

Agenda Thursday February 28

08:00-08:30: Summaries of Breakout session 1, presented by the scribes.

Theme 2: Mass fluxes.

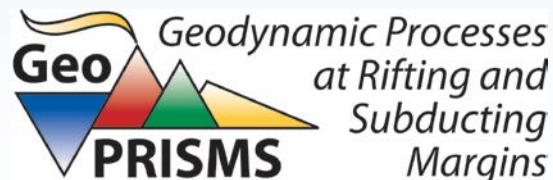
08:30-08:45: Introduction of the science theme. **Harm Van Avendonk** and **Katie Kelley**

08:45-09:05: What are the mechanisms and consequences of fluid and volatile exchange between the Earth, oceans, and atmosphere at rifted continental margins? **Tobias Fischer**

09:05-09:25: How are volatiles, fluids, and melts stored, transferred, and released through the subduction system? **Terry Plank**

09:25-09:40: Questions for both speakers.

09:40-10:00: *Coffee break.*

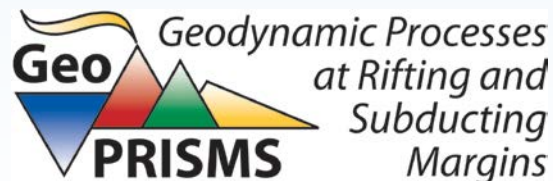


Agenda Thursday February 28

10:00-10:20: What does the crustal composition of volcanic rifted margins tell us about the dynamics of rifting? **Donna Shillington**

10:20-10:40: How does the composition of island arc crust evolve as the convergent plate boundary matures? **James Gill**

10:40-11:00 | Questions for both speakers, and discussion of Theme 2. Moderated by **Harm Van Avendonk** and **Katie Kelley**



Agenda Thursday February 28

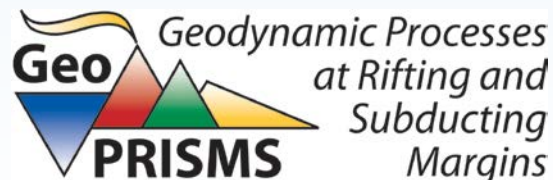
Research Coordination Networks

11:00-11:15: Presentation on SZ4D Research Coordination network (RCN) for a decadal SZ4D program. **Harold Tobin**

11:15-11:30 | Presentation on Planning for a Modelling Collaboratory for Subduction Zone Science. **Gabriel Lotto**

11:30-11:45 | Presentation on Community Network for Volcanic Eruption Response (CONVERSE): **Tobias Fischer**

Lunch provided (11:45-13:15).



The importance of mass fluxes

- Release of hydrous fluids at plate boundaries affects pore pressure, facilitates deformation.
- Volatiles in the Earth's crust and mantle greatly affect rheology.
- Mass fluxes control the long-term evolution of Earth's continental crust.
- Thick sediment deposits influence the style of rifting, subduction.

Mass Fluxes in GeoPRISMS “Big Themes”

- Origin and Evolution of Continental Crust
- Fluids, Magmas and Their Interactions
- Geochemical Cycles

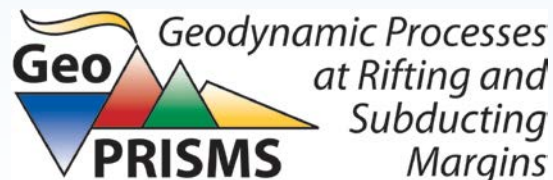
Mass Fluxes

Solid Earth fluxes have maintained and modified the volume and composition of Earth's continental crust.

What were we thinking in 2010?

Perspective on SCD/Mass Fluxes

- What is the role of **serpentine** in subduction and release of H₂O?
- What is the relationship between **dehydration reactions** and the release of fluids and/or melts from the slab?
- What are the **melting** reactions and loci and melt pathways from the mantle wedge to the surface?
- What are the fluxes of **volatiles** delivered to the mantle from the subducting slab and how are **fluids and melts** focused to the volcanic front?
- How do **surface processes and climate** modulate volatile inputs and outputs at subducting margins, and vice versa?
- What are the rates and processes of arc **crust growth** and differentiation and how is arc crust transformed to **continental crust**?

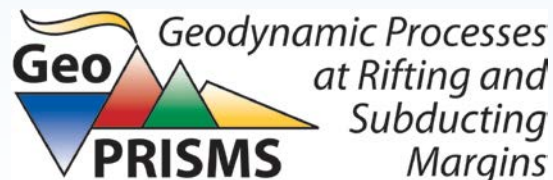


What were we thinking in 2010?

Perspective on RIE/Mass Fluxes

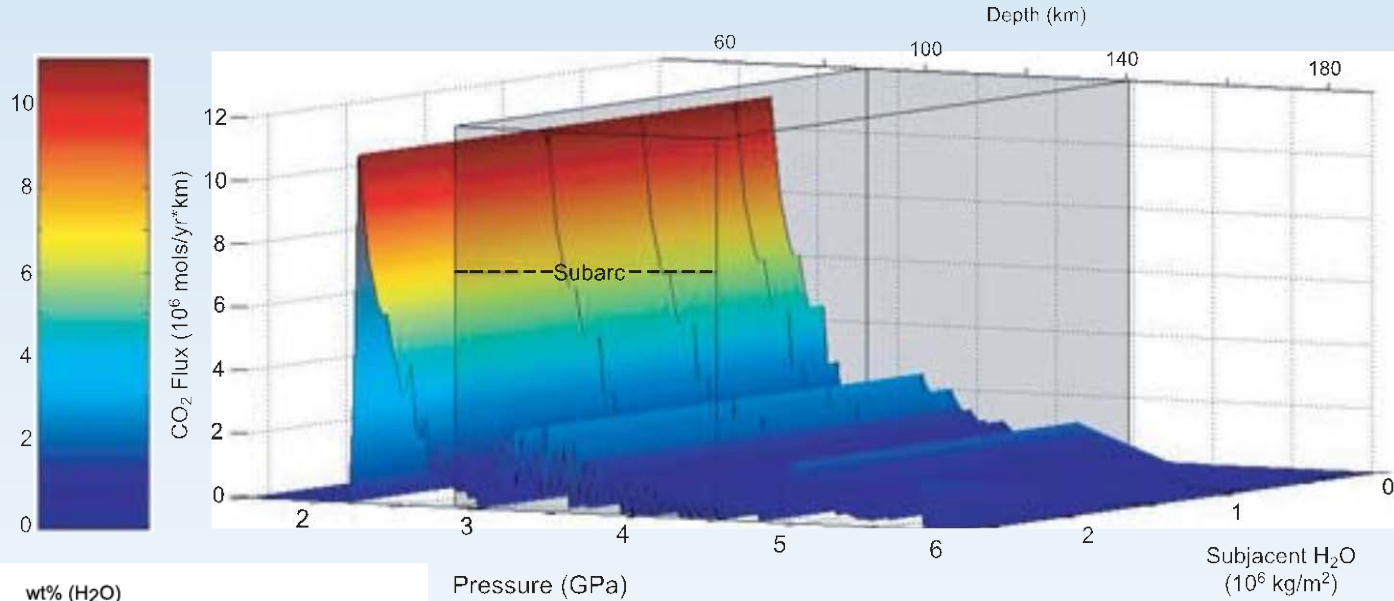
- What is the relationship between **deformation and magmatism** at all levels of the lithosphere?
- How does evolving rift architecture modify and interact with subaerial and submarine **sediment-dispersal** pathways through time?
- What are the rates, processes, and timescales of **delta transport** across shelves into deep basins and how are the signals of these variations expressed in the stratigraphic record?
- How do fluxes of **sediment** to margins, and the landscapes they support, respond to changes in climate and land-use? How can these insights be used to predict future changes expected for large, heavily populated, low-lying deltas?
- What are the net **volatile** fluxes at continental rifts?
- What are the reservoirs and release mechanisms for **volatiles** from rift inception to breakup?

