

**Geoscience BC**



NECHAKO BASIN



**2008 Nechako Seismic Survey:
A Regional Survey in a Volcanic-Covered Basin**

**NECHAKO BASIN:
ONGOING GEOSCIENCE BC-FUNDED PROJECTS**

2008 Nechako Seismic Survey: A Regional Survey in a Volcanic-Covered Basin

In July 2008, Geoscience BC (GBC) initiated a Vibroseis seismic reflection survey in the northern Nechako Basin in British Columbia. This seismic reflection survey was the first seismic work to be carried out in the area since Canadian Hunter's (CH) work in the 1980's.

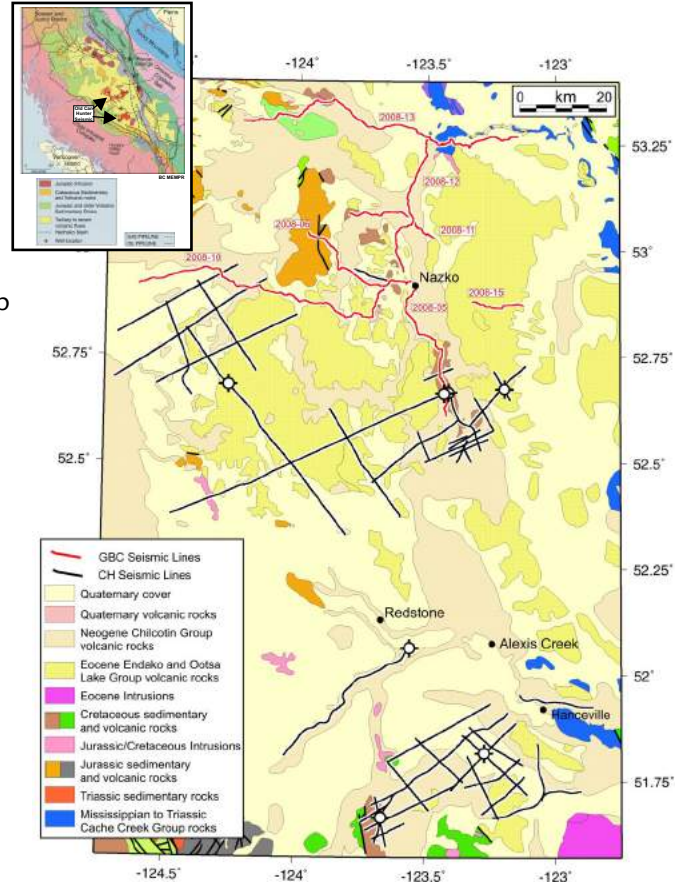
The 2008 GBC survey focused on:

- Maximising source effort
- Low frequencies for transmission through volcanics
- Small VP interval for high near-surface fold to project reflections to outcrop
- Long offsets for first arrival tomography to basement
- Extended correlation of long upsweep to recover deep reflections
- Vibroseis survey recorded along existing logging roads to reduce cost
- Coincident seismic and magnetotelluric profiles

Key results include:

- Reflections often recorded as shallow as 100 m
- Lower crustal reflections recorded across entire survey indicating good signal penetration through volcanic cover
- New interpretation of Cretaceous section
- Northern Cretaceous sub-basin identified
- Different seismic-magnetotelluric signatures for main lithologies

Data (structure stack and migration files in SEG Y format) and plots will be available soon from Geoscience BC (www.geosciencebc.com). For further information contact Andrew Calvert (acalvert@sfu.ca)



Acquisition Parameters

| | GBC 2008 | CH 1980 |
|-----------------------------|-----------------|-----------------|
| Source interval | 40 m (half stn) | 100 m |
| Receiver group interval | 20 m | 50 m |
| Geophone | 10 Hz GS32CT | 8 Hz L-15 |
| Array length | 6 over 20 m | 36 over 100 m |
| No. channels (split) | 960 (240/720) | 48 (24/24) |
| Max. Offset | 14390 m | 1350 m |
| Nominal fold | 240 | 24 |
| Fold at 1.0 s (est.) | 100 | 24 |
| No. vibrators | 4 over 60 m | 5 over 100 m |
| Vibrator weight | 24,000 kg | 7467 kg |
| No. sweeps per VP | 4 | 16 |
| Peak force (%) | 80 | 60-75 |
| Sweep + listen time | 28 + 6 s | 15 + 4 s |
| Sweep bandwidth | 8-64 Hz | 10-70 Hz |
| Field Filter | 200 Hz linear | 62 Hz |

