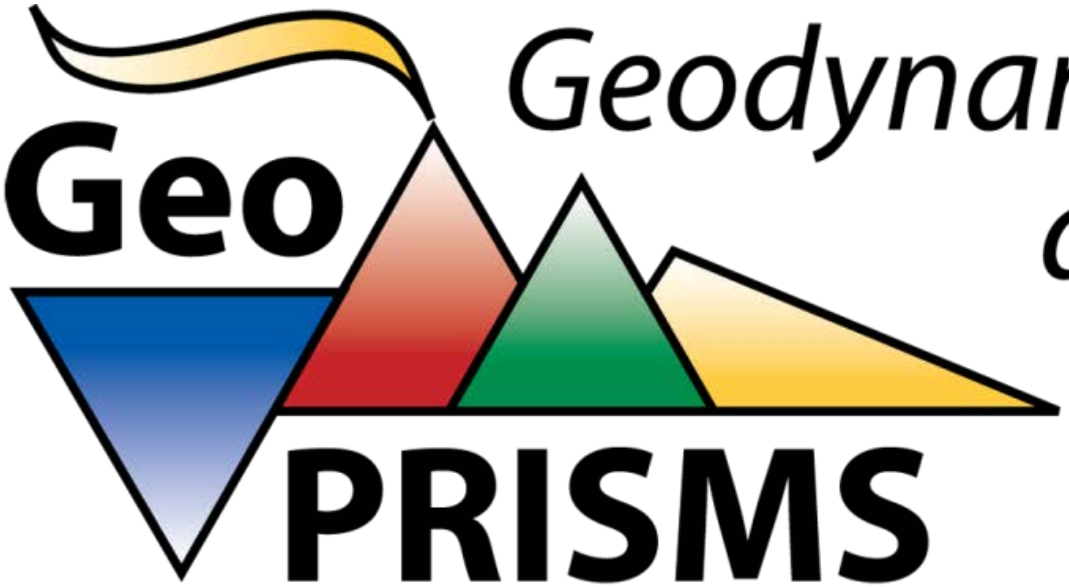
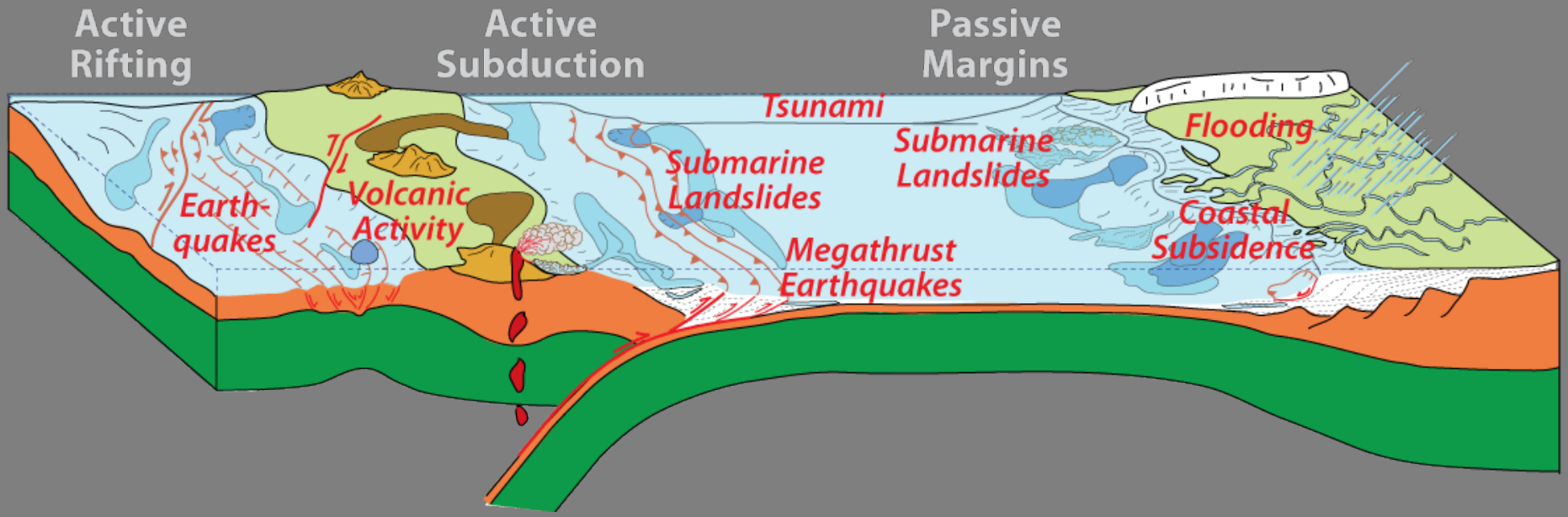