What role do **volatiles** play in the initiation and evolution of rifting?

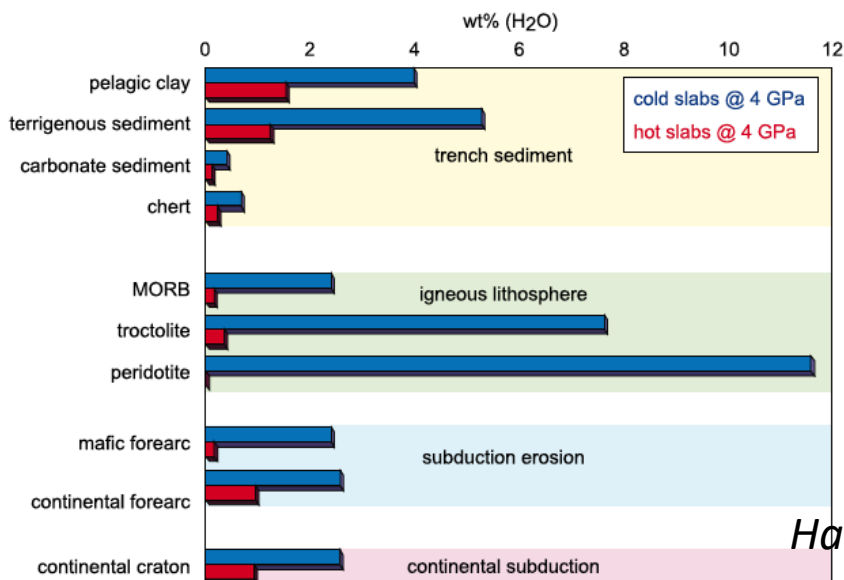


Mass Fluxes

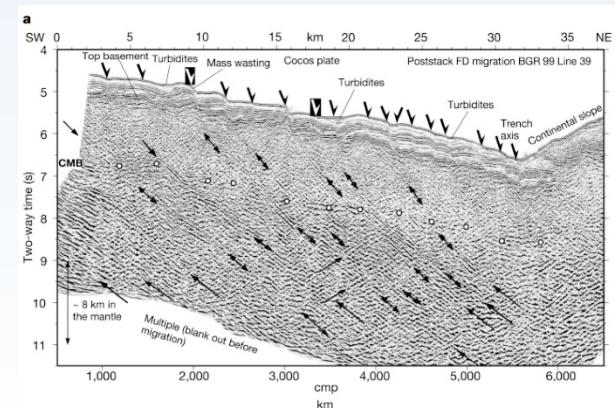
- How are volatiles, fluids, and melts stored, transferred, and released through the subduction system?



Gorman et al. (2006)



