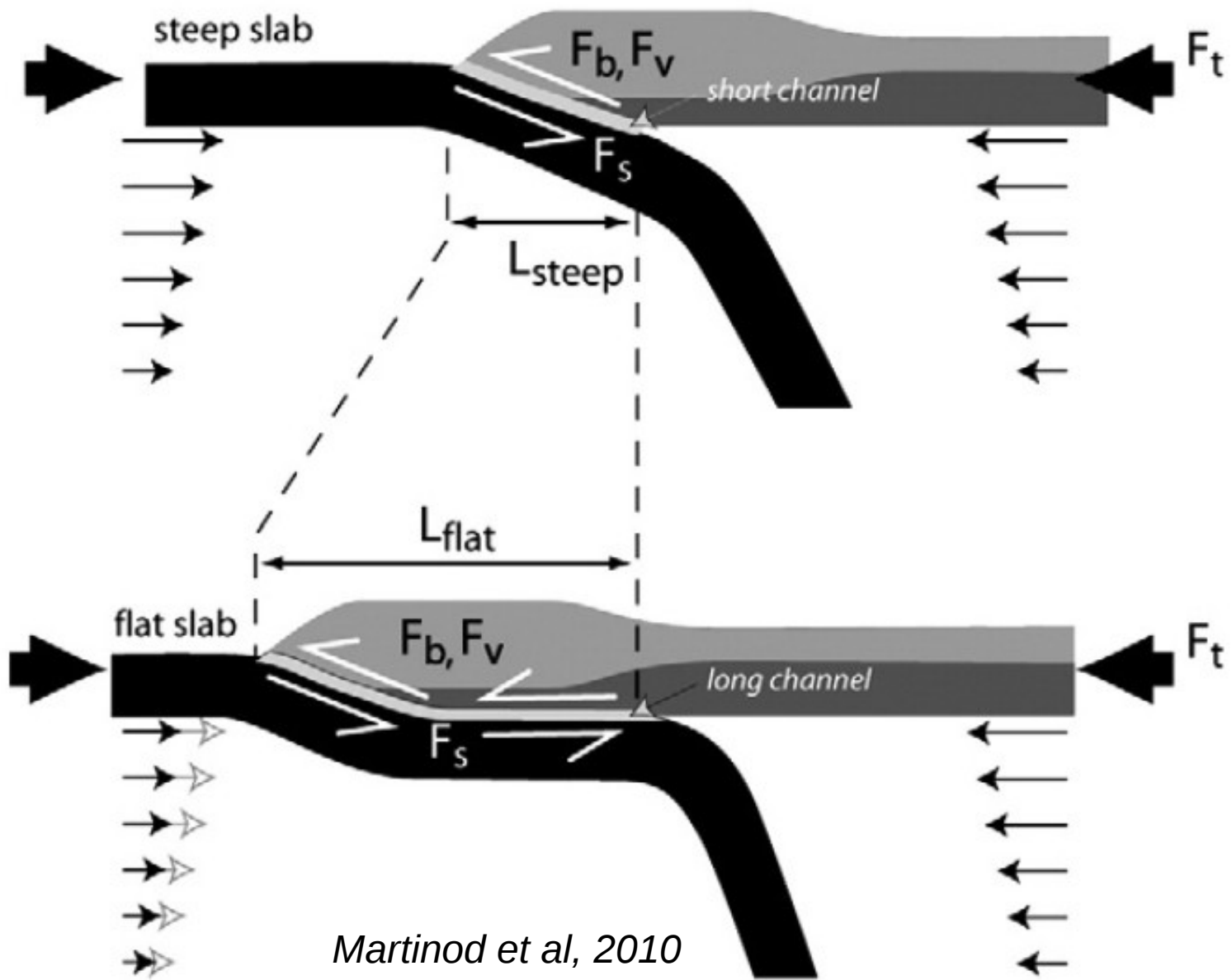




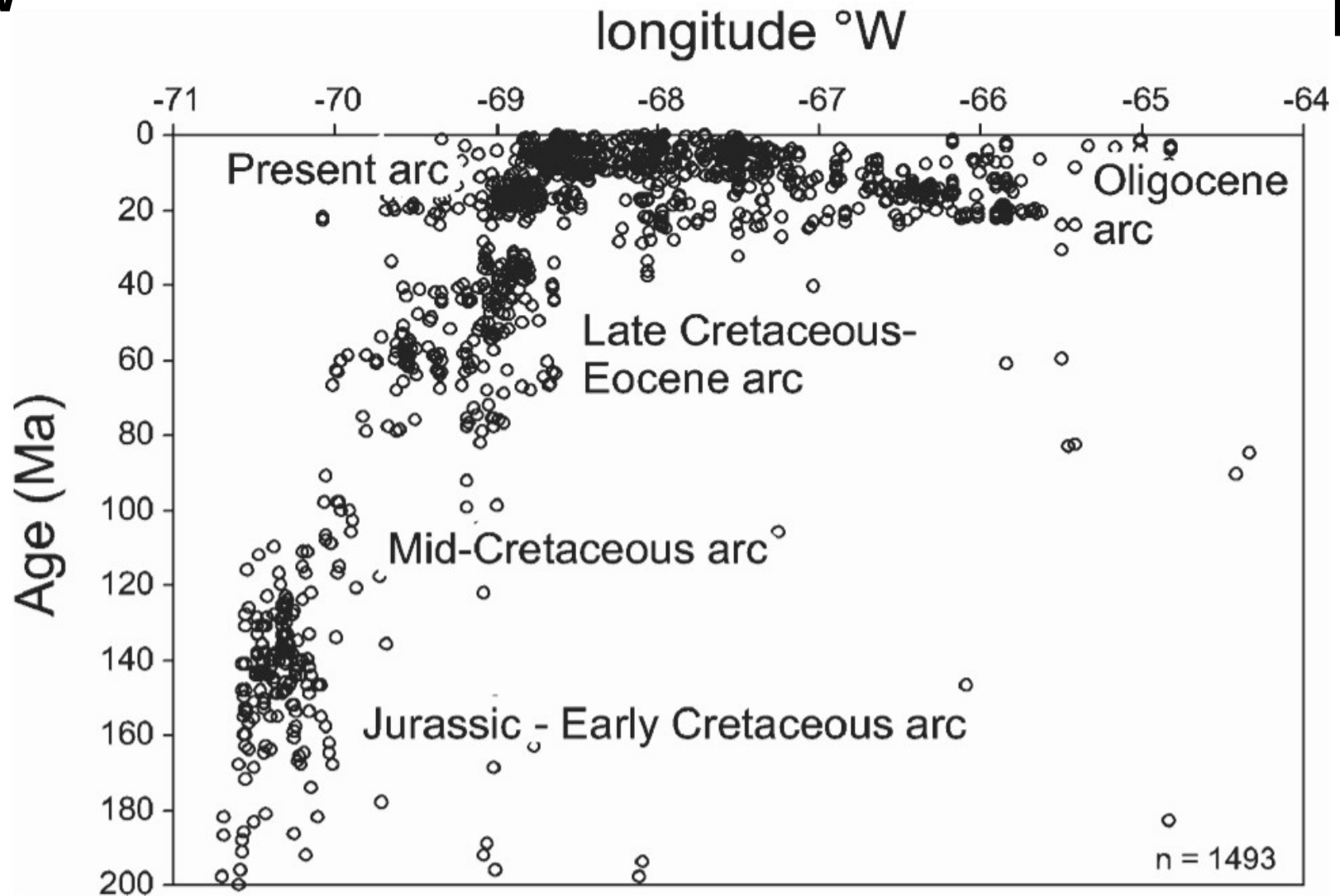
# SIERRAS PAMPEANAS

100 km



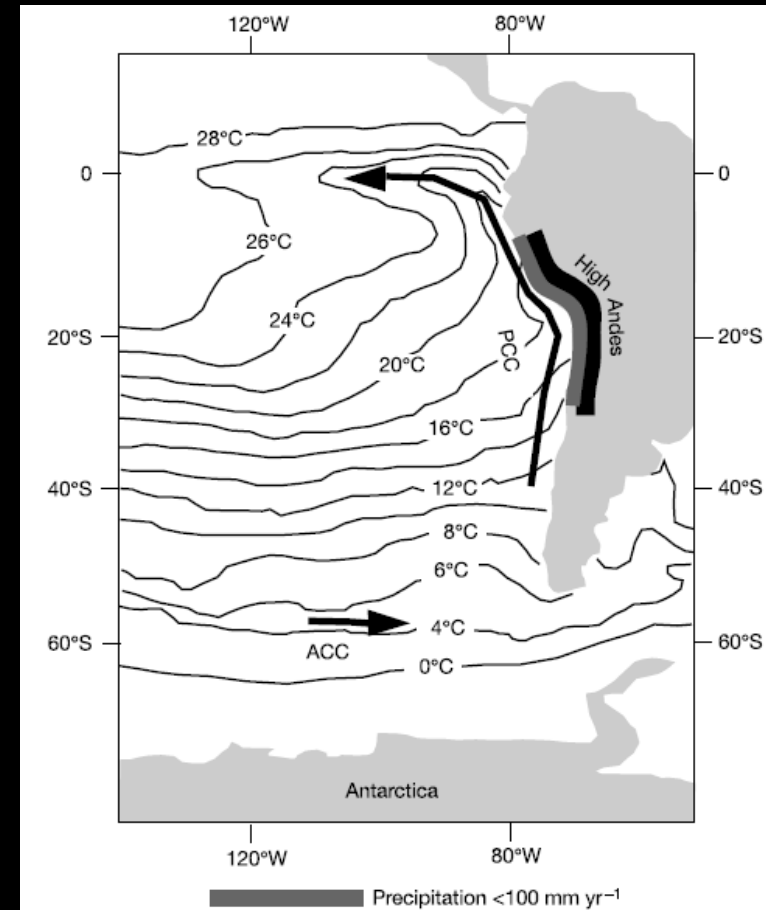
