What are the most important problems to address?

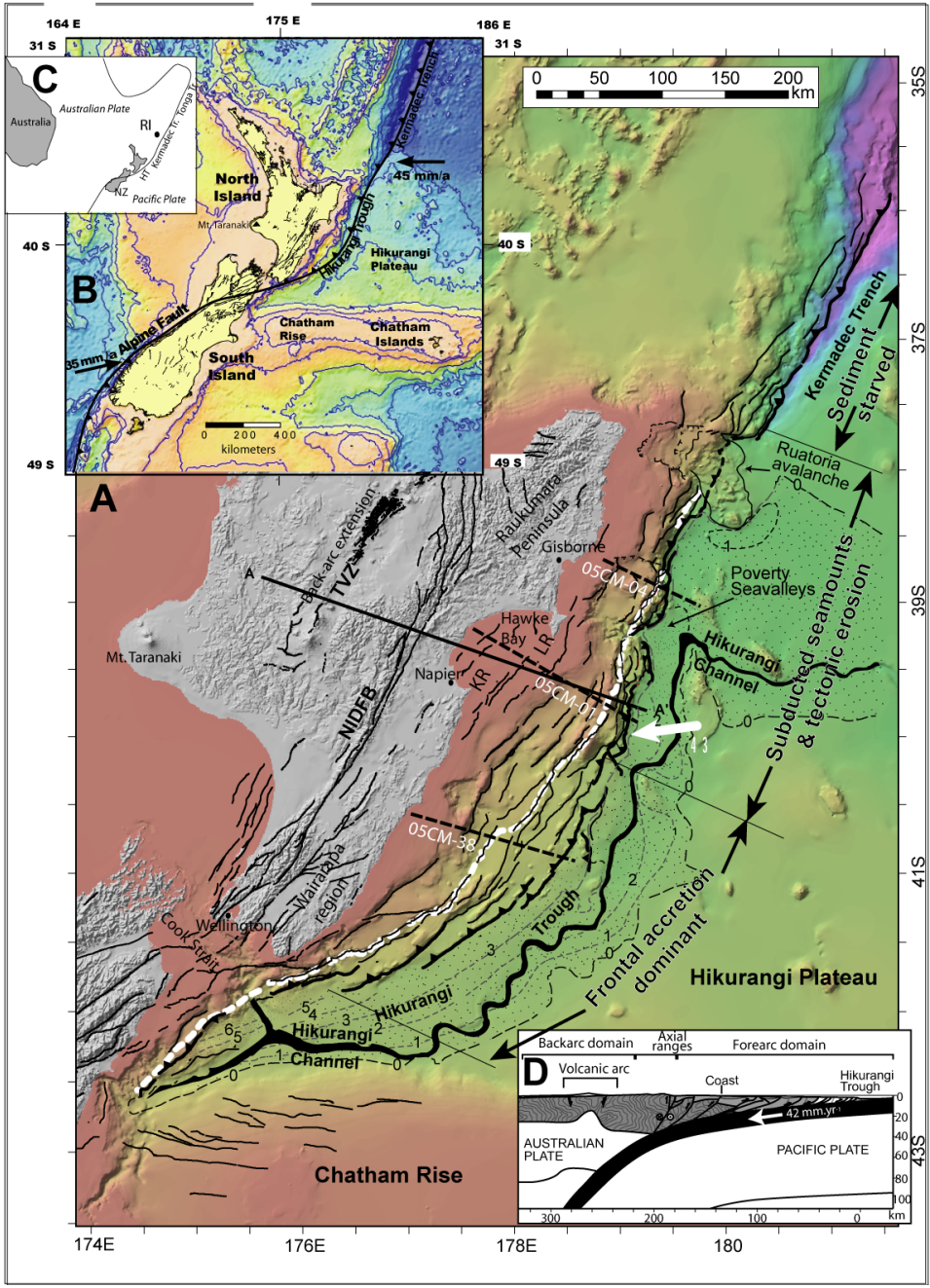
- What are the causes and consequences of along-strike and long-term variability?
  - How have the volcanic and fault systems developed as the plate boundary evolves thru time?
  - Temporal changes in deformation (long and short-term) and their relation to along-strike changes along margin?
  - How and why does a subduction interface transition from locked to aseismic creep? How are the physical conditions on the interface different from an area of stick-slip to slow slip/aseismic creep?
  - What leads to diversity of slow slip event behavior?
  - Climate-tectonic feedbacks?
  - *How are all of these changes interrelated?*

Advantages

- strong systematic, along-strike transitions in a variety of subduction margin characteristics
- structural changes of the incoming plates
- changes in sediment input/budgets
- changes along the volcanic arc (volatile/mass/silica content), and across the margin from the forearc through to the arc

- How do we use modern observations in conjunction with geologic data/models to understand subduction initiation?

NEW ZEALAND IS IDEAL FOR AN AMPHIBIOUS APPROACH



Datasets that already exist:

- Source-to-sink data exist here
- Long-term stratigraphic/magmatic/paleoseismic history
- Continuous GPS
- Extensive 2D offshore seismic data
- Extensive passive seismic network/earthquake catalogs
- Geochemical from springs and seeps in forearc
- Highres bathymetry
- Some core data but not extensive
- Industry drill-hole data (with possible buy-in?)
- QMAP data
- BSR Heat flow
- Magnetotelluric data (minimal), but NZ effort in this is ramping up
- Local earthquake tomographic models
- Onshore/offshore refraction transects
- Geochemical monitoring of magmatic activity
- Great physical volcanology record
- Paleo shoreline mapping

Datasets that are needed:

- 3D seismic reflection along the slow slip source area
- Wide-angle refraction
- Drilling northern Hikurangi offshore margin
- Turbidite/tsunami history
- Offshore geodesy (pressure sensors or GPS-acoustic systems)
- Heatflow measurements
- Improved onshore/offshore passive seismic network/data
- Dense array seismic networks
- Strain and tilt meters to evaluate smaller slow-slip events
- Improved fluid flow measurements offshore
- More magnetotelluric data, possible continuous MT?
- Focused geophysical transects across the along-strike transition from locked to creeping (south to north)
- Cores and seismic data to eval. SI
- Geologic/geochron/geochem documentation SI
- 3D seismic to image slab SI (proposal submitted—Gurnis)
- Drilling SI
- More bathymetry? SI
- More continuous GPS

Infrastructure and Leverage:

- GeoNET
- Volcano Observatories, monitoring (seismicity, deformation, geochem)
- GNS/NIWA/Universities, dynamic earth science community
- Substantial Government support, EQC
- Good ports
- Potential for industry buy-in (geothermal, petroleum)
- International communities interested (Japanese/Germans)
- Societal support and implications
- Long field seasons
- Language isn't tooo difficult!
- Marine Geophysical vessels available locally
- IODP drilling vessel will be 'around' in 2013
- Good wine