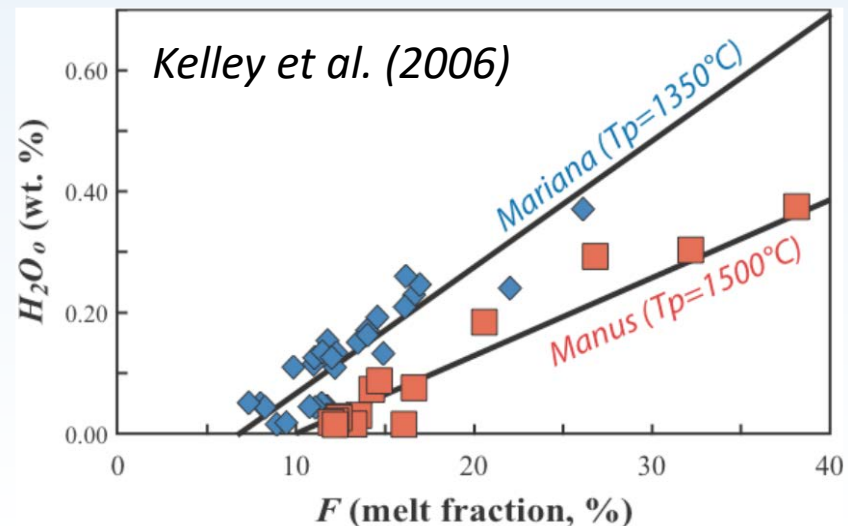
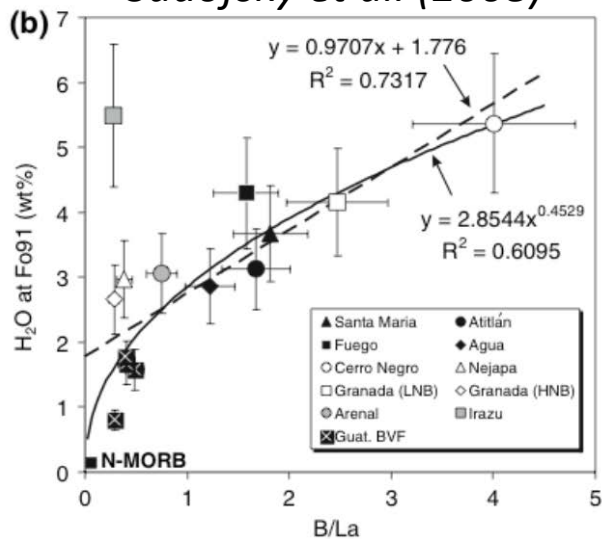
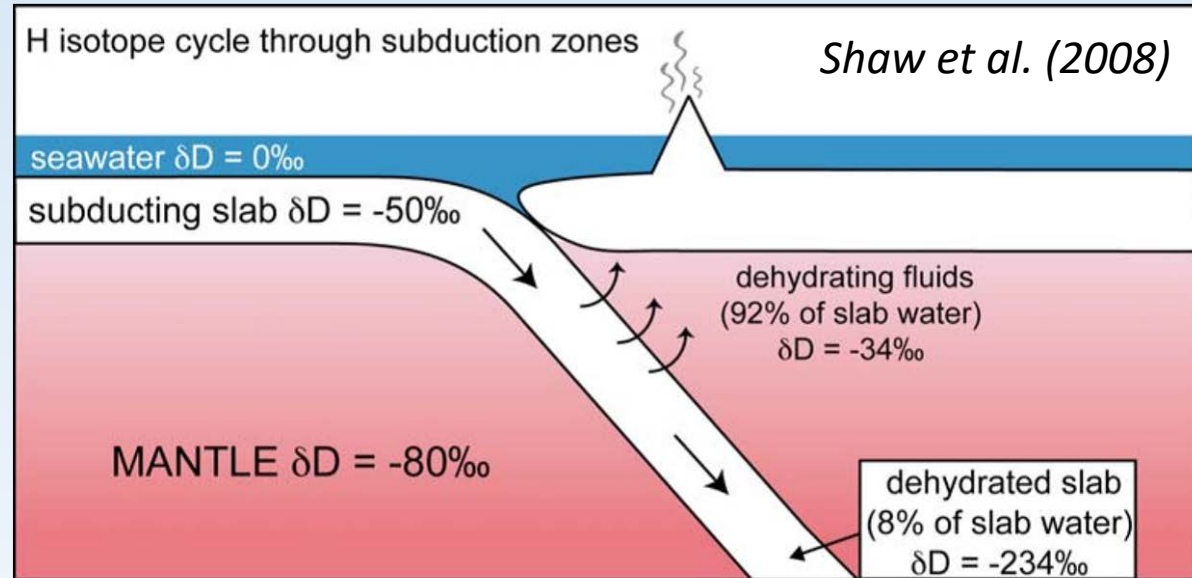
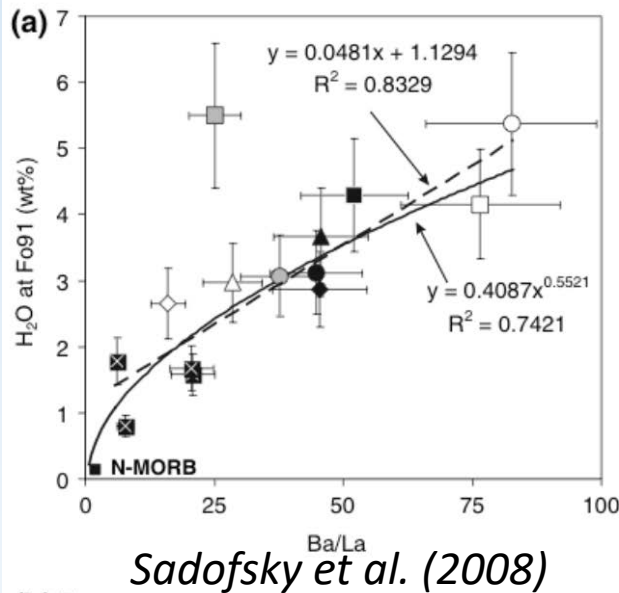
Hacker (2008)



Ranero et al. (2003)

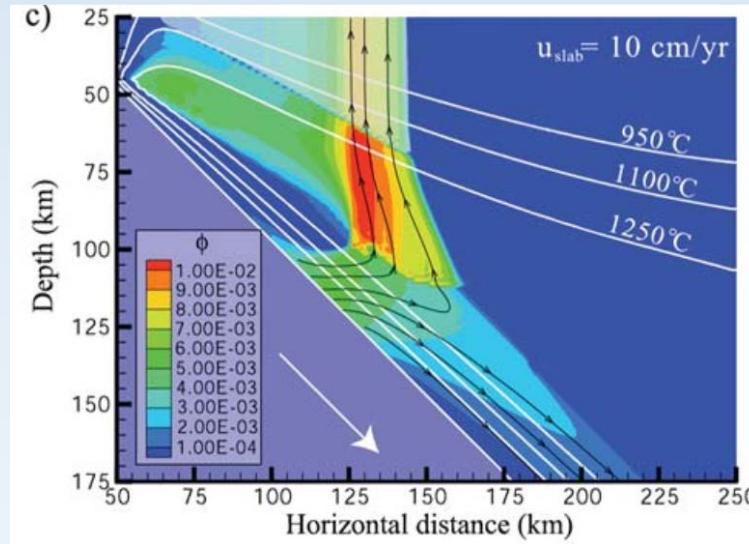
Mass Fluxes

- How are volatiles, fluids, and melts stored, transferred, and released through the subduction system?

