Priddis 3D seismic survey and development of a training centre

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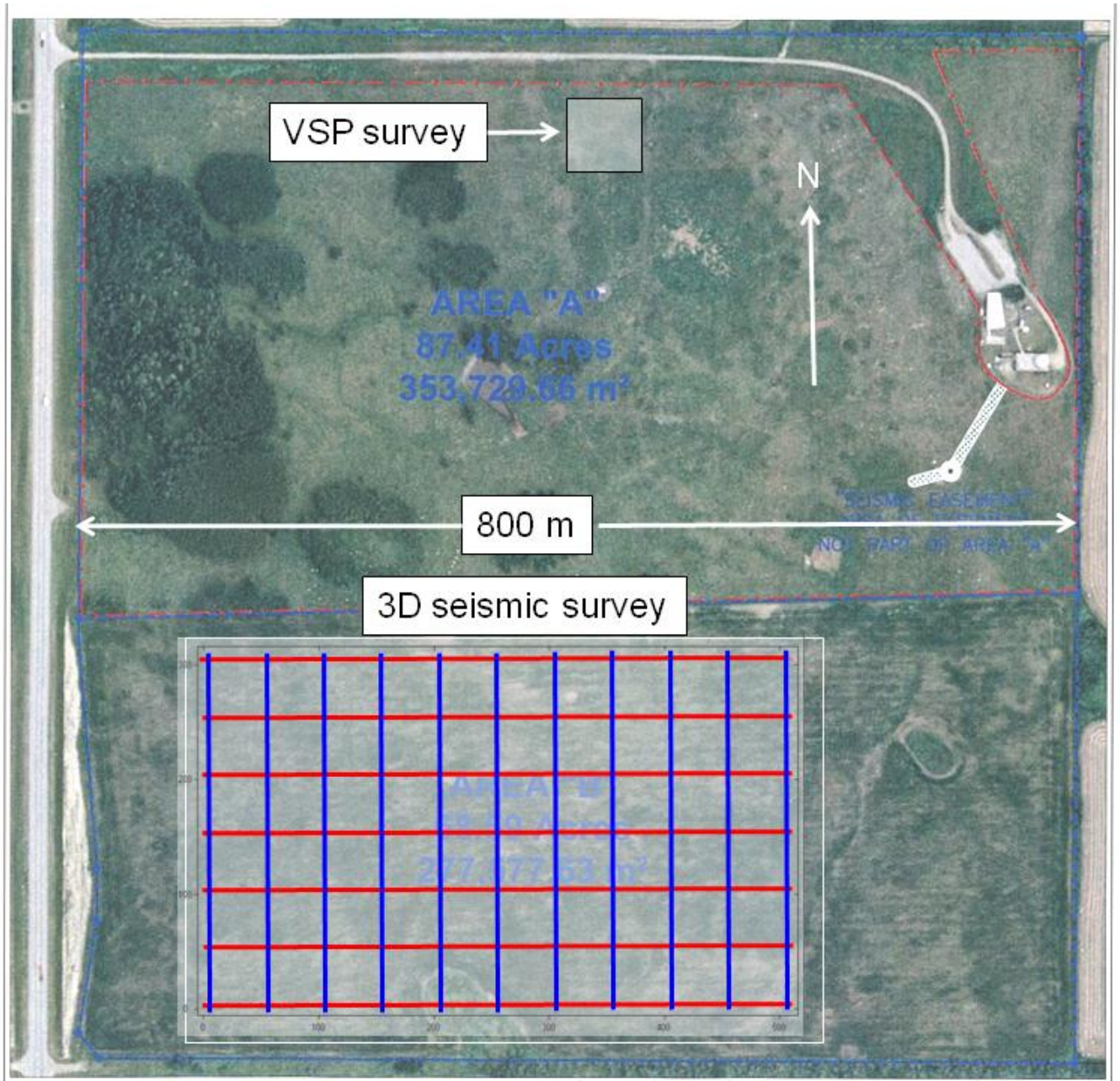
CREWES

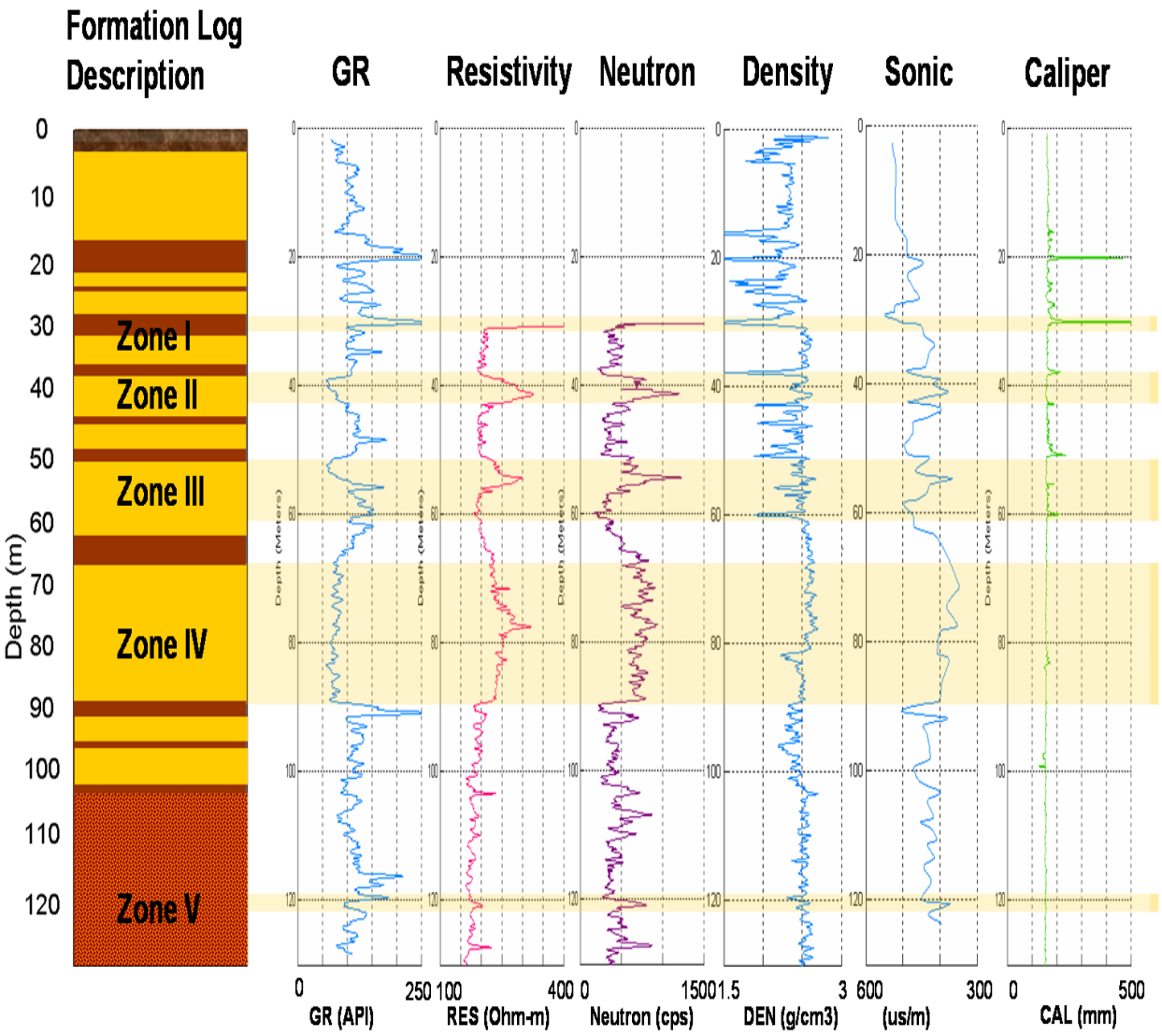
Objectives

- 3D seismic surveys for shallow targets
- Evaluate Envirovibe for 3D surveys
- Map aquifers
- Field School training in 3D acquisition
- Training centre
- New technologies

