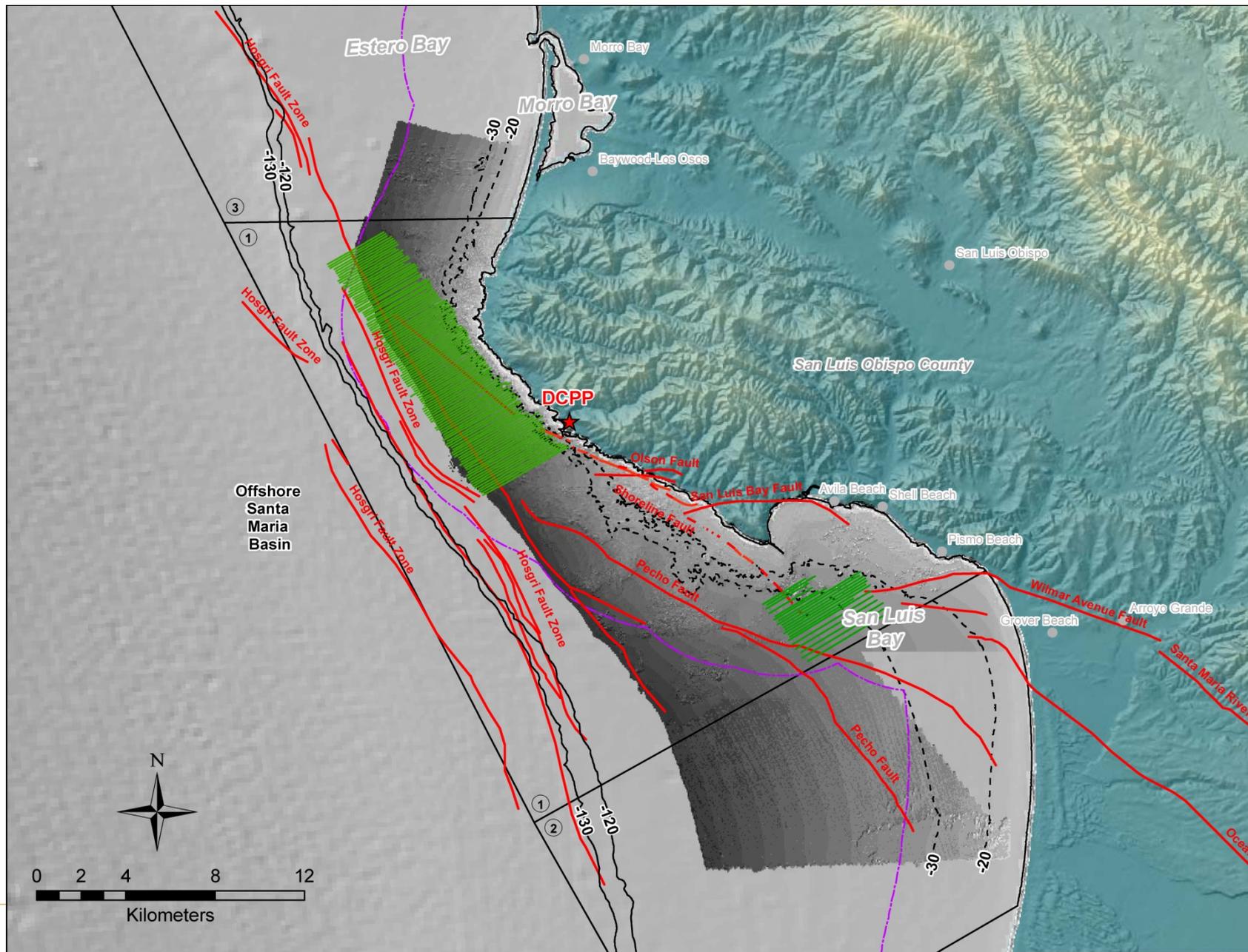


- Introduction
- 2010/2011 2D/3D Surveys
 - Data Quality and resolution
 - Data Examples
- Legacy Data Archive
- Planned December 2011 3D Pcable Survey
- Other Future Surveys