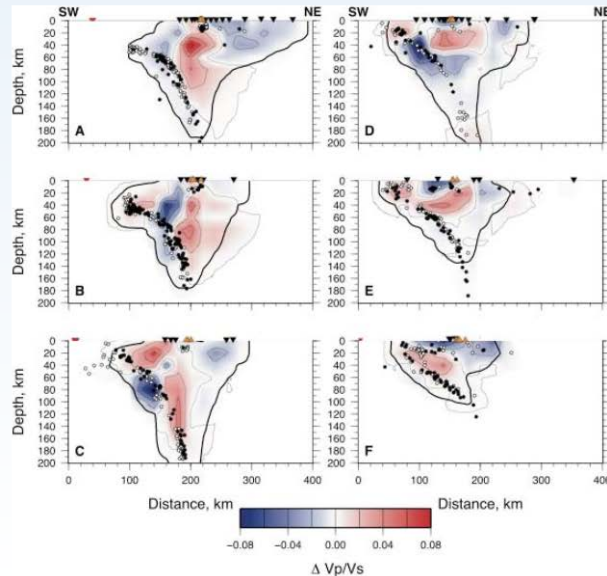


Mass Fluxes

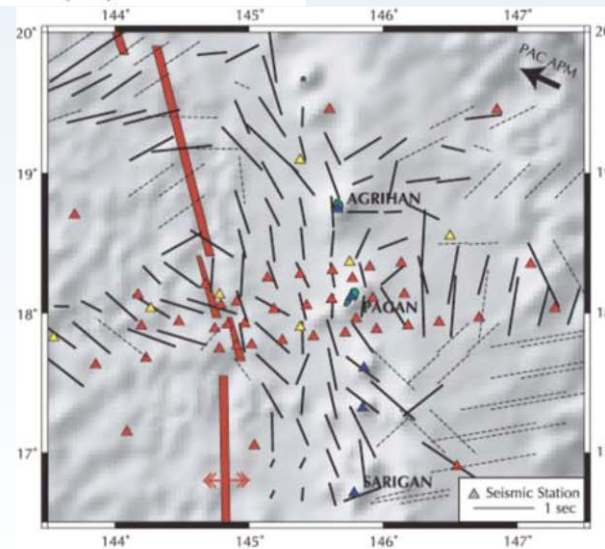
- How are volatiles, fluids, and melts stored, transferred, and released through the subduction system?



Cagnioncle et al. (2008)



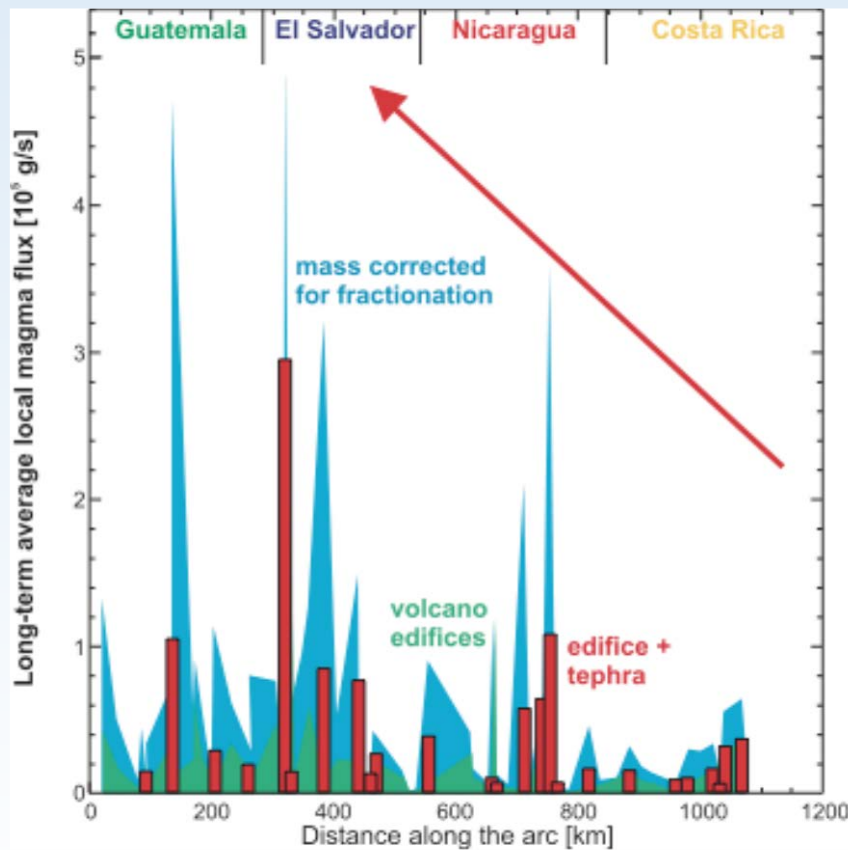
Syracuse et al. (2008)



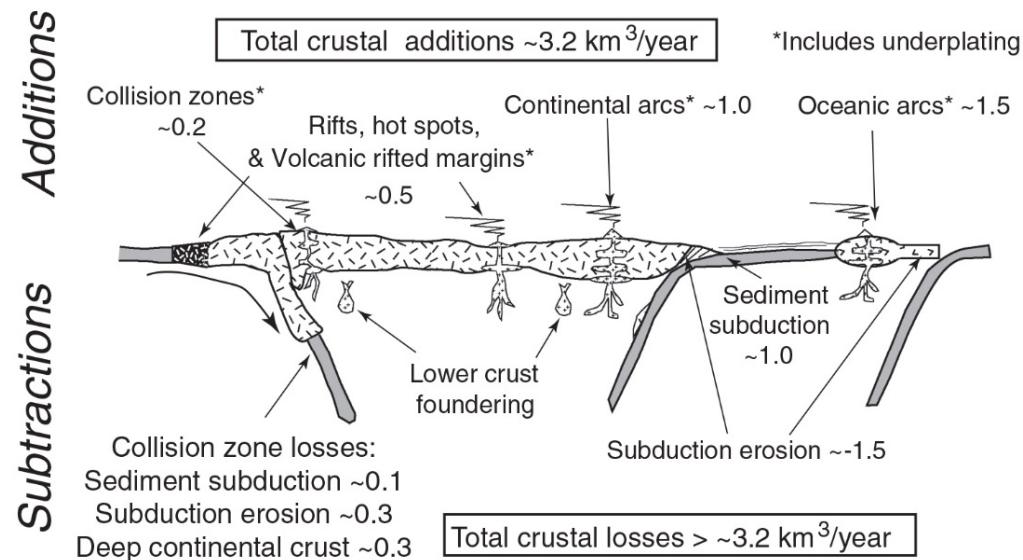
Pozgay et al. (2008)

Mass Fluxes

- What are the geochemical products of subduction zones, from mantle geochemical reservoirs to the architecture of arc lithosphere, and how do these influence the formation of new continental crust?



