Constraints on the Structure of the Border Ranges Fault System, South-Central Alaska from Integrated 3-D Inversion of Gravity/Magnetic Data

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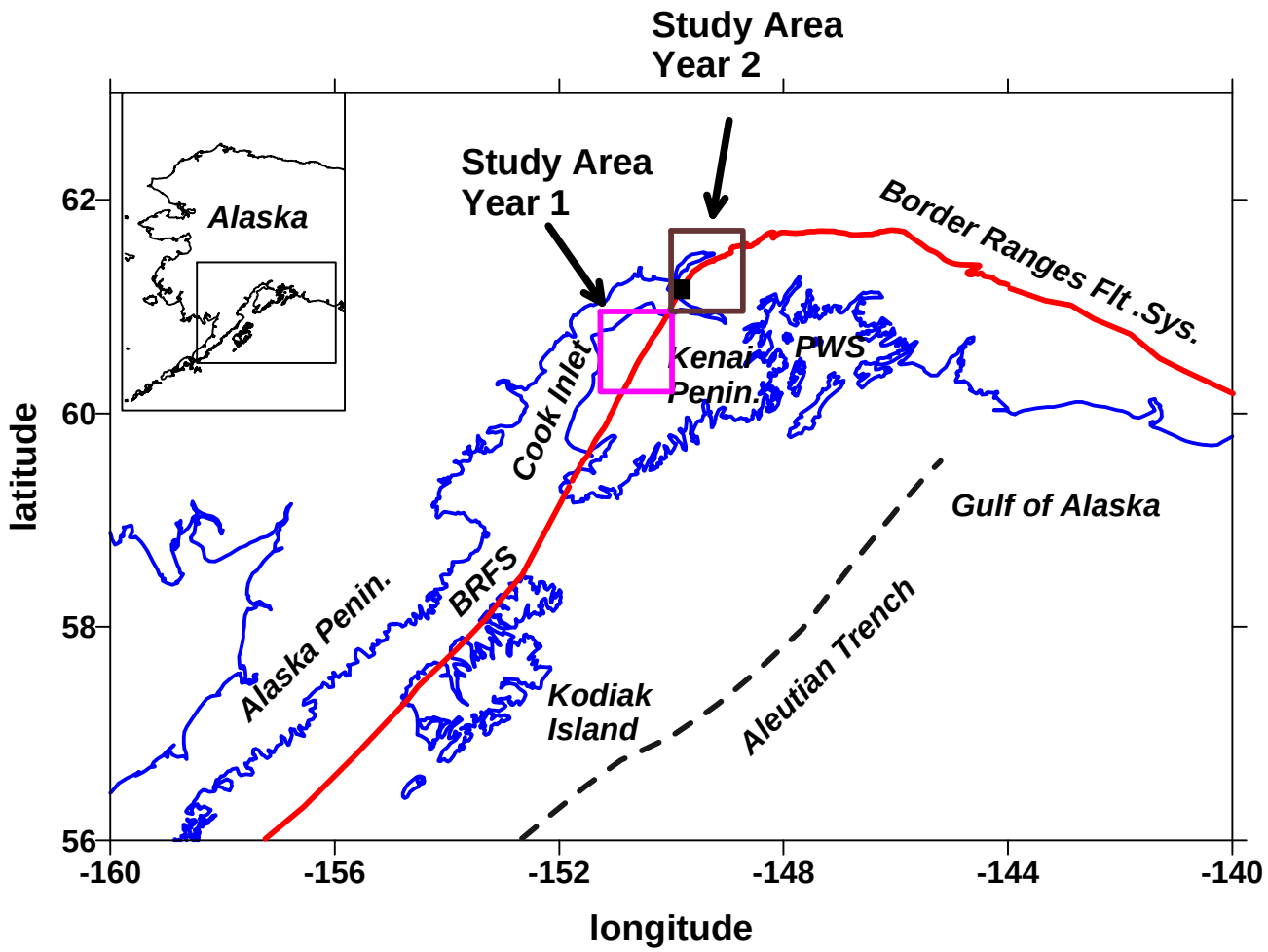
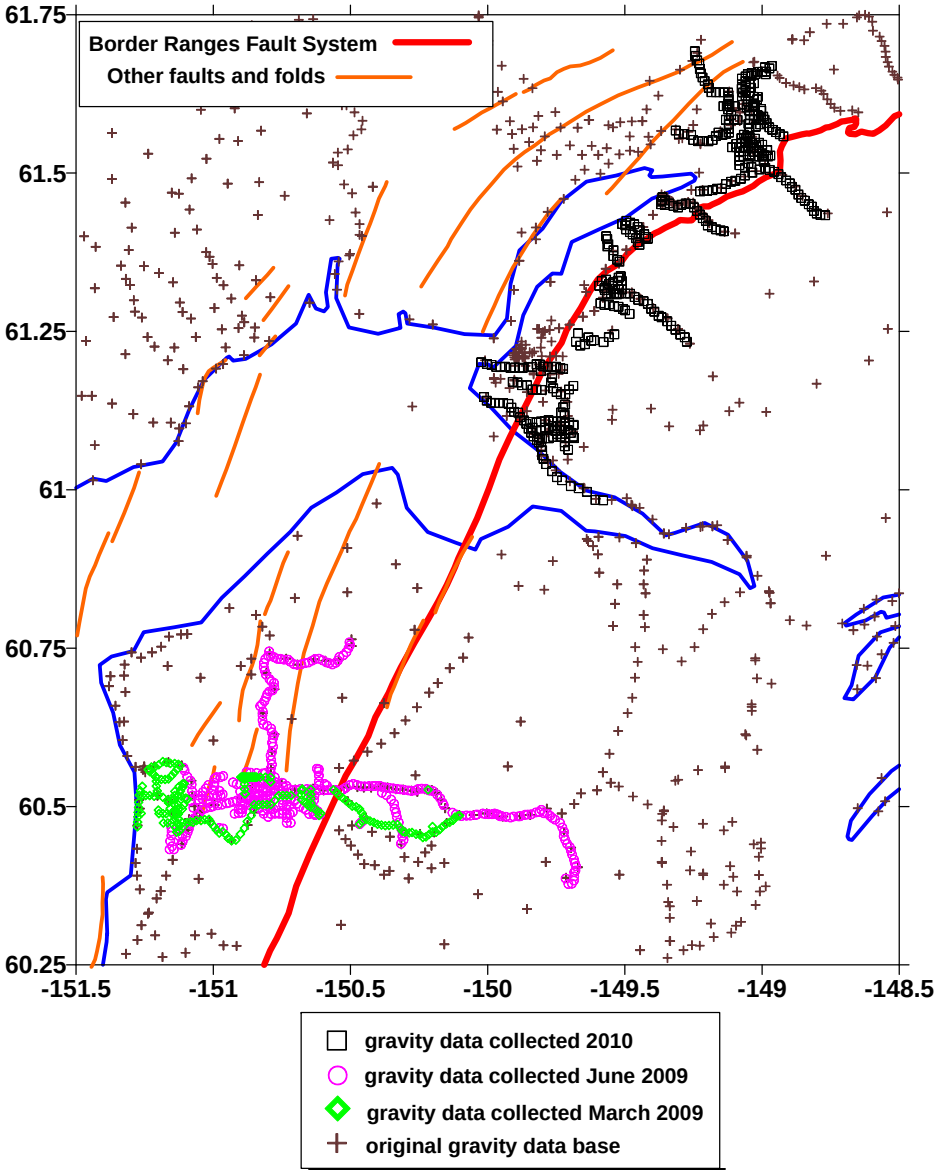
Significance