Survey location at Rothney Astronomical Observatory



Priddis well driller's report and well logs



Porous Zones	ϕ	Sw
I	0.58	0.12
II	0.42	0.56
III	0.5	0.44
IV	0.34	0.72
V	0.36	0.79

Joe Wong

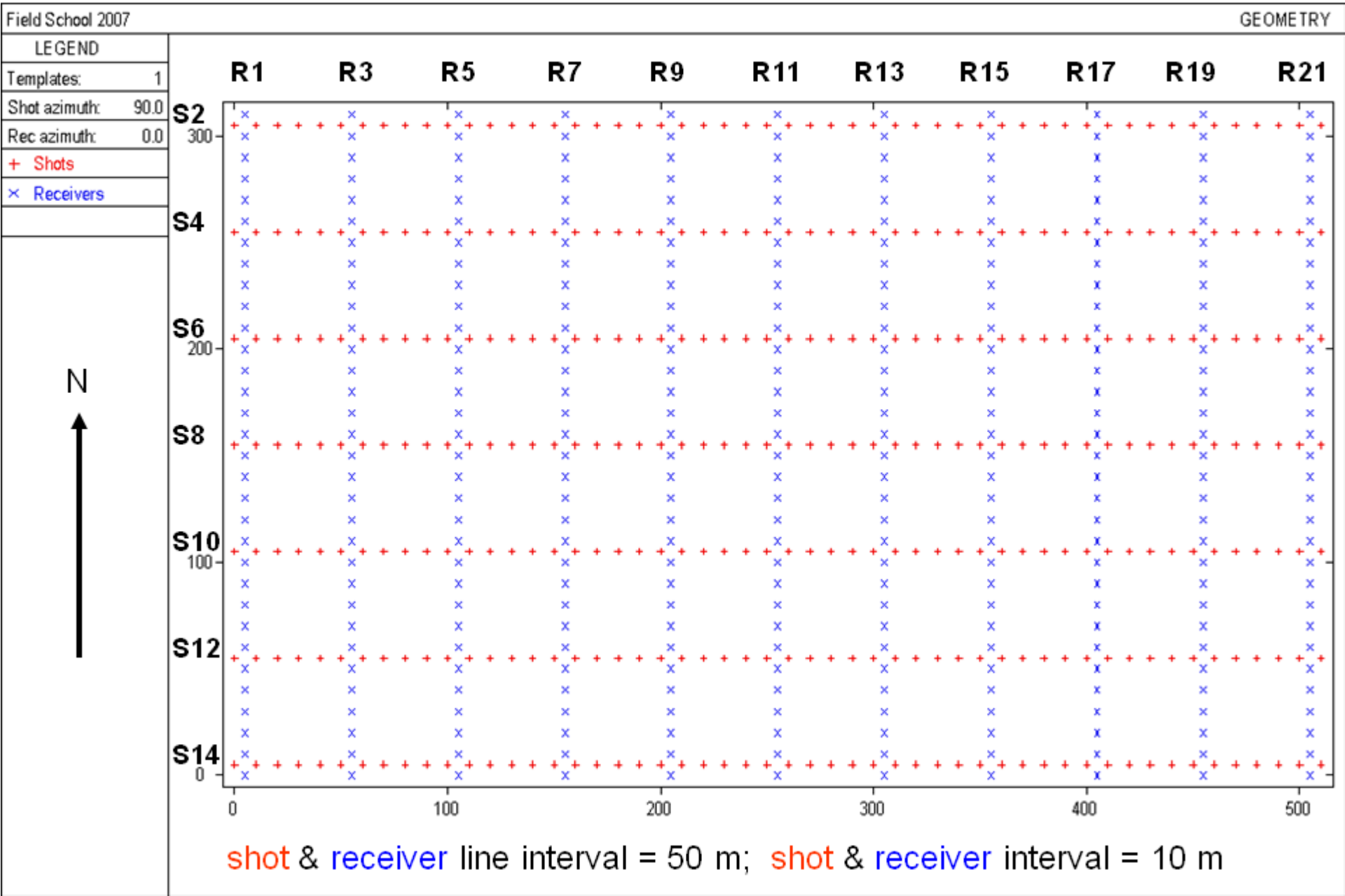
3D seismic survey parameters

Shot-line interval:	50 m
Shot interval:	10 m
Source:	Envirovibe 17,200 lb
Sweep:	4 x 10 – 180 Hz over 12 seconds

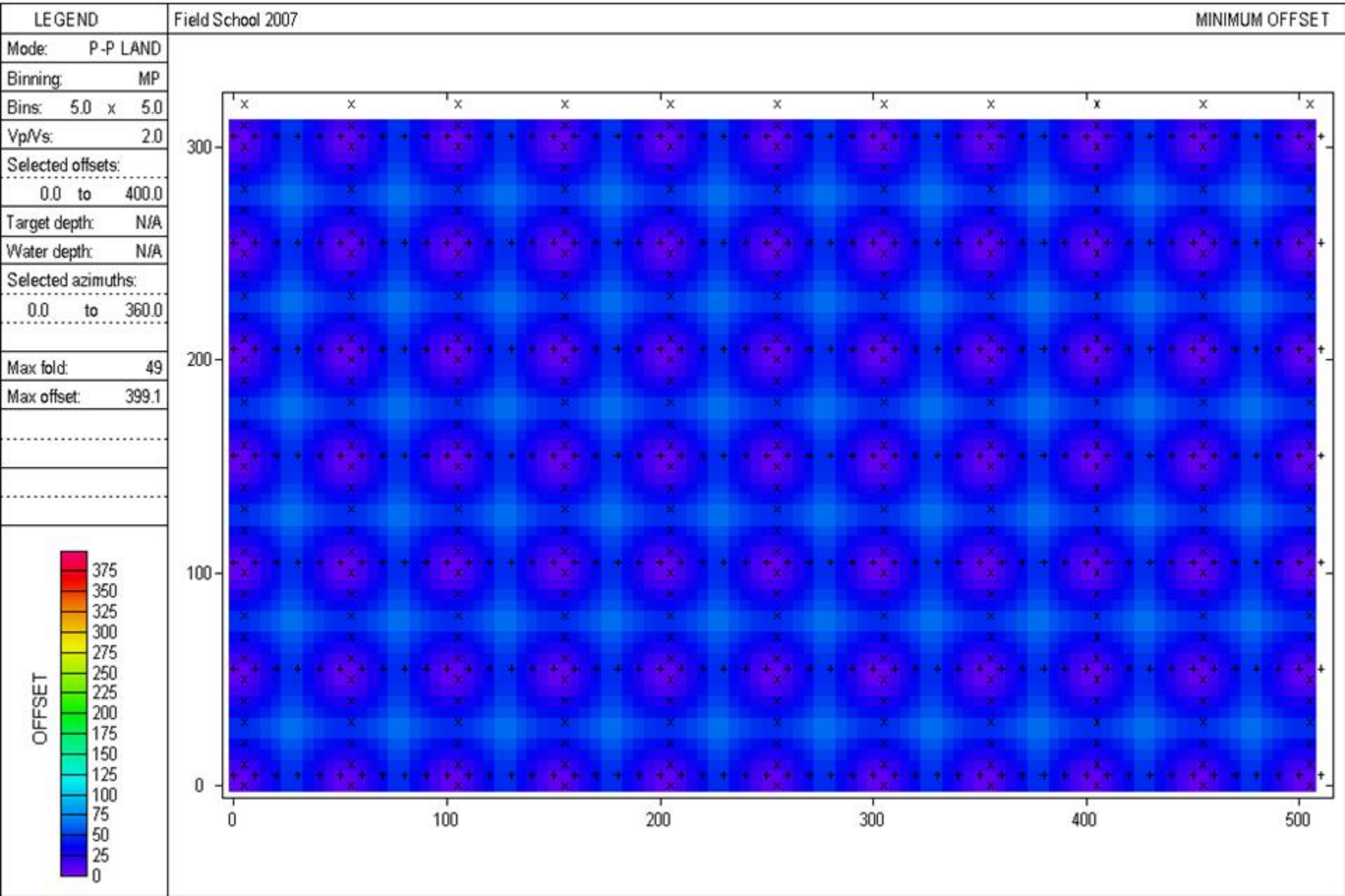
Receiver-line interval:	50 m
Receiver interval:	10 m
Receivers:	Single 10 Hz vertical component
	Single 10 Hz 3C (one receiver line)