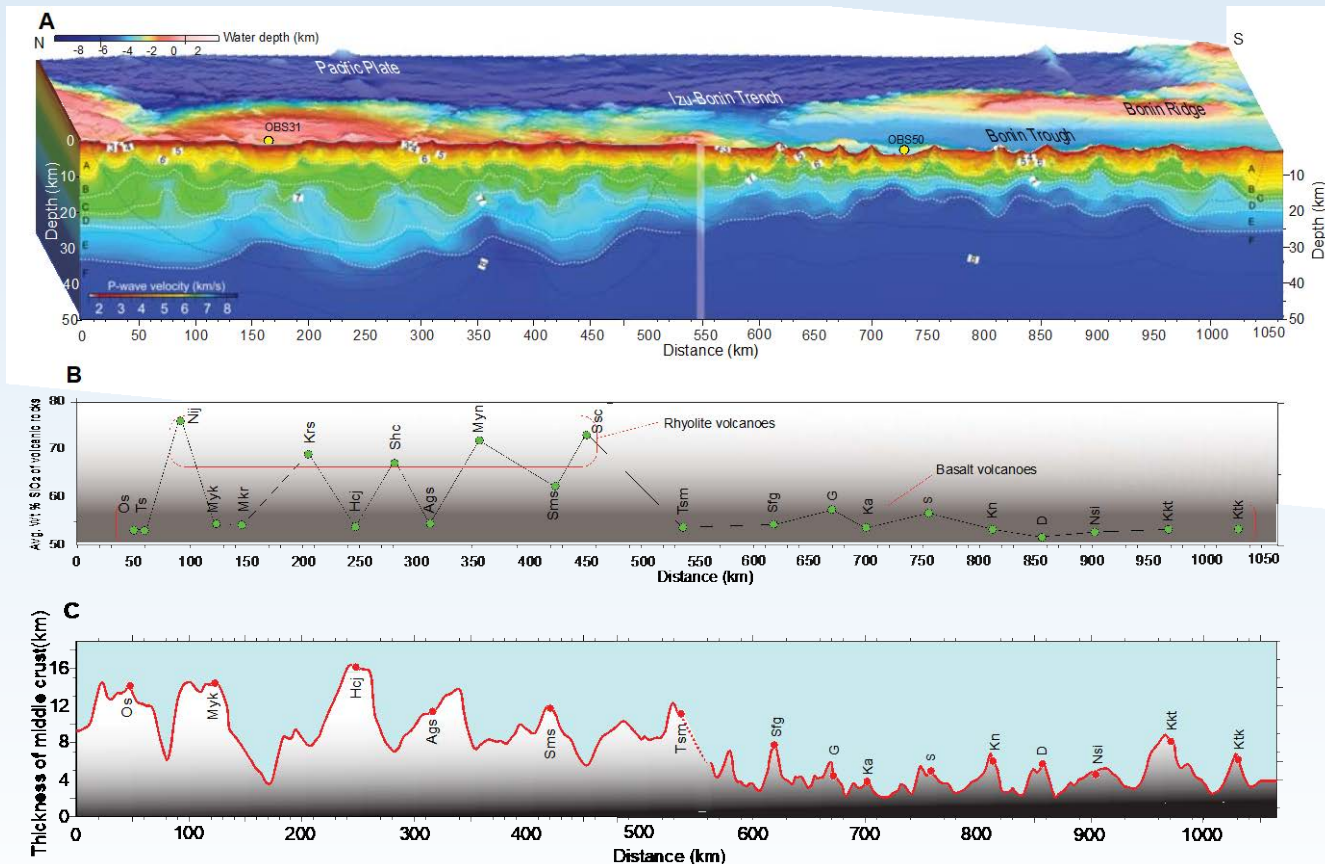
Kutterolf et al. (2008)



Stern and Scholl (2010)

Mass Fluxes

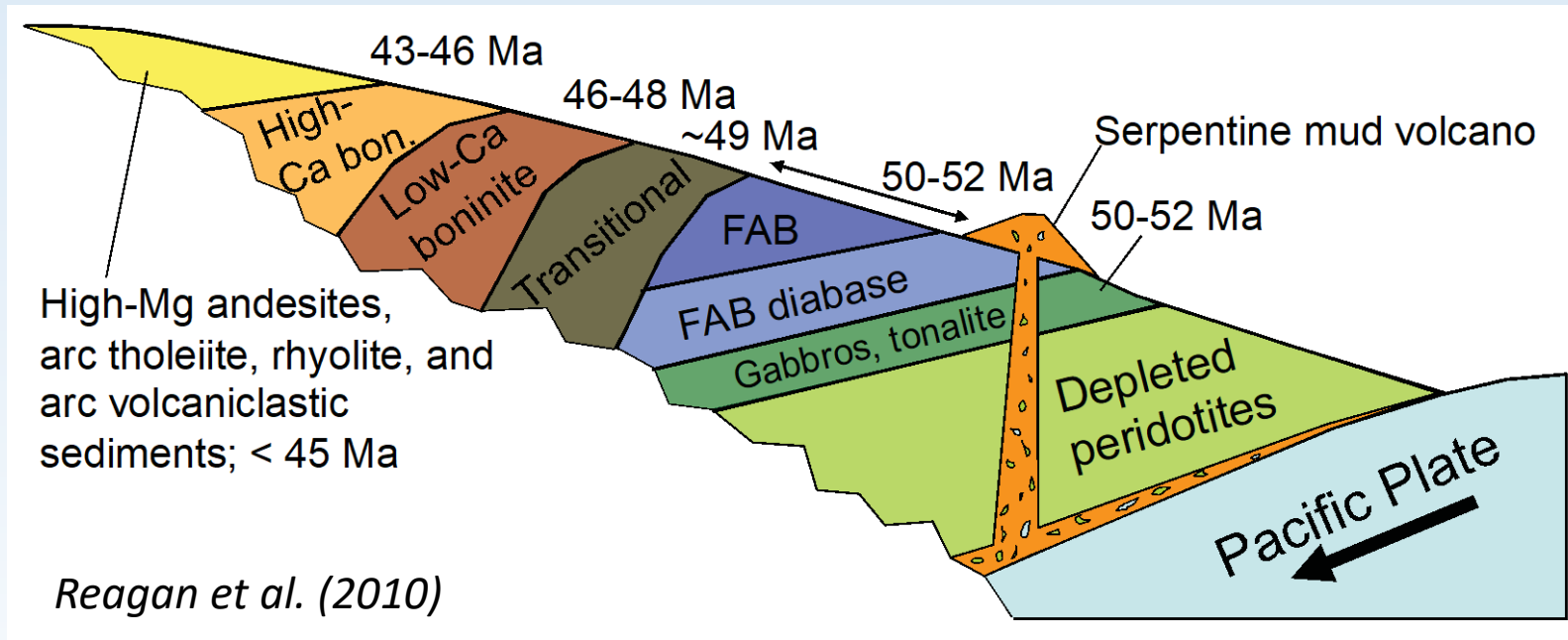
- What are the geochemical products of subduction zones, from mantle geochemical reservoirs to the architecture of arc lithosphere, and how do these influence the formation of new continental crust?