- The Border Ranges Fault System (BRFS) bounds the major petroleum producing region of Cook Inlet Basin
- The geometry, timing, sense and amount of movement along BRFS and its influence on basin formation are poorly known
- We will test models of BRFS structure and basin evolution using a novel 3-D inversion of gravity and magnetic data

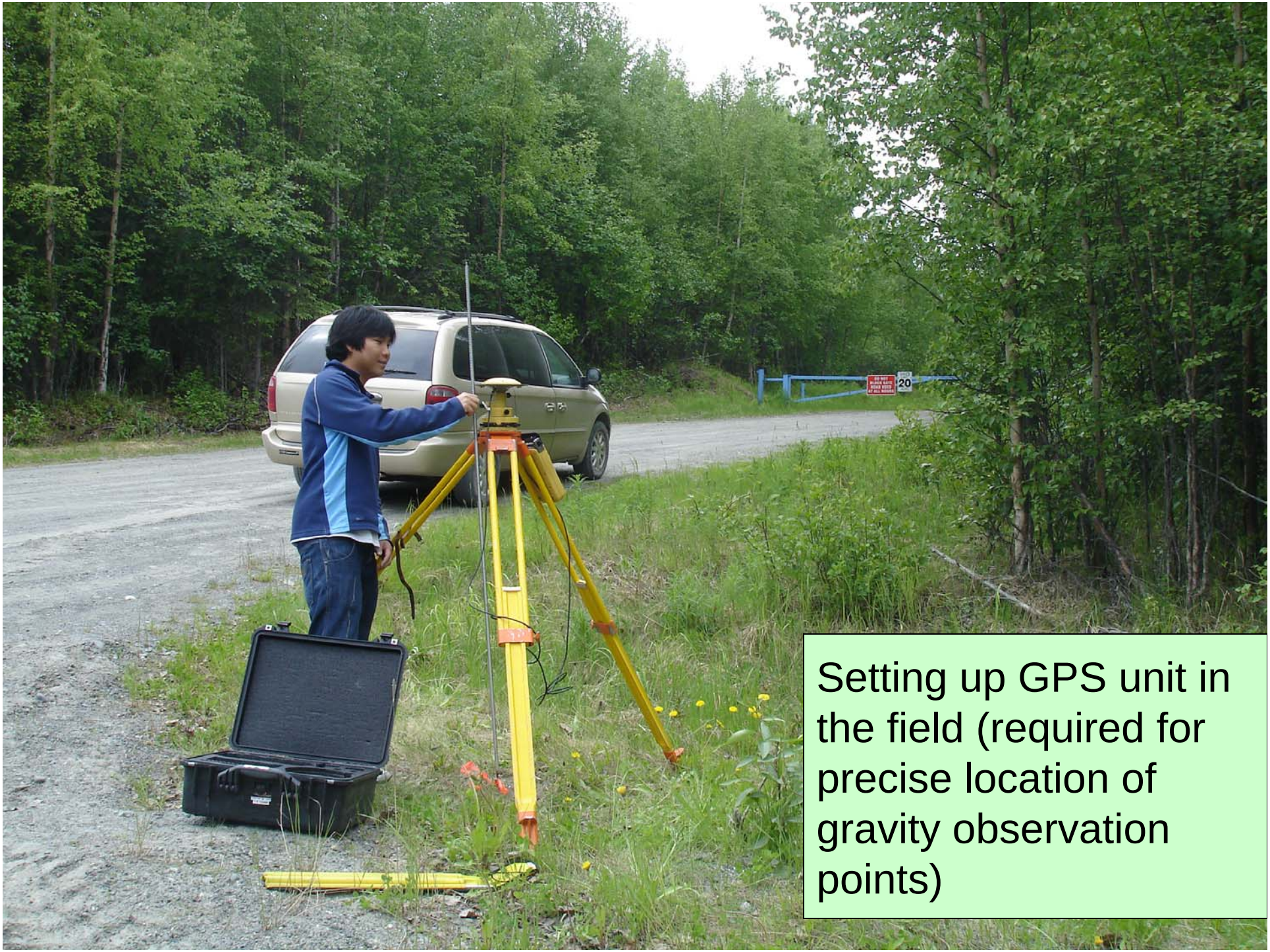


Red is BRFS. Boxes show study areas for years 1 and 2.

