

CREWES Project Work Plan for 2009

March 11, 2009

Research Areas (and lead researchers)

Imaging (Lawton, Ferguson, Bancroft, Margrave)
Numerical Modelling (Ferguson, Margrave, Lamoureux)
Physical Modelling (Lawton, Margrave)
Field Experiments (Lawton, Ferguson, Margrave)
Instrumentation (Lawton)
Data Processing (Bancroft, Margrave, Ferguson)
Interpretation (Lines, Lawton)
Passive Monitoring (Eaton, Lawton)
CO₂ Sequestration (Lawton, Ferguson, Margrave)

Imaging:

We have a strong imaging group and we will continue to innovate in this area. We will work towards the development of a 3D prestack imaging engine for anisotropic, heterogeneous media. The construction of PP and PS images of the highest possible fidelity is a first concern. This code will run on our newly deployed Linux cluster. Other important imaging topics include velocity analysis, topographic compensation, inclusion of statics, 2D thrust belt, and footprint suppression. Our immediate focus will be the use of this facility in time-lapse monitoring over essentially stratigraphic targets.

Numerical Modelling:

Modelling provides an important means to calibrate an imaging or inversion algorithm. We have developed a number of useful modelling tools and we wish to continue this. Modelling approaches that honour 3D elastic waves will be a priority. We have purchased a 3D elastic finite difference code and are evaluating it. Of special interest to us are the modelling of fracture-induced anisotropy, AVO in complex stratigraphic environments, the response of reservoirs after changes in fluids and pressure, and anelastic attenuation.

Physical Modelling:

Our new facility is running. We plan physical models of a buried channel, an HTI reservoir, and an anisotropic medium above a thrust sheet.

Field Experiments:

We plan a minimum of two seismic field experiments per year. We are presently conducting an experiment at the Priddis test site designed to measure the frequency dependence of Q in the near surface and to establish a benchmark line before the development of the Priddis testing facility. We will also continue our evaluation of the land streamer. Later this summer we will return to Priddis and further advance the test facility. In addition, CREWES will be involved with the Department geophysical field school and will gain data from this endeavour.

Instrumentation:

We are planning an experiment to test the possibility of extended bandwidth through a frequency-dependent gain. Such a gain setting is not currently available but we may be able to simulate the effects with a properly designed experiment. We hope to also evaluate the Blastmate calibrated 3C seismometer.

Data Processing:

We will continue work evolving Gabor deconvolution, concentrating on the surface consistent code and also on color correction and well log calibration. Coherent noise reduction, AVO analysis, residual statics, and velocity analysis all remain items of interest.

Interpretation:

The estimation of lithologies and pore fluids remains the key goal. We will continue with AVO analysis and regression approaches while also trying to move more towards geostatistics and inversion. We are keenly interested in the assessment of reservoir fracturing from surface seismic data.

Passive Monitoring:

A key component in our plans is to advance our passive monitoring capability. We plan to conduct experiments at Priddis using both surface and downhole phones to evaluate our ability to locate microseismic hypocenters.

CO2 Sequestration:

We are very excited to support the plans for a CO2 sequestration test and training centre at Priddis. We expect this to evolve a great deal this year and hopefully we will see the drilling of several 500 m wells and the installation of 600 3C phones in an areal patch (buried 2 m). Eventually, we plan to conduct controlled CO2 injection monitoring experiments using time-lapse seismic (surface and borehole).