Geometry:	Orthogonal design
Shot-lines:	East-west
Receiver-lines:	North-south

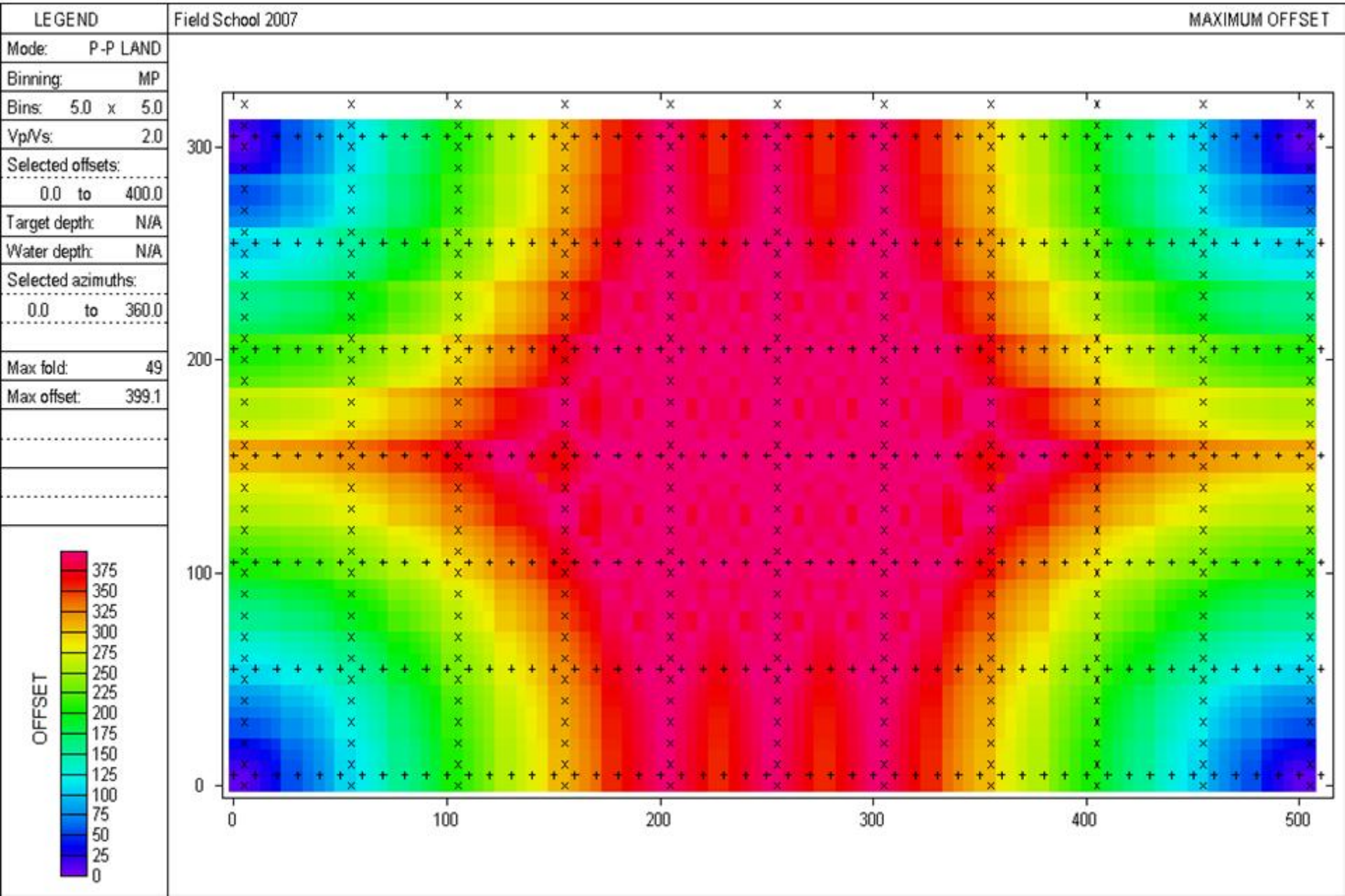
3D pre-survey geometry



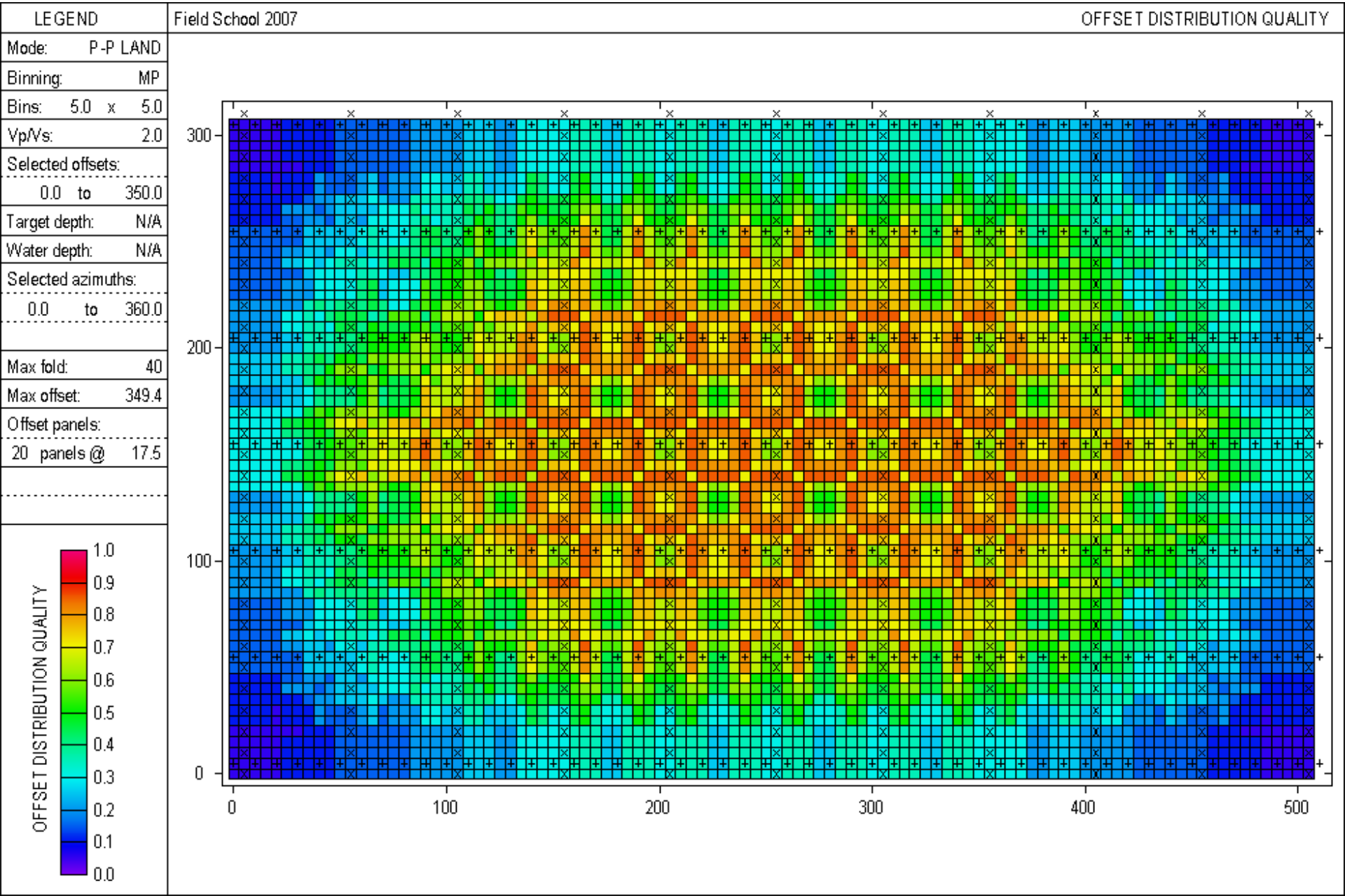
3D pre-survey near-offset distribution



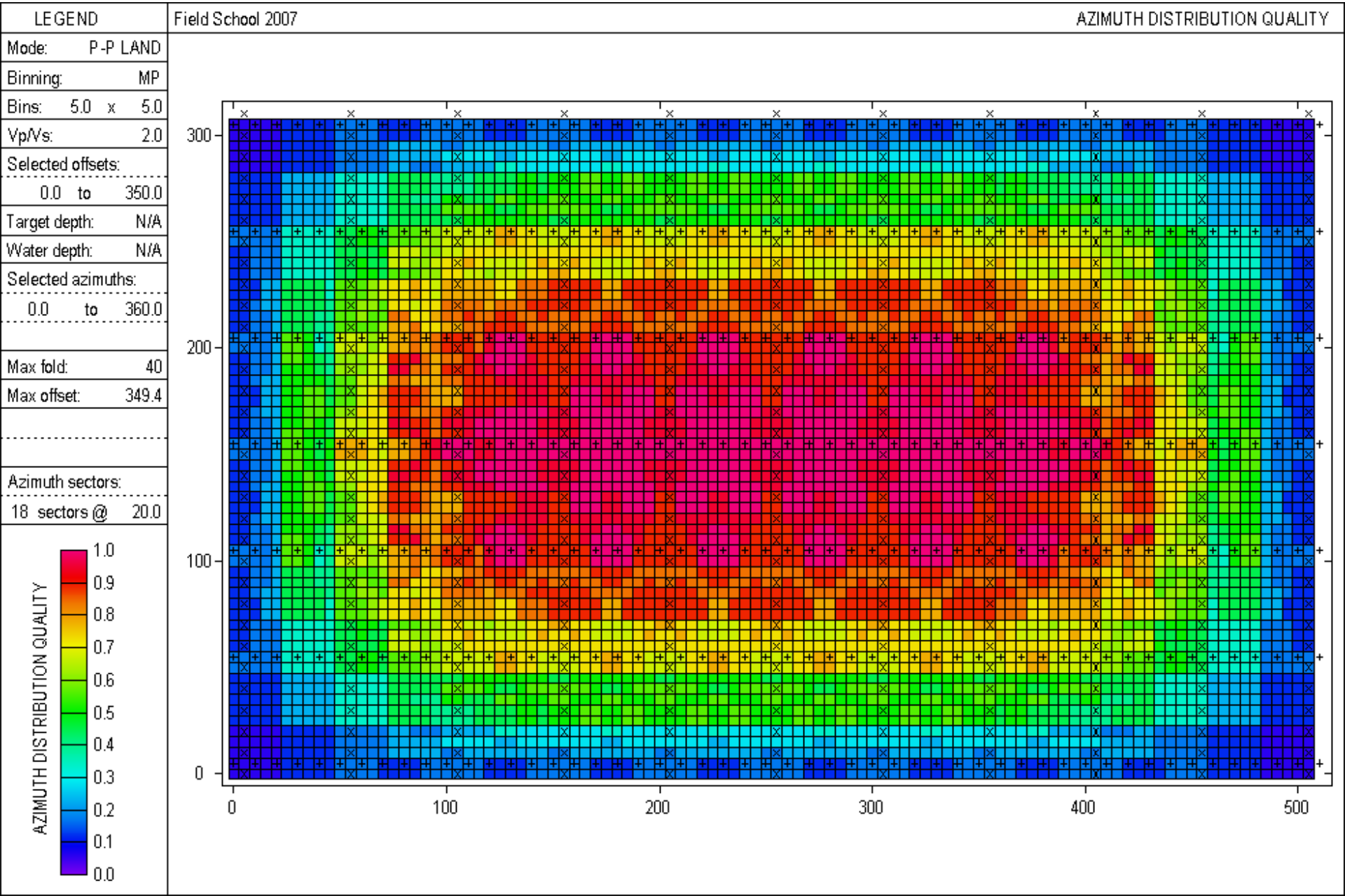
3D pre-survey far-offset distribution