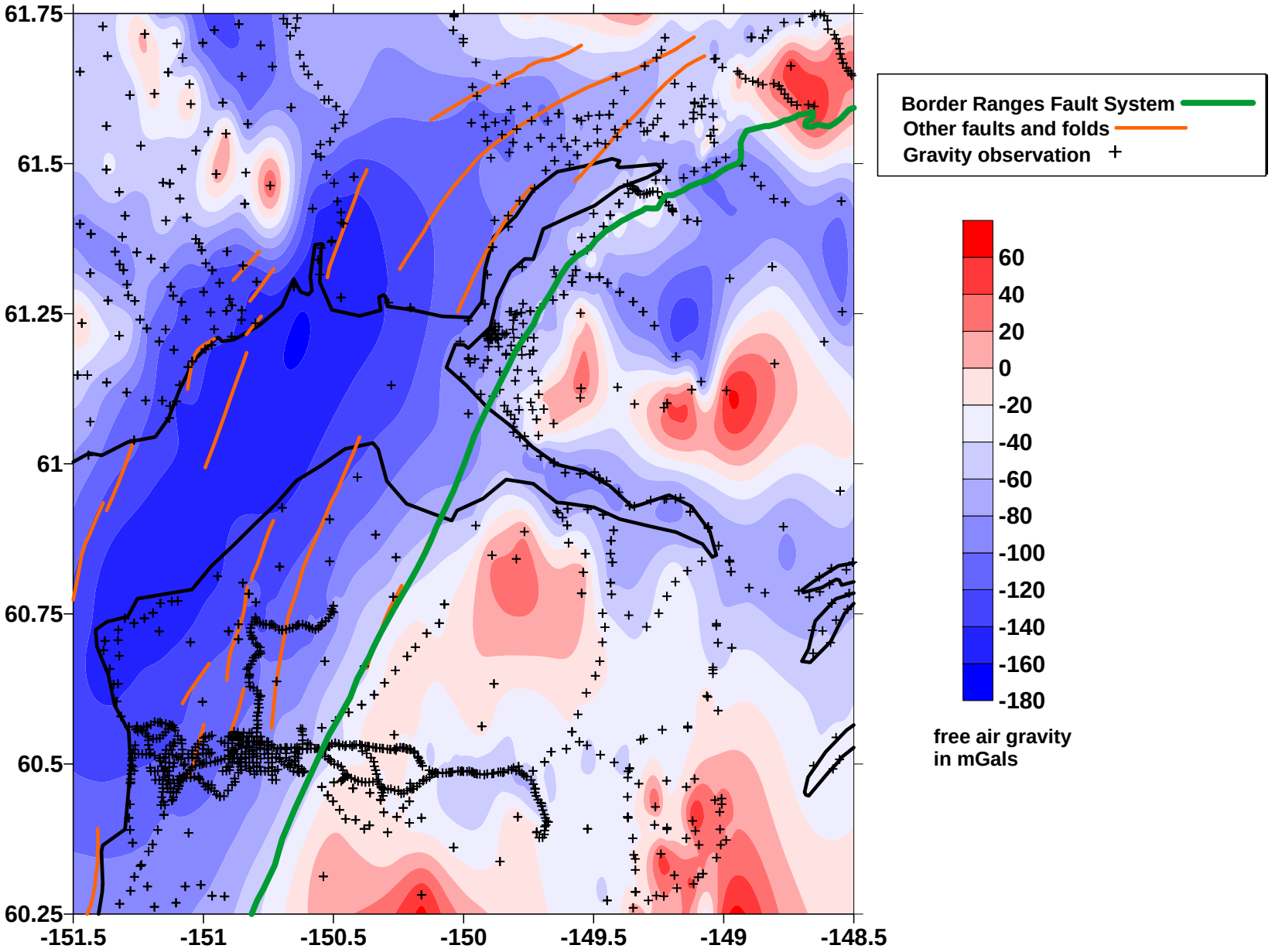
Black square indicates Anchorage.