Geodynamic Processes at Rifting and Subducting Margins

Kermadec Arc - Havre Trough workshop
Sunday December 8, 2013

GeoPRISMS Tectonic Settings



GeoPRISMS investigates the coupled geodynamics, earth surface processes, and climate interactions that build and modify continental margins *over a wide range of timescales (from s to My), and cross the shoreline, with applications to margin evolution & dynamics, construction of stratigraphic architecture, accumulation of economic resources, and associated geologic hazards and environmental management.*

What Is GeoPRISMS?

Successor to the decadal NSF MARGINS Program

Studies of origin & evolution of continental margins

- Community-driven, interdisciplinary, cross-divisional NSF-funded
- Integrating field, theory, experiment, and modeling

Focus on rifts and subduction zones

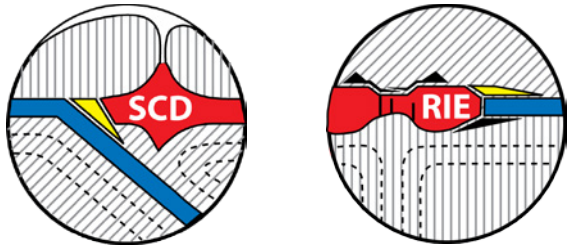
- Active geodynamic processes; formation of continental crust
- Where geology and society intersect; many economic resources

Shoreline-crossing, i.e., "amphibious"

- Where most rifts and subduction zones occur
- Geologic & geodynamic processes span the shoreline
- Where focused, cross-divisional efforts most needed

Two broadly integrated initiatives

Subduction Cycles & Deformation



Rift Initiation & Evolution

- **Research at Primary Sites & through Thematic Studies**

(from New Zealand Draft implementation plan)