Pre-survey offset distribution quality



Pre-survey azimuth distribution quality



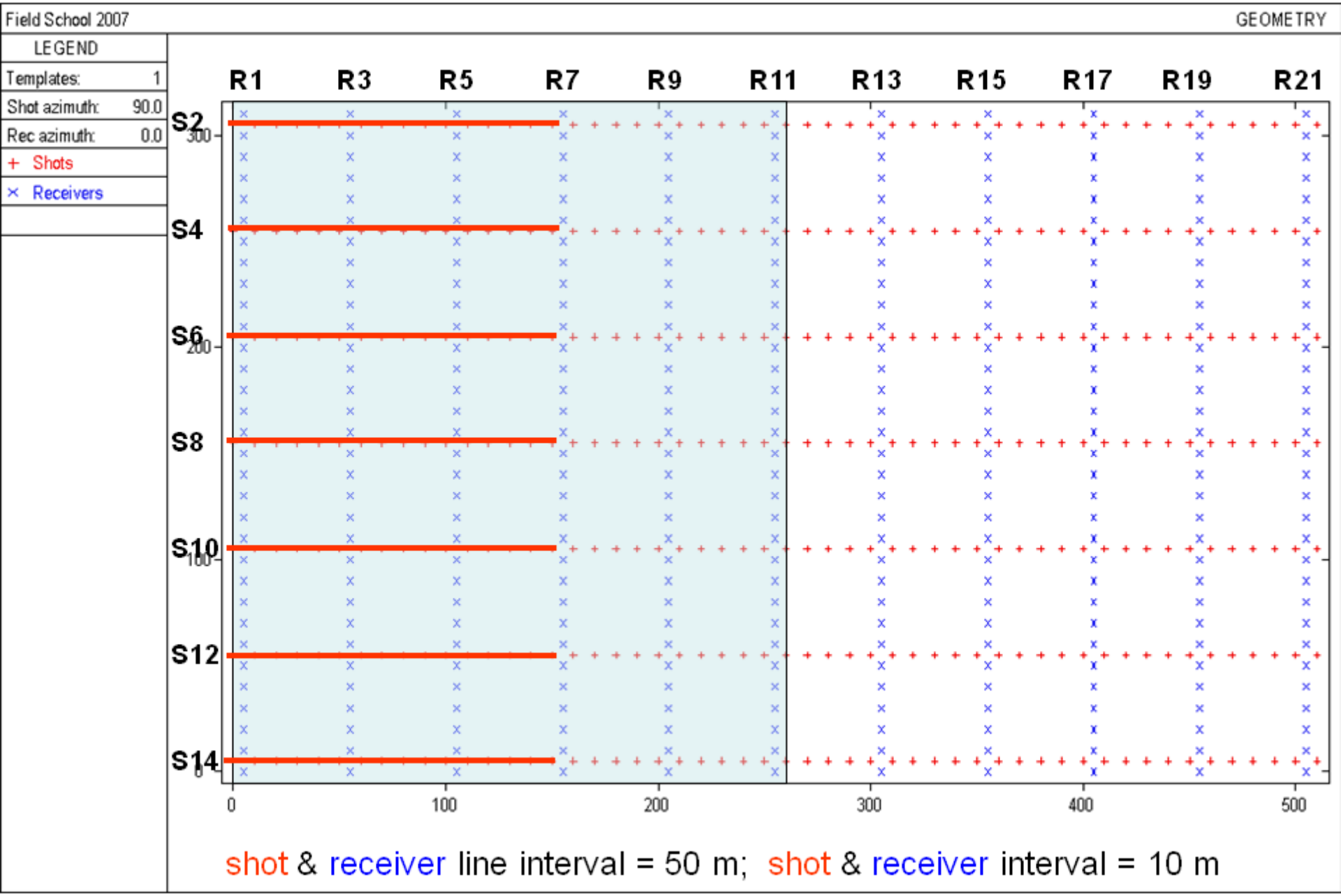
University of Calgary 17,200lb Envirovibe

Sweep: 10-180 Hz over 12 seconds, 4 sweeps per shotpoint

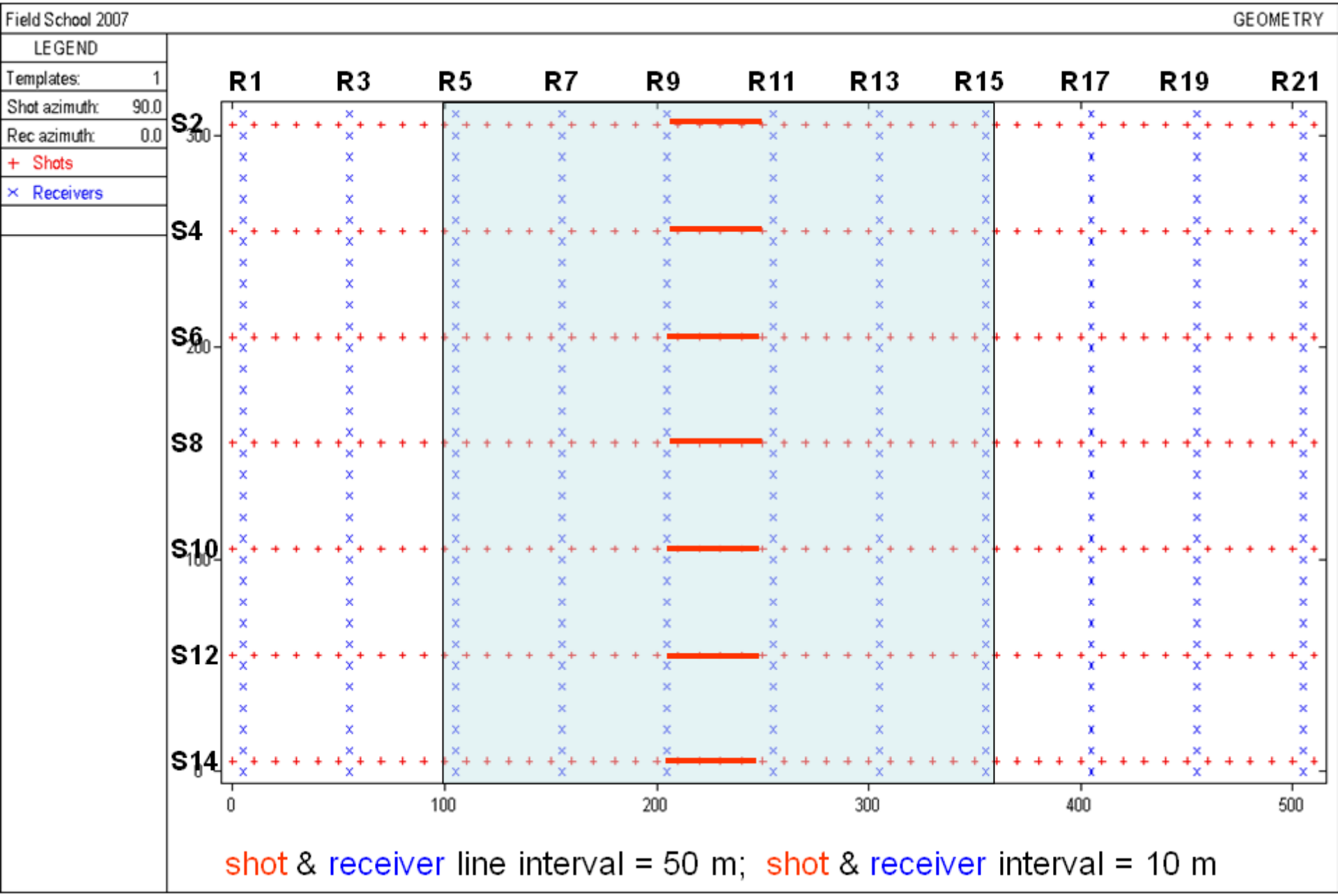
University of Calgary ARAM recording system

