Collaborative Research: The Thermal Regime of the Hikurangi Subduction Zone and Shallow Slow Slip Events, New Zealand

PI: Rob Harris (Oregon State Un.); co-Pis: Anne Trehu (OSU), Andy Fisher (UCSC)

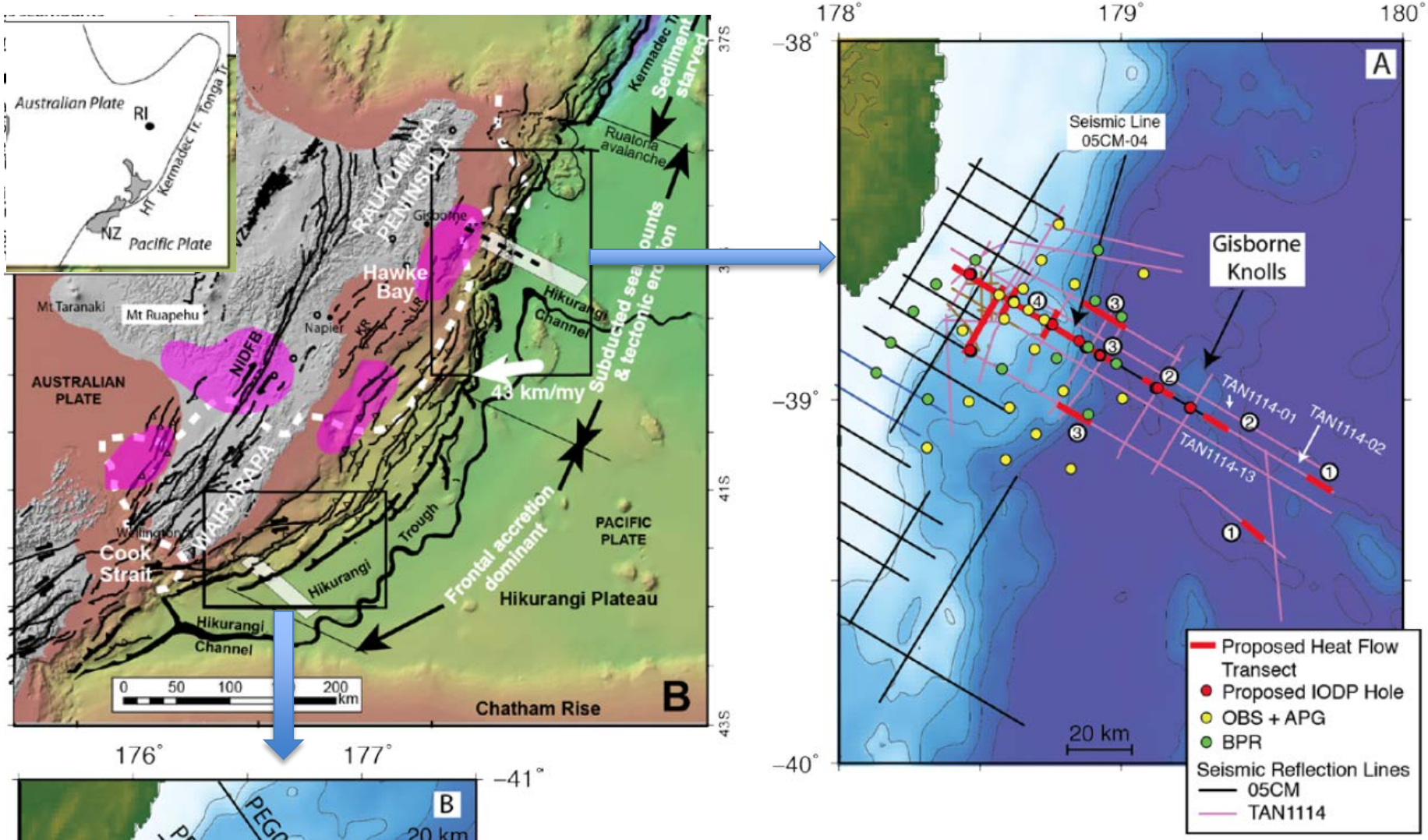
Primary Objective: Develop a process-based understanding of the thermal structure of the Hikurangi subduction zone.