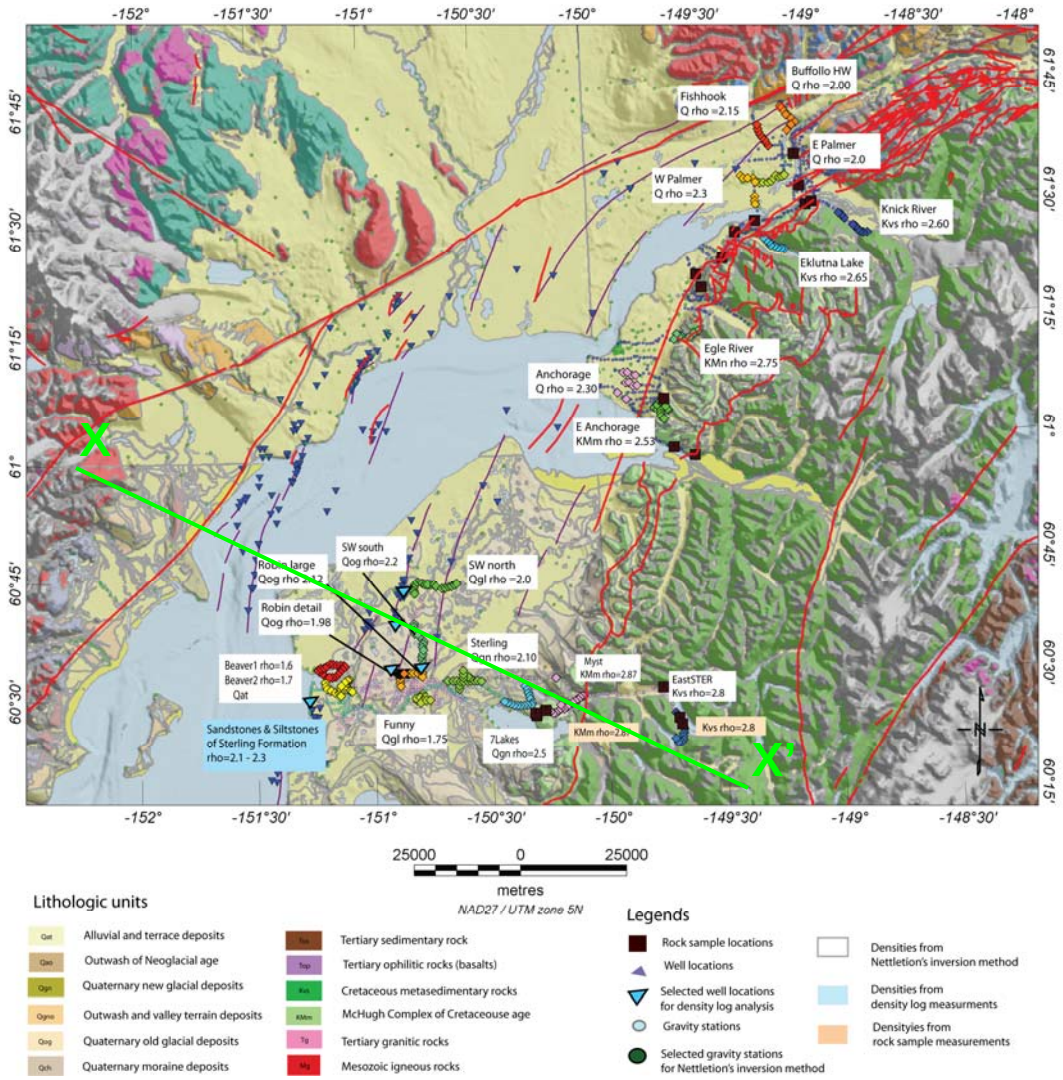
In 2009 and 2010 we collected over 800 gravity observations (green, magenta, and black symbols) to help constrain our models of the BRFS. Note sparseness of original data (brown plusses).