600 channels, upgrading to 1800 channels

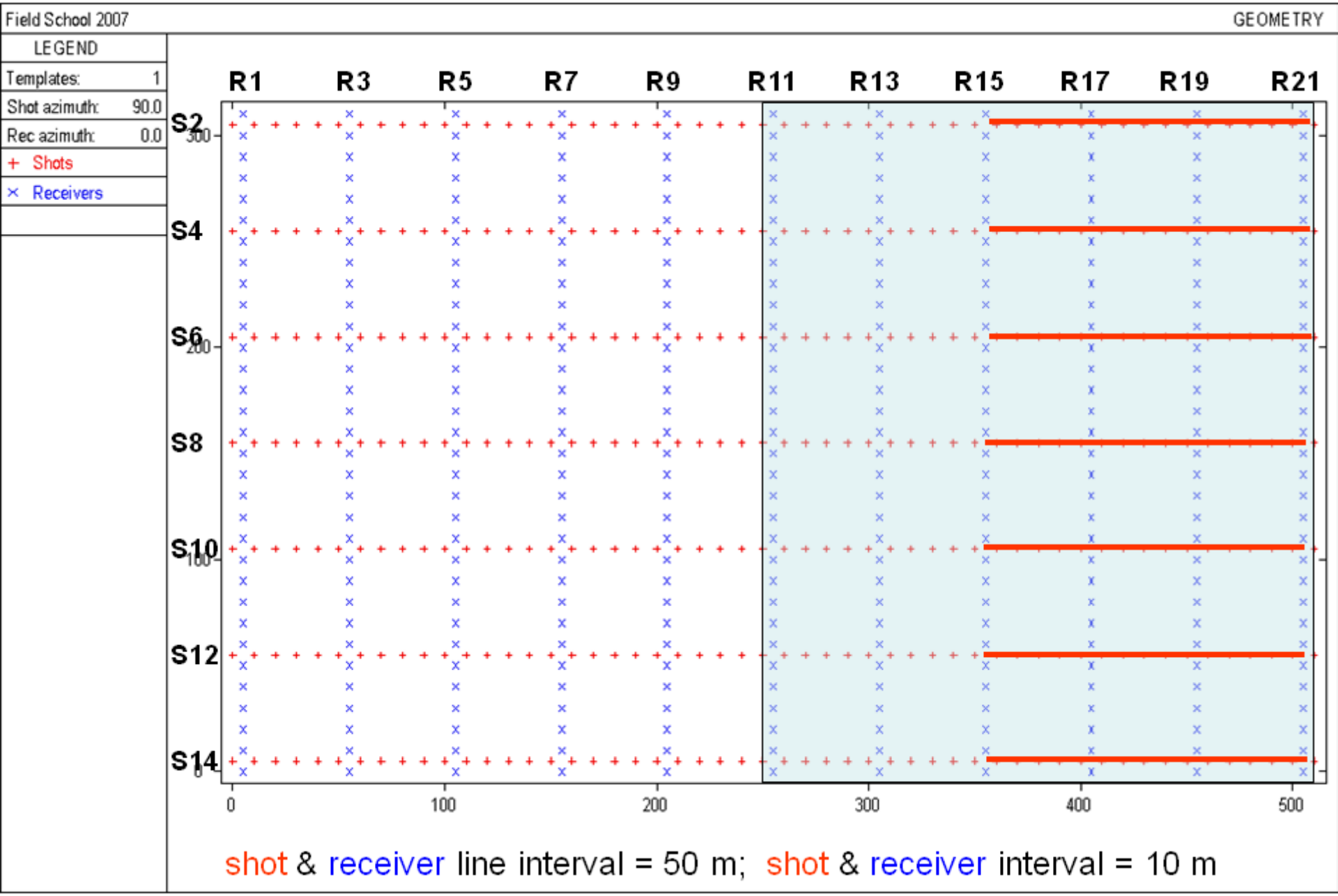
Recording patch #1



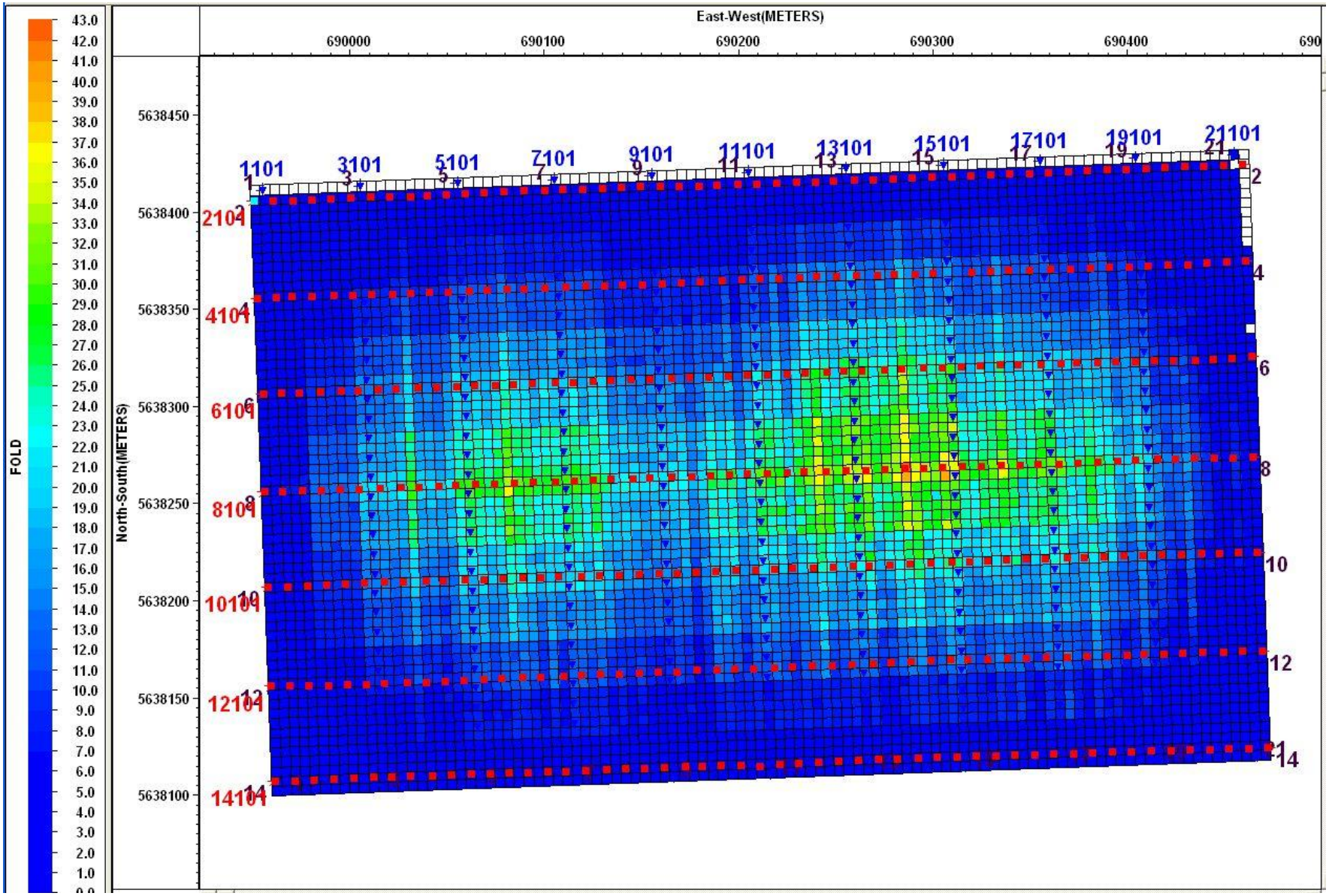
Recording patch #3