Kodaira et al. (2007)

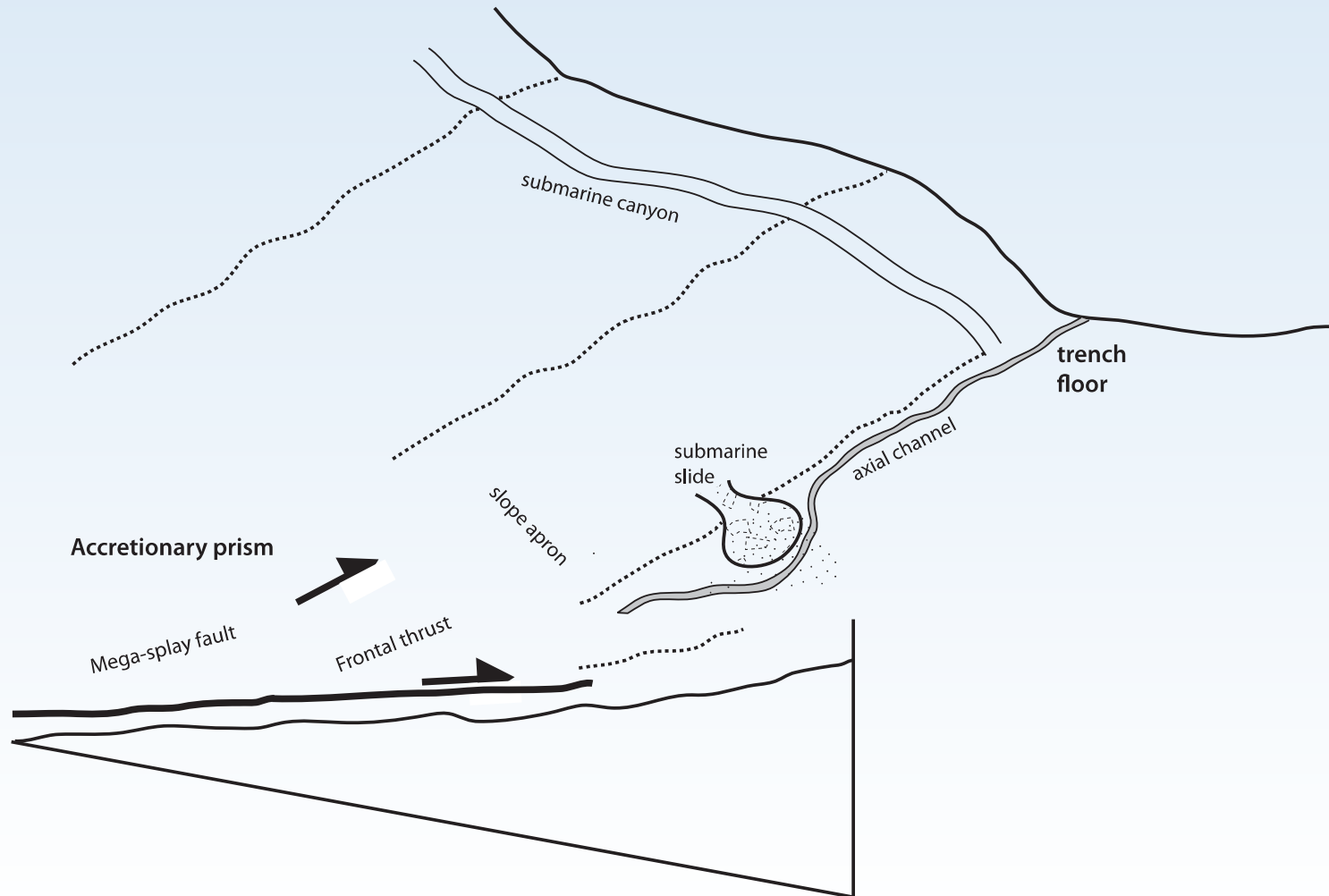
Mass Fluxes

- What are the physical and chemical conditions that control subduction zone initiation **and the development of mature arc systems?**



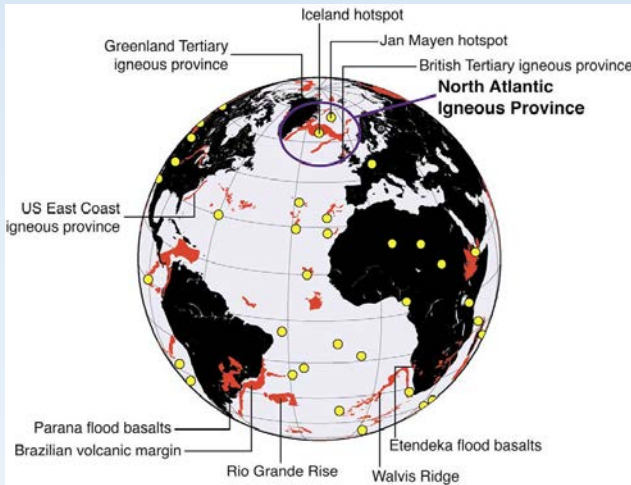
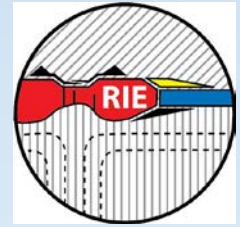
Mass Fluxes

- What are the critical feedbacks between surface processes and subduction zone mechanics and dynamics?
- What is the fate of subducted sediments?