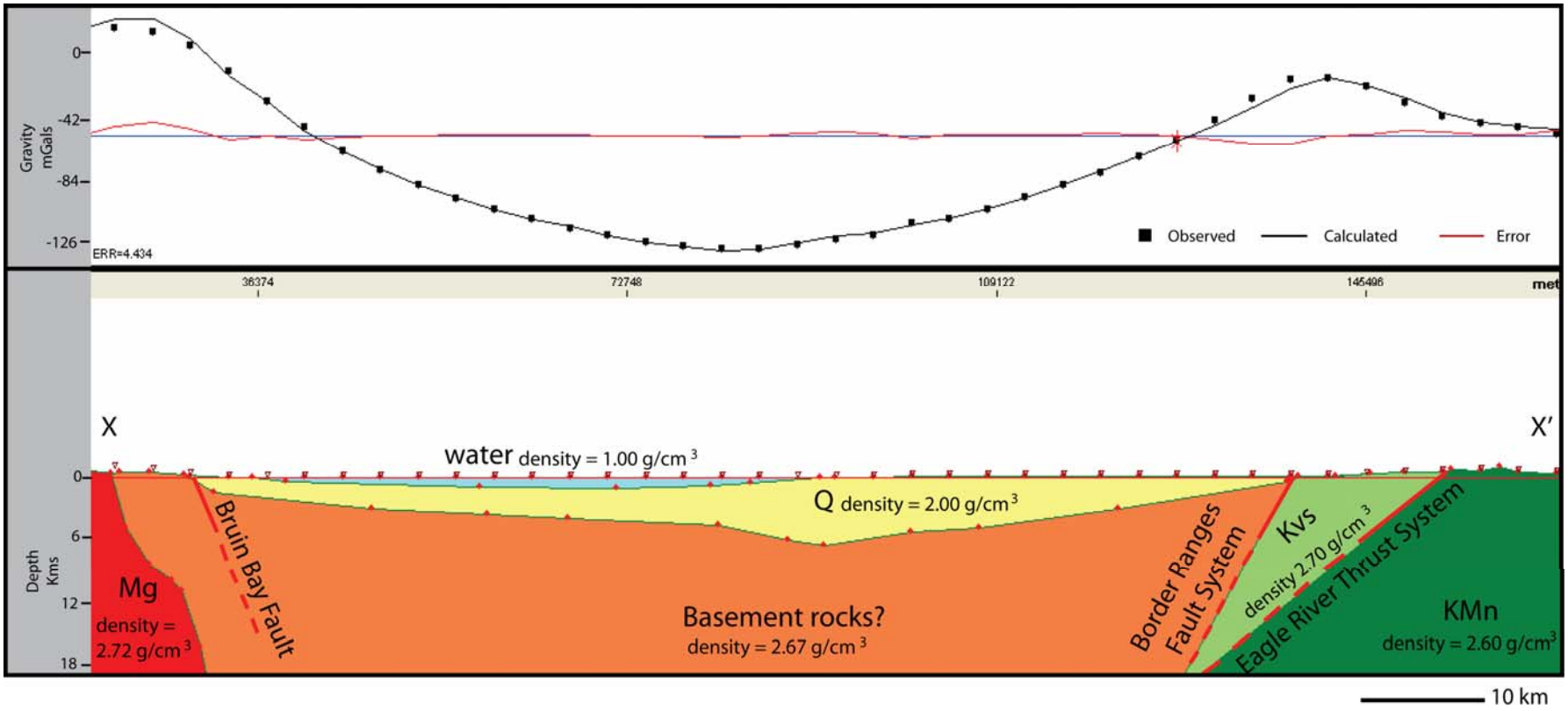
Setting up GPS unit in the field (required for precise location of gravity observation points)



Our latest map of variation in gravitational acceleration across the BRFS.



We have collected gravity observations in subregions to estimate variations in near-surface densities (white boxes). These are comparable to estimates from well logs (blue boxes) or surface samples (tan boxes). Geology/gravity cross section (green line) shown in next slide.



Cross section along X-X' (see previous slide) showing observed gravity (black dots), calculated gravity (black line) and error (red line). Preliminary geologic/density model shown below. Model is based on well log, seismic reflection, surface geology and other information.

Third Year Tasks

- Complete paper on inversion approach used to determine near-surface densities
- Conduct 2-D modeling of gravity data to aid in building 3-D model
- Build plausible 3-D models to test
- Complete testing of forward modeling code for magnetic data
- Complete and test inversion code
- Determine most viable models for the BRFS