

# From Rockies to Andes: learnings from the mountain fronts

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The Canadian foothills have been foundational in the development of seismic-imaging technology since Shell's discovery at Jumping Pound in 1944, which was the first use of seismic to image structures in a fold-and-thrust belt. This innovative tradition carried on over the decades, culminating in a dedicated industry-academic research consortium at the University of Calgary and Queen's University called the Foothills Research Project (FRP). FRP researchers were major contributors to the development of seismic imaging in complex-structure environments.

The FRP was an innovator in quantifying and correcting the effects of dipping anisotropy in the complex-structure clastic overburden of the Canadian Foothills. Seismic wave propagation through dipping anisotropic strata results in lateral-position errors and blurring of seismic reflectors below these strata. Correcting these effects resulted in more geologically accurate shapes and improved imaging of subsurface reflectors. This was one of those rare times when technology for land seismic imaging was ahead of marine technology.

The integrated approach of the FRP included structural geology and geophysics

- Structural geology
  - field mapping of folded and faulted structures
  - physical modelling of compressional structures
- Geophysics
  - scaled physical seismic modelling
  - refraction and VSP surveys to quantify seismic anisotropy
  - TTI anisotropic model building and migration

After a brief introduction of the technology development at the FRP, data examples from the Rockies and the Andes illustrate seismic-imaging issues in these mountainous areas and demonstrate the importance of the research contributed by the FRP.