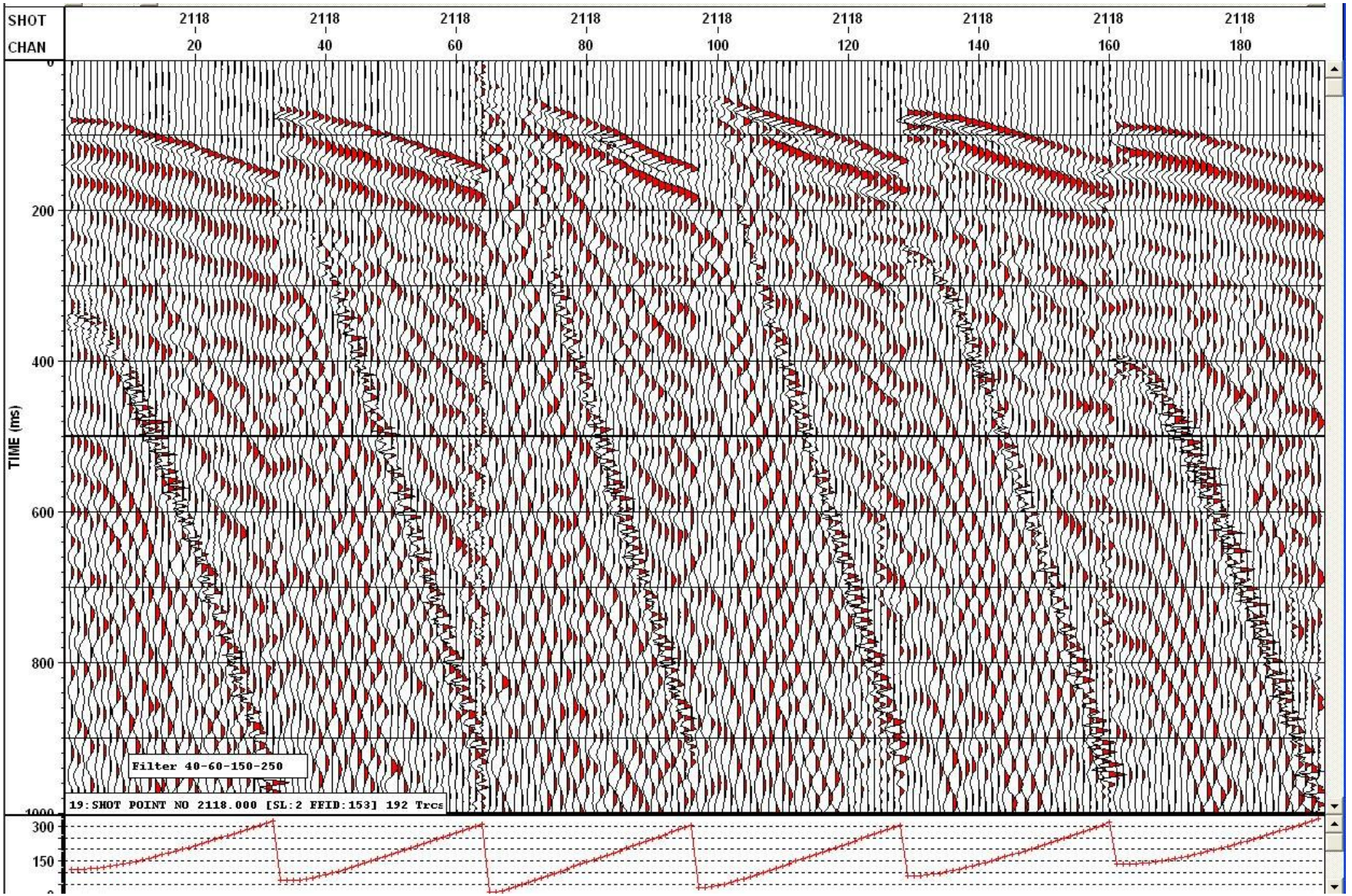
Recording patch #6



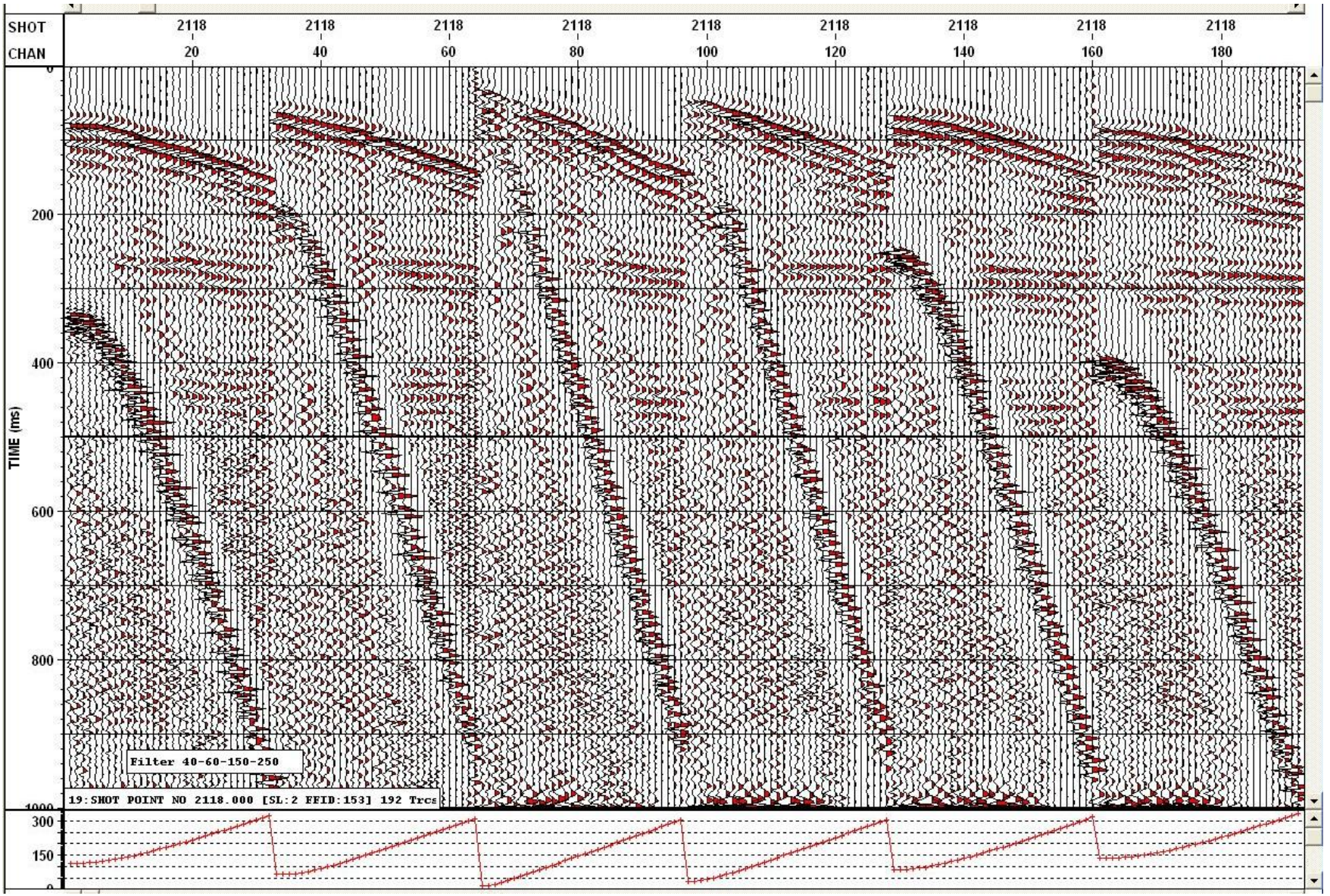
Post-acquisition fold



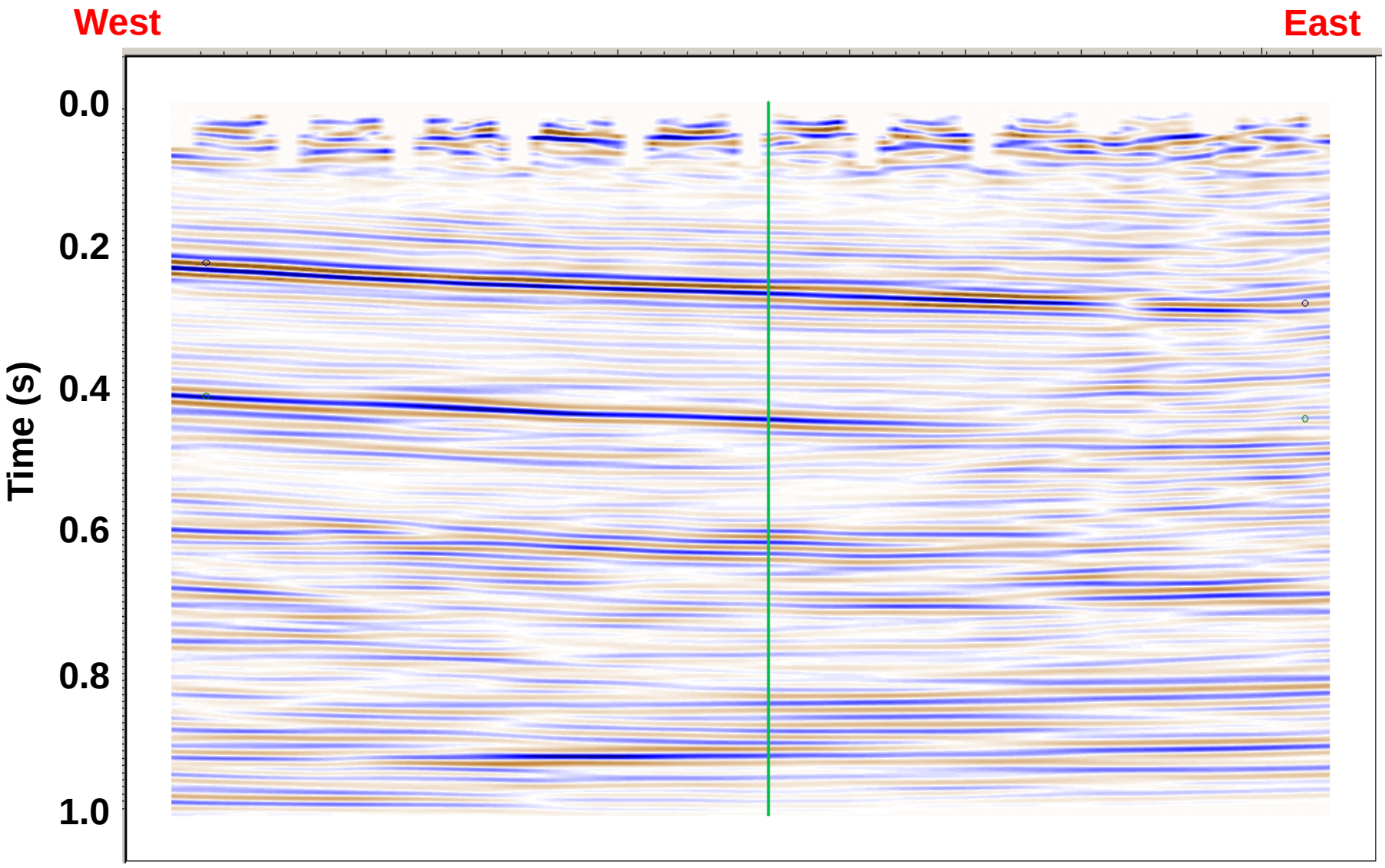
Raw shot gather (agc applied)