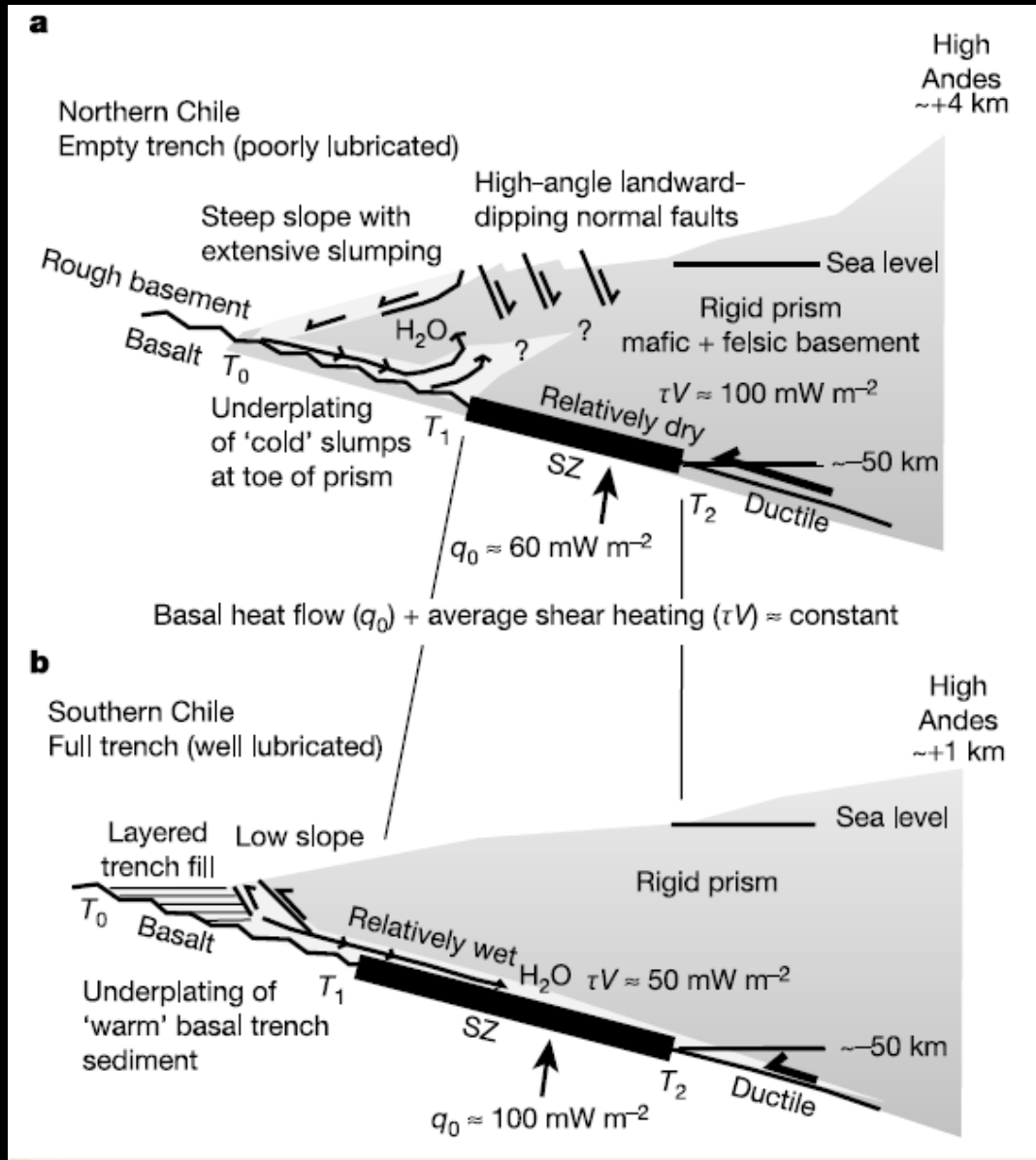


*Martinod et al, 2010*

**W****E**

Edades radiométricas de rocas volcánicas e intrusivas en el norte de Chile, en función de su distancia a la actual línea de costa

# INFLUENCIA DEL CLIMA EN LA SUBDUCCIÓN



*Lamb and Davis, Nature, 2003*