Processing Parameters

| | GBC 2008 | CH 1981 |
|------------------------------|--|--|
| Refraction Statics | Tomostatics (1500m / 3000 m/s) | GLI (1500 m / 3000 m/s) |
| Amplitude Recovery | T**2.5 | T**1.2 |
| Surface Consistent Decon | 100 ms (S-R-L), pw=1.0% | 80 ms (S-R-L), pw = 0.1% |
| Spectral Balancing | No | 8-80 Hz |
| Trace Equalisation | AGC (window=500 ms) | Decon Gates |
| F-K Filter | No | Pass +/- 8 ms/tr |
| Residual Statics (2 passes) | +/- 60 ms, 500-5000 ms +/- 30 ms, 500-5000 ms | +/- 25 ms, 350-2500 ms +/- 17 ms, 300-2200 ms |
| Velocity Analysis (2 passes) | Coherency Spectra / CVS at 500 m | Coherency Spectra x 2 at 750 m |
| NMO and Mute | Floating Datum, 125% stretch | Floating Datum, T-X pairs |
| Trim Statics | No | +/- 8 ms |
| Stack | 240-fold | 24-fold |
| Time-Variant Filter | 0.0 – 18.0 s: 10/14 – 54/64 Hz | 0.0-1.8 s: 7/12 – 60/70 Hz 2.8-4.0 s: 7/12 – 40/50 Hz |
| AGC | 500 ms | 500 ms |

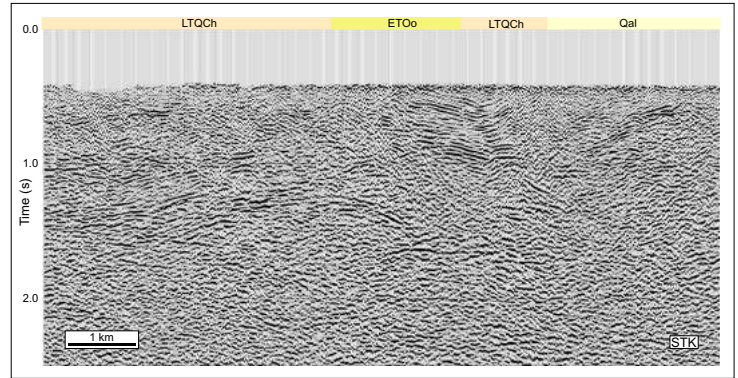
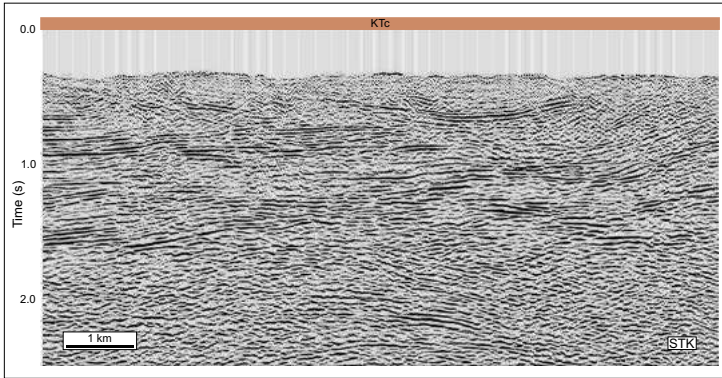


Comparison of Data from 2008 Geoscience BC Survey with 1980 Canadian Hunter Survey