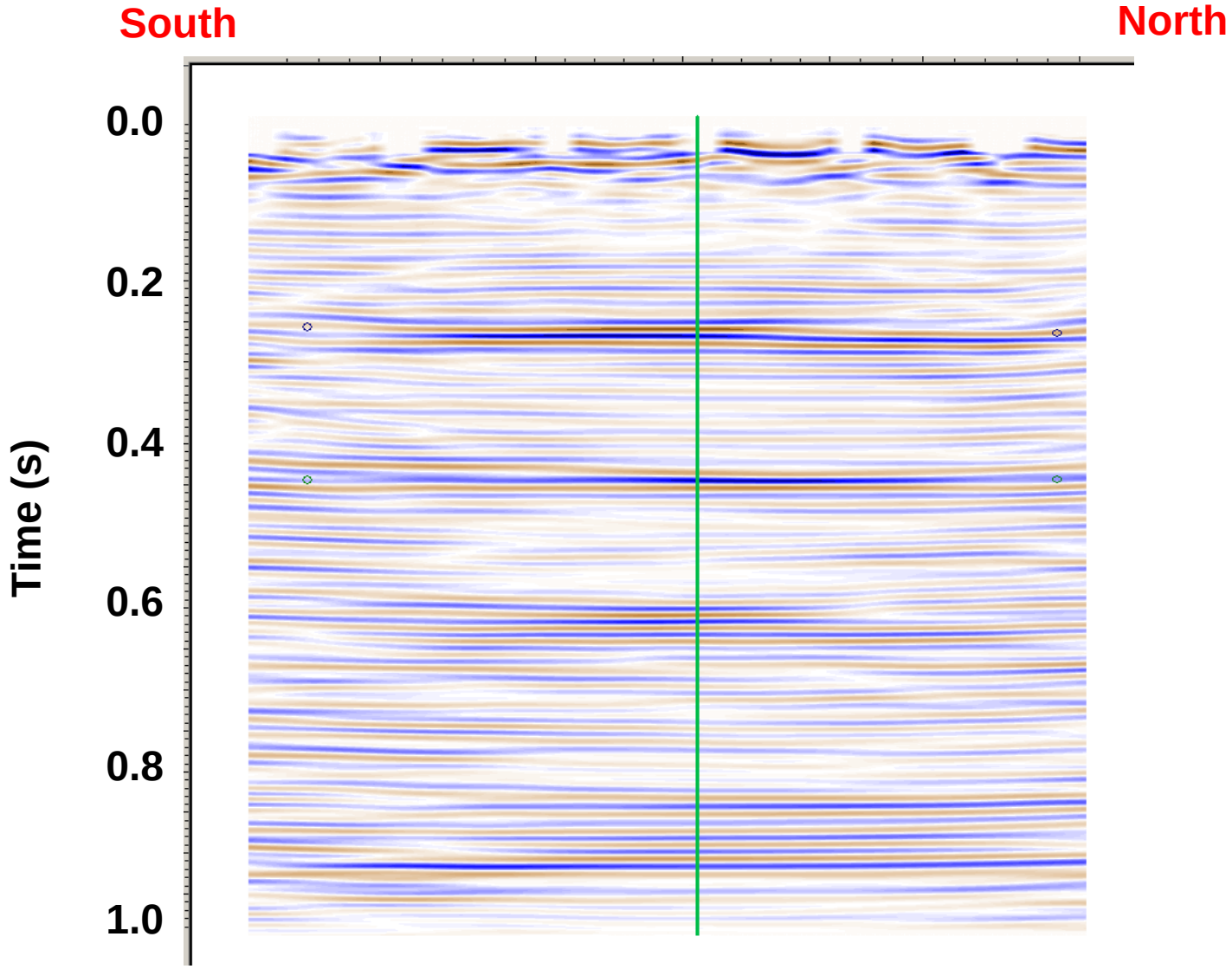
Shot gather (30-50-150-180 Hz filter)