Experimental strategy:

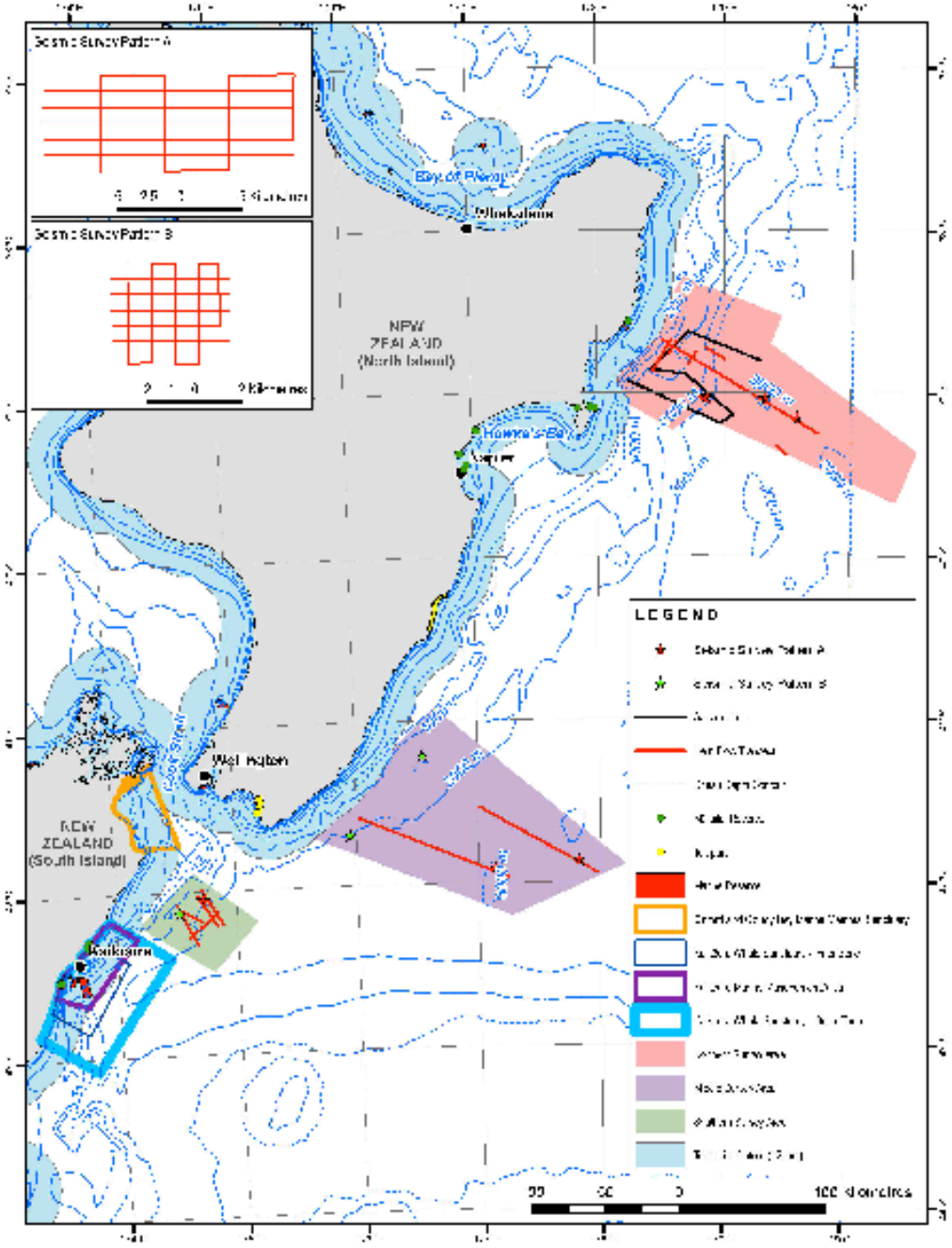
- Obtain ~15 high-resolution transects of heat flow measurements at well-characterized sites. Transects are on the incoming plate as well as in the forearc and include both the northern and southern Hikurangi subduction zone
- Extend coverage using BSR observations in existing MCS data and in new high-resolution MCS data acquired as part of this experiment.
- Develop numerical models constrained by the new data to understand along strike variations in heat and fluid flow and their relationship to variations in slow slip events and apparent slip deficit.

Additional objectives:

- Obtain seismic reflection data to characterize HOBITSS OBS sites.
- Acquire cores to obtain biogeochemical constraints on fluid flow and methane production.



Schematic of the experiment plan showing the location of planned heat flow transects compared to location of documented slow slip events (magenta), slip deficit (dashed white line in downdip limit of > 20 mm/yr), and HOBITSS OBS deployment.



Map from permit application:

Shows more clearly where high-resolution seismic surveys are planned to characterize subsurface structure in the vicinity of heat flow sites to complement existing data. Also shows contingency sites related to gas hydrate processes that were identified in consultation with New Zealand colleagues. Seismic data will be acquired here is time allows.