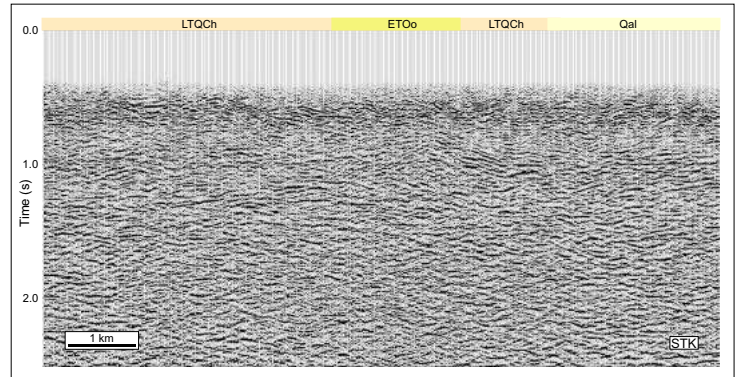
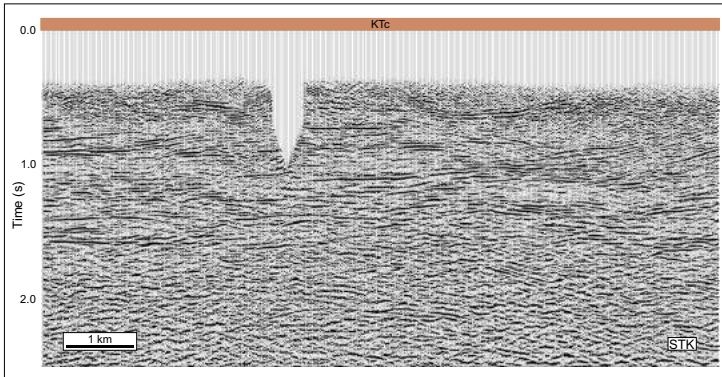
Cretaceous Sediments at Surface