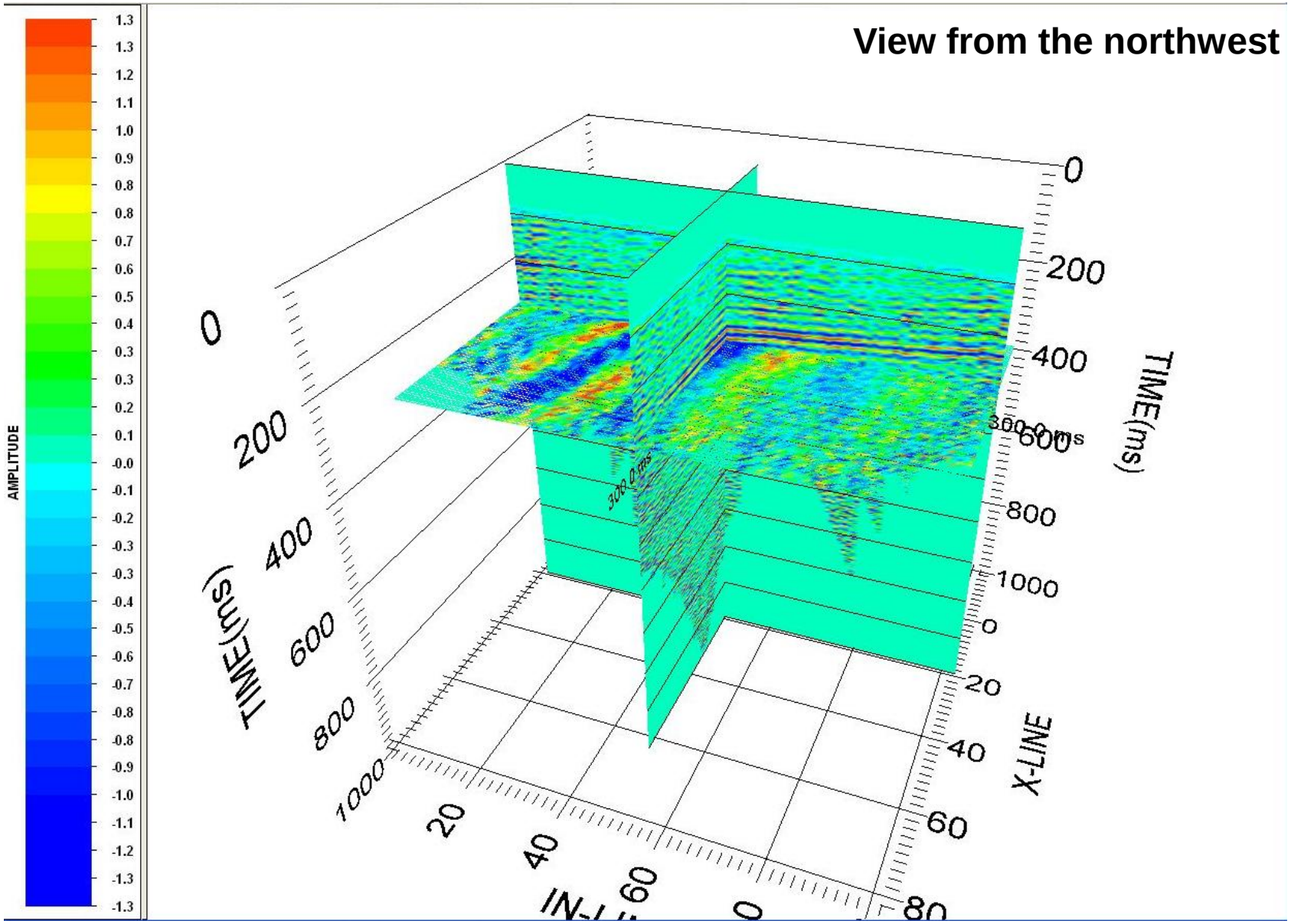
Cross-line from the 3D migrated volume



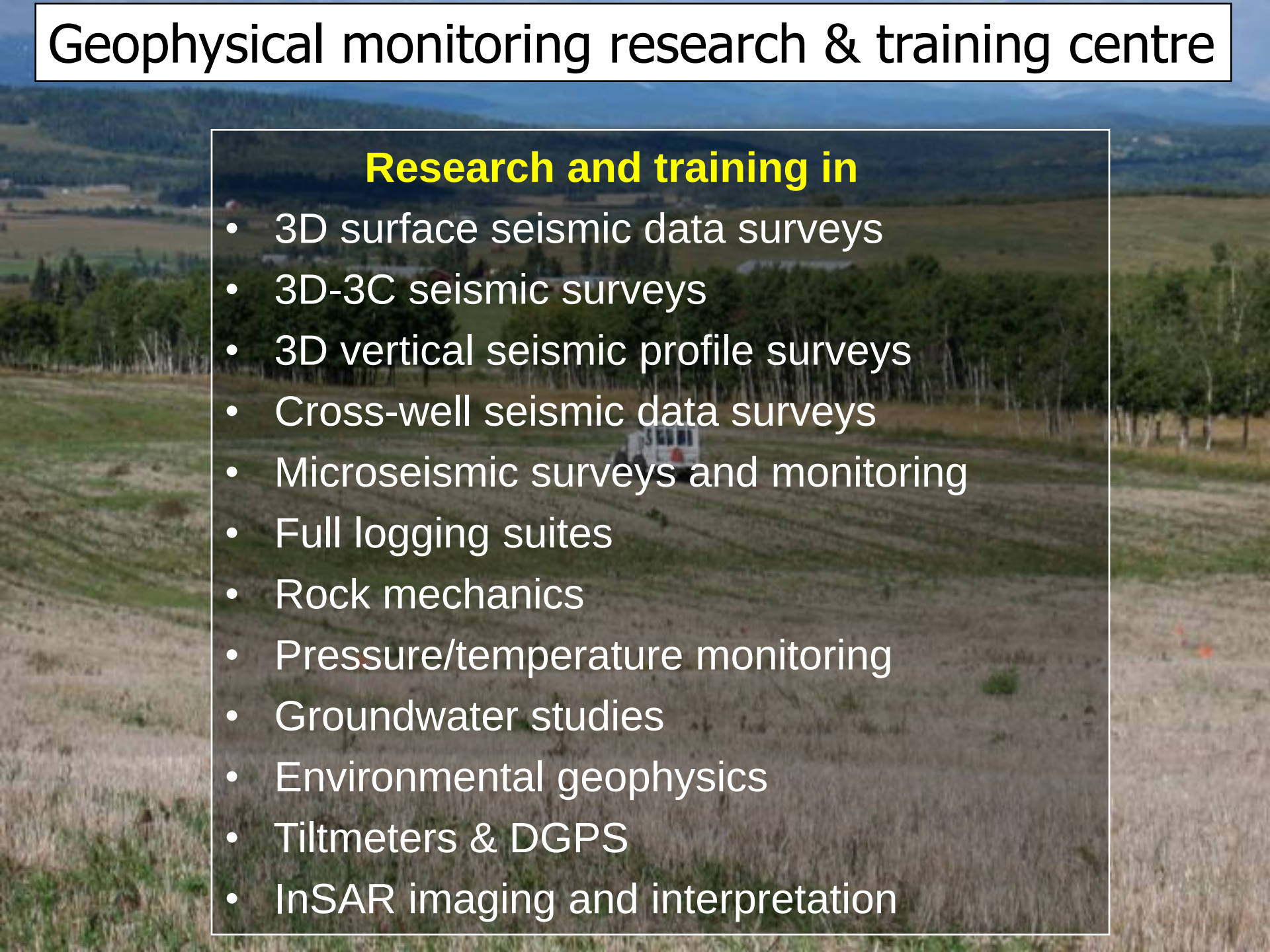
In-line from the 3D migrated volume



Fence diagram from the 3D volume

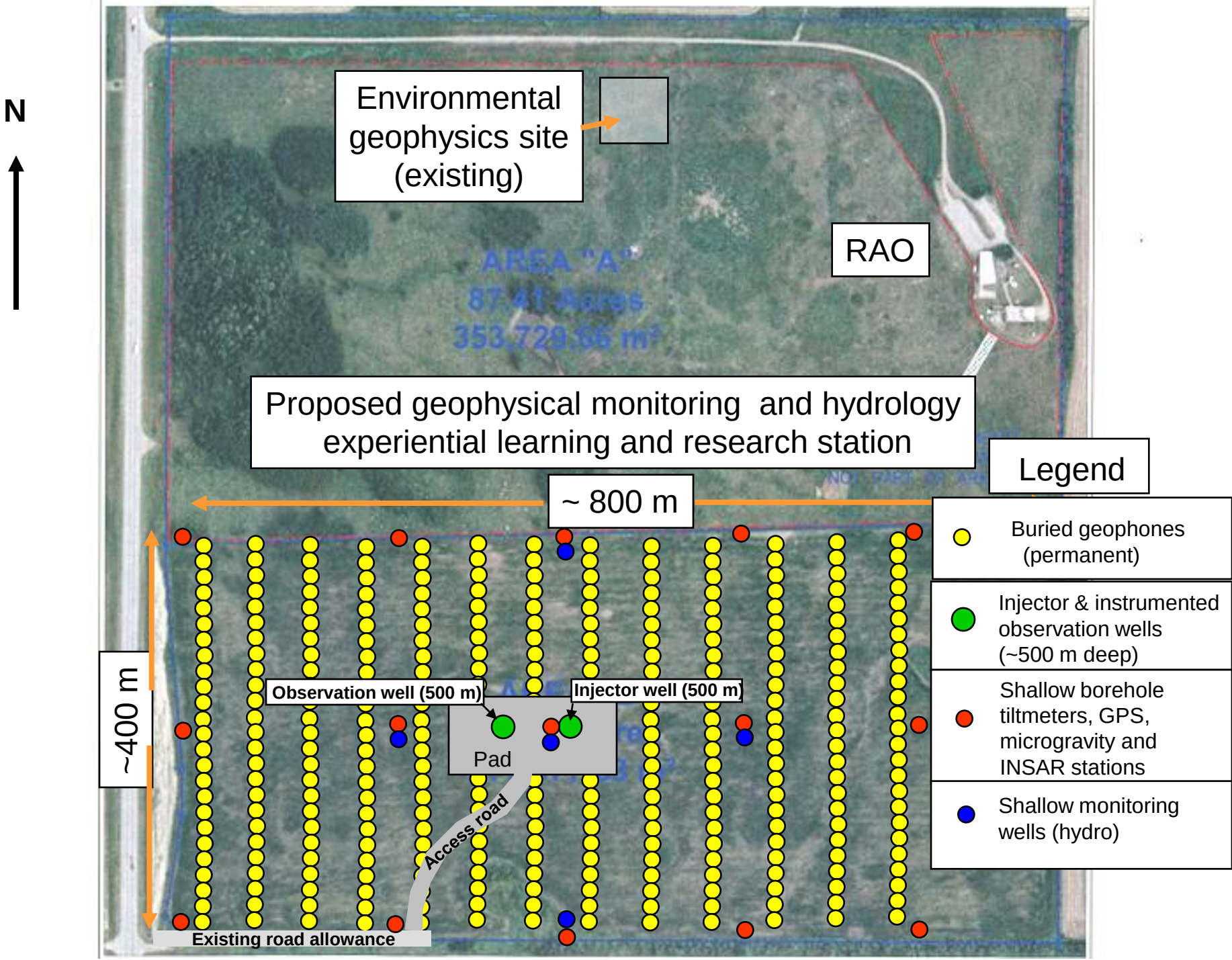


Geophysical monitoring research & training centre



Research and training in

- 3D surface seismic data surveys
- 3D-3C seismic surveys
- 3D vertical seismic profile surveys
- Cross-well seismic data surveys
- Microseismic surveys and monitoring
- Full logging suites
- Rock mechanics
- Pressure/temperature monitoring
- Groundwater studies
- Environmental geophysics
- Tiltmeters & DGPS
- InSAR imaging and interpretation


N
Environmental geophysics site (existing)
RAO
Proposed geophysical monitoring and hydrology experiential learning and research station
~ 800 m
~400 m
Observation well (500 m)
Injector well (500 m)
Pad
Access road
Existing road allowance
Legend
Buried geophones (permanent)
Injector & instrumented observation wells (~500 m deep)
Shallow borehole tiltmeters, GPS, microgravity and INSAR stations
Shallow monitoring wells (hydro)

Geophysical monitoring research & training centre

Drivers

- Field training needs in all seismic methods
- Exposure to new monitoring technologies
- Monitoring of subsurface fluid flow
- Measurement, monitoring and verification (MMV) for carbon capture and storage (CCS)
- Public site for new instrument testing
- Public outreach

Industry CCS in Alberta

Letters of intent to Alberta Energy moving to full proposals for $2b funding (November, 2008)

CNRL
ConocoPhillips
Enoch Cree Nation/Teedrum Inc.
Enhance Energy Inc
Hydrogen Energy
Petro-Canada
Shell Canada
Sherritt International
StatoilHydro
Suncor Energy Inc
Syncrude Canada Ltd
Total E&P

ATCO Power
Enbridge
EPCOR
Northwest Upgrading
Opti Canada
Swan Hills Synfuels
TransAlta
TransCanada

Conclusions

- Priddis is a good location for shallow 3D seismic surveys and VSPs
- 3D seismic survey imaged near surface structure & stratigraphy
- The site is being proposed for a comprehensive field research and training centre for 3D seismic methods, VSP, timelapse analysis, monitoring and verification of CO_2 injection

Acknowledgements

- Students from the 2007 Geophysics Field School
- CREWES Staff
- Landmark Graphics Corporation (Promax Software)
- Gedco (Vista software)


N
Look up at night
87.41 Acres
353,729.66 m²
Look down during the day