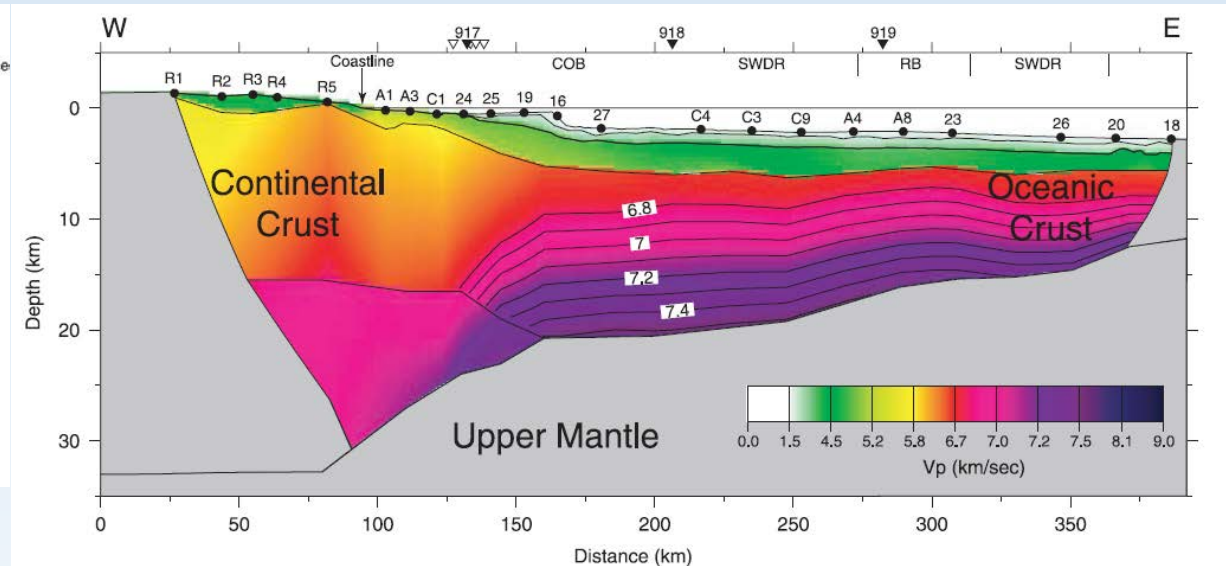


Mass Fluxes

- How do mantle plumes interact with rifts?



Coffin and Edholm (1994)



Hopper et al. (2003)

The connection between plume arrival and magmatic output during rifting is not fully known.

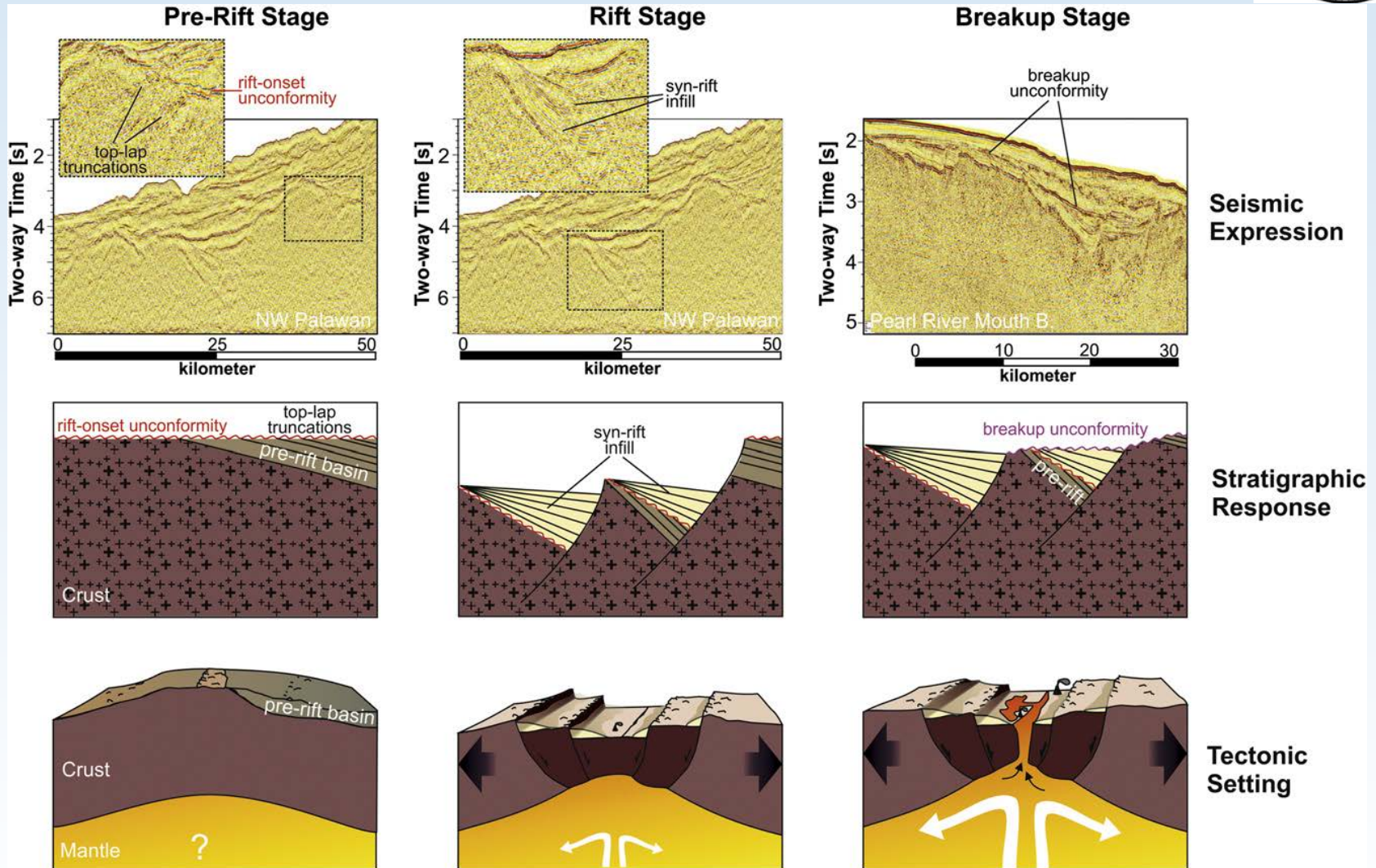
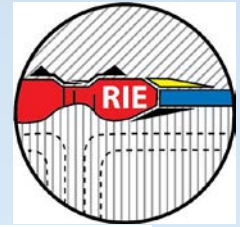
Generally, hotspots correspond with volcanic wedges at rifted margins.

Lower crust with high seismic velocities at rifted margins indicative of magmatic intrusions.

Higher seismic velocities may correspond to higher mantle potential temperatures.