Tertiary Volcanic Rocks at Surface

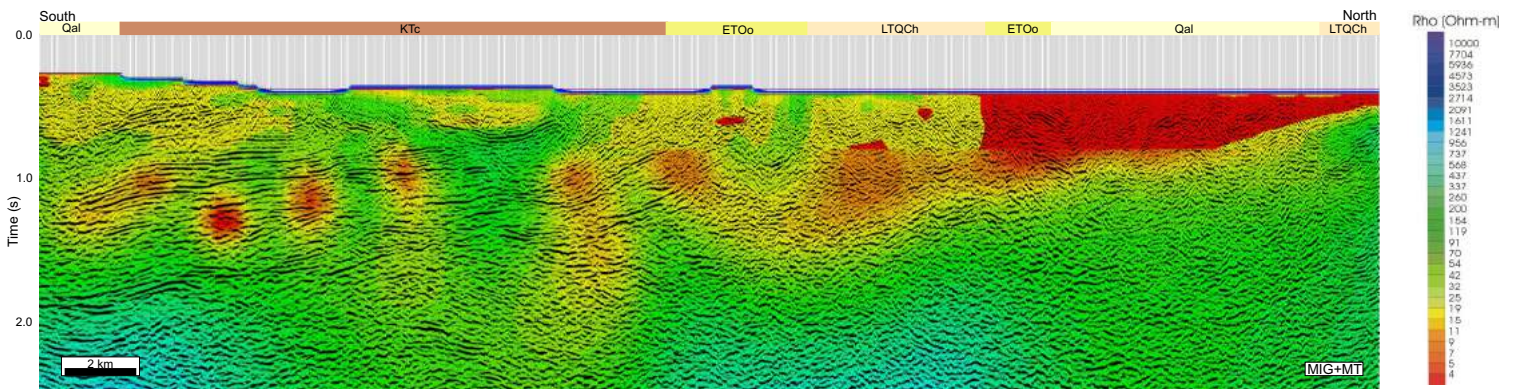
2008 Survey



1980 Survey



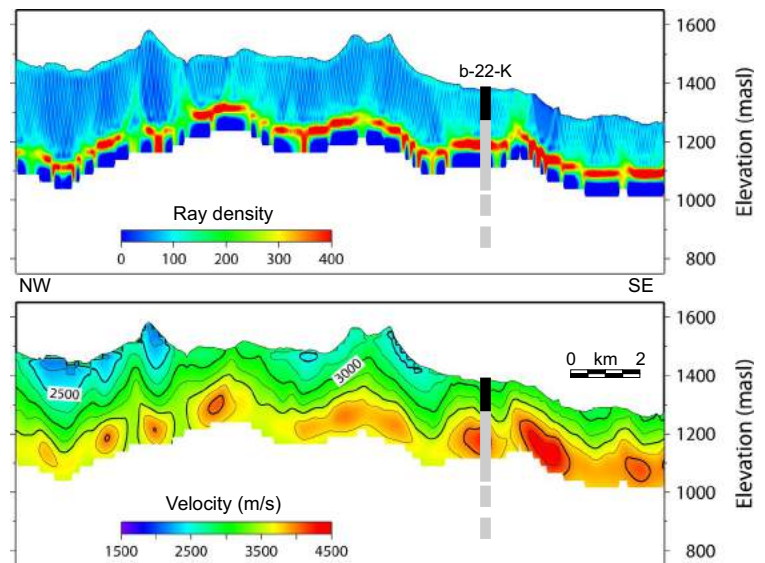
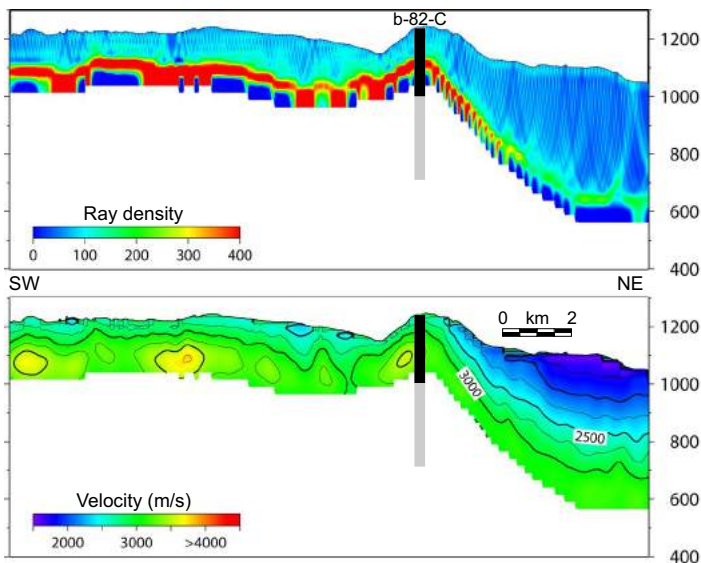
Coincident Seismic and Magnetotelluric Surveys



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In addition to the Nechako Seismic survey, Geoscience BC has continued to support geoscience partnership projects in the Nechako Basin, with five projects active in 2008:

- Integrated interpretation and first arrival tomography of reflection surveys in Nechako Basin (*Drs. Andrew Calvert and Nathan Hayward, Simon Fraser University*)
- Enhanced velocity structure from waveform tomography of seismic first arrival data: Application to the Nechako Basin (*Dr. Ron Clowes, University of British Columbia*)
- Stratigraphic Analysis of Cretaceous Strata flanking the Southern Nechako Basin: Constraining Basin Architecture and Reservoir Potential (*Dr. Peter Mustard, Simon Fraser University and Dr. Brian Mahoney, University of Wisconsin*)
- Magnetotelluric Profiles on the Nechako Basin (*Jim Craven and Jessica Spratt, Natural Resources Canada*)
- Mapping the Structure of the Nechako Basin Using Passive Source Seismology (*John Cassidy, Natural Resources Canada*)



First-arrival tomographic inversion models showing Ray Density and Velocity for seismic reflection sections: (a) CH-160-05. Heavy black line shows the extent of Eocene Endako Group volcanic rocks in well b-82-C. (b) CH-161-03. Heavy black line shows the thickness of Neogene Chilcotin Group volcanic rocks in well b-22-K. Figures courtesy of Dr. Nathan Hayward, SFU.

Geoscience BC is an industry-led, industry-focused not-for-profit society. Its mandate includes the collection, interpretation and marketing of geoscience data and expertise to promote investment in resource exploration and development in British Columbia.

Geoscience BC is funded through grants from the Provincial Government and works in partnership with industry, academia, government, First Nations and communities to attract mineral and oil & gas investment to BC.