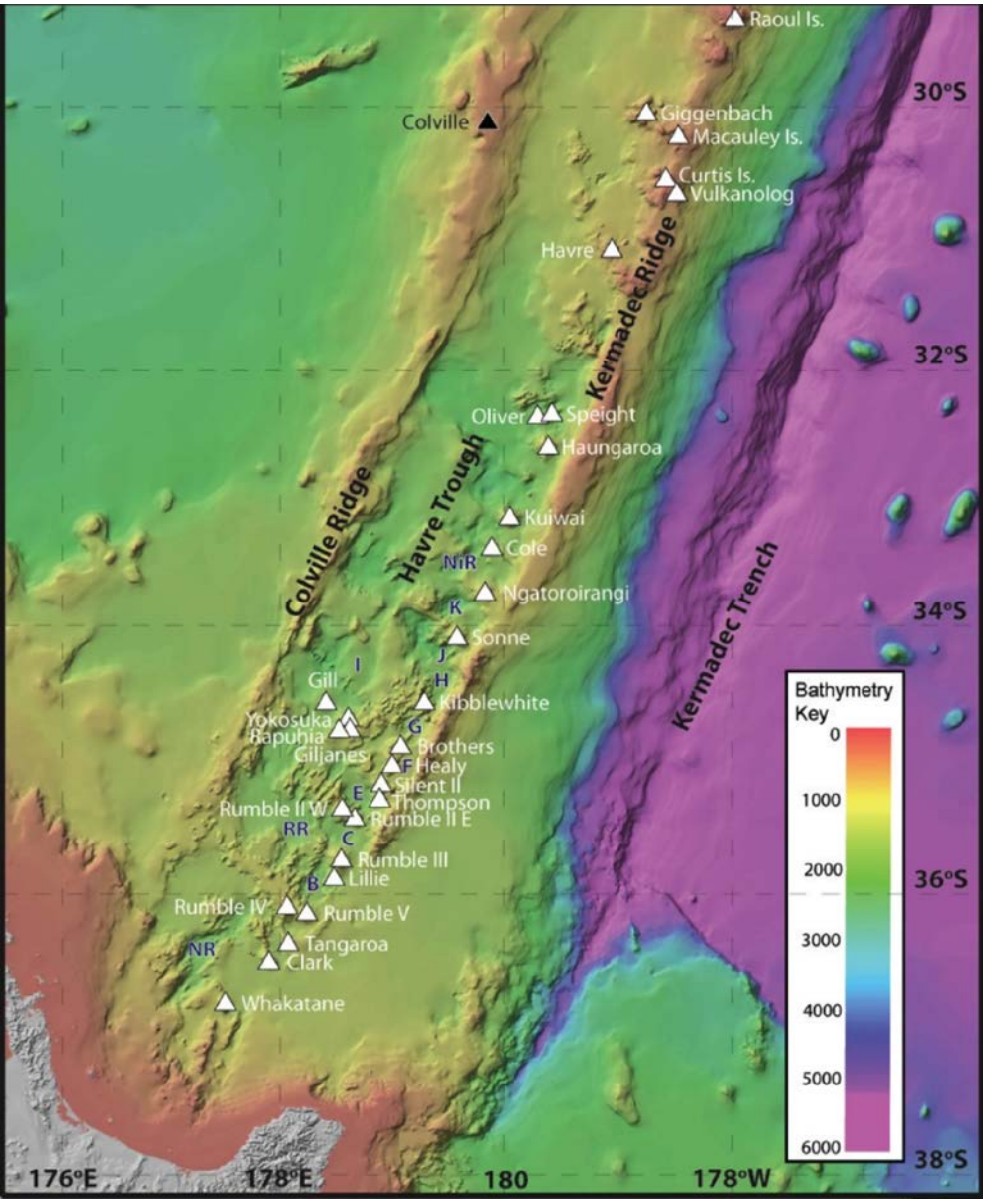
Four out of seven SCD questions can be answered in New Zealand

What are the geological, geochemical and geophysical responses to subduction initiation and early arc evolution, and how do they affect subduction zone development?

What are the pathways and sources of magmas and volatiles emerging in the arc and forearc, and how do these processes interact with upper plate extension?

What controls subduction thrust fault slip behavior and its spatial variability?

What are the feedbacks between climate, sedimentation, and forearc deformation?



The Kermadec-Havre Trough region includes a well-preserved example of Eocene subduction initiation, providing unique opportunities to examine the structural, stratigraphic and volcanic record associated with subduction initiation and subsequent arc evolution. This area is also ideally suited to the study of volatile fluxes from the fore-arc to the back-arc, and to determine the effects of along-strike changes in composition and sediment inputs of the incoming plate. The presence of rhyolitic magma also provides opportunities for study of silicic magma formation in oceanic arc systems.

Is there an observable signature of Hikurangi Plateau subduction along or across-strike?

What are the volatile fluxes in the TVZ/Kermadec/Tonga system and how do they relate to along and across strike variations?

What is the relationship between tectonism, magmatism, and fluid fluxes during the rifting stage of backarc development?

What systematic variation is there in subducted components and what is the partitioning of magmatism and fluxes in the forearc, volcanic front, and back-arc?

How do arcs initiate – what are the timing, mechanisms, rock types etc.? How does the record of arc initiation in the KAHT relate to the well-documented record in the Izu-Bonin-Mariana forearc?