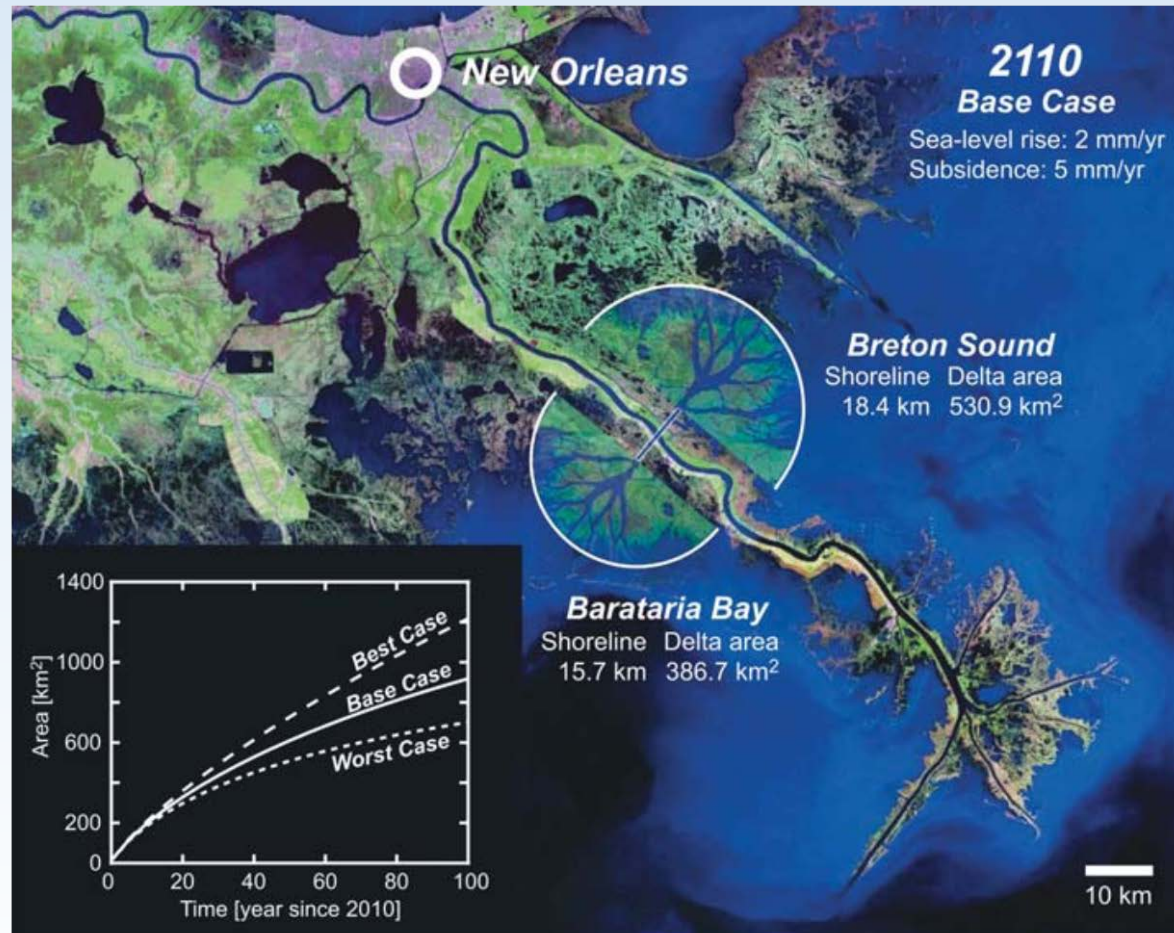
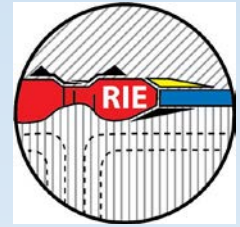
Mass Fluxes

- How do sediment dispersal and rift mechanics interact?



Mass Fluxes

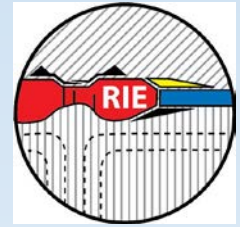
- What controls the structural and stratigraphic architecture of rifted continental margins after breakup?



Kim et al., 2009

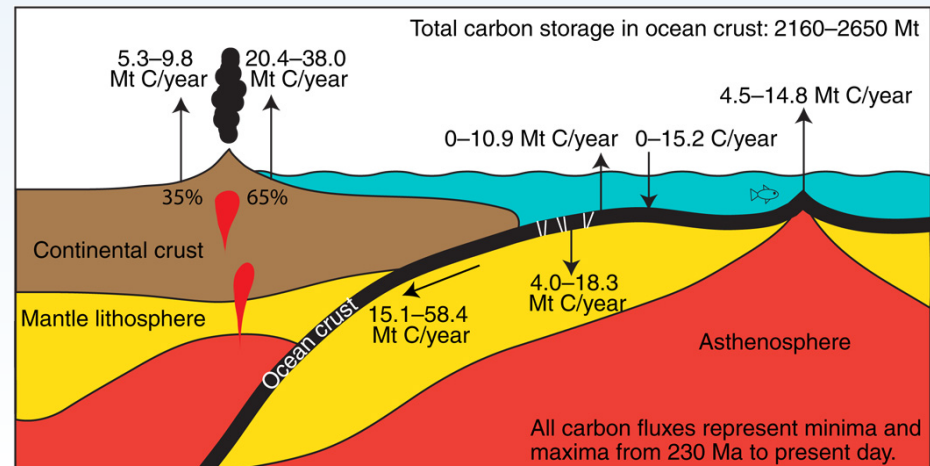
Mass Fluxes

- What are the mechanisms and consequences of fluid and volatile exchange between the Earth, oceans, & atmosphere at rifted continental margins, and between the lithosphere and the mantle?



Miller and Lizarralde (2013)

Muller and Dutkiewicz (2018)



Mass Fluxes

Topic 2a: *Fluid and volatile fluxes at plate boundaries.*

What are the mechanisms and consequences of fluid and volatile exchange between the Earth, oceans, and atmosphere at rifted continental margins? **Tobias Fischer**

How are volatiles, fluids, and melts stored, transferred, and released through the subduction system? **Terry Plank**

Topic 2b: *Evolution of the volcanic arcs, and the composition of continental crust*

What does the crustal composition of volcanic rifted margins tell us about the dynamics of rifting? **Donna Shillington**

How does the composition of island arc crust evolve as the convergent plate boundary matures? **James Gill**