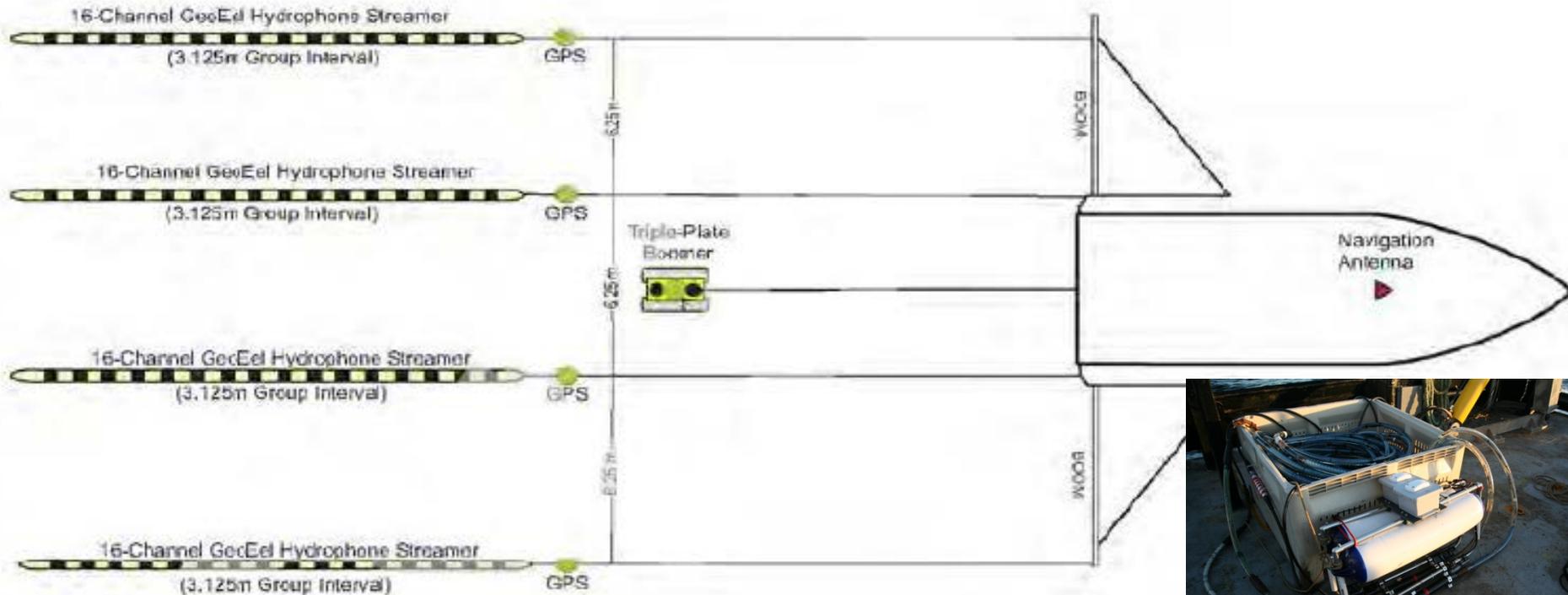
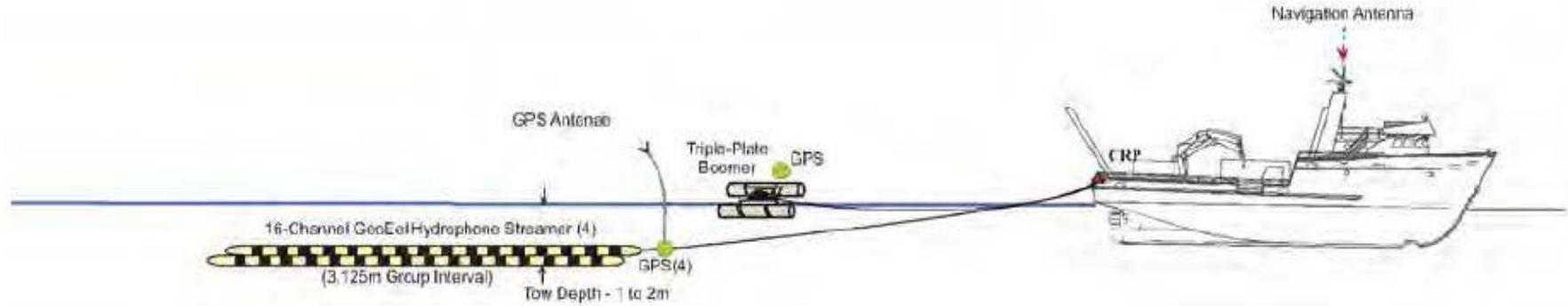
2010-2011 2D Survey Areas



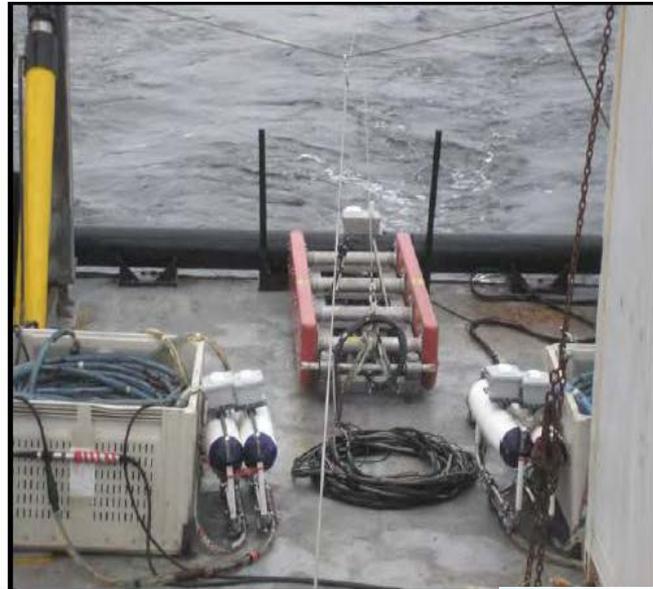
2010-2011 Fugro 2D/3D Data Location Map



2010/2011 2D/3D Survey Layback Diagram



2010/2011 2D/3D Survey



Triple Plate Boomer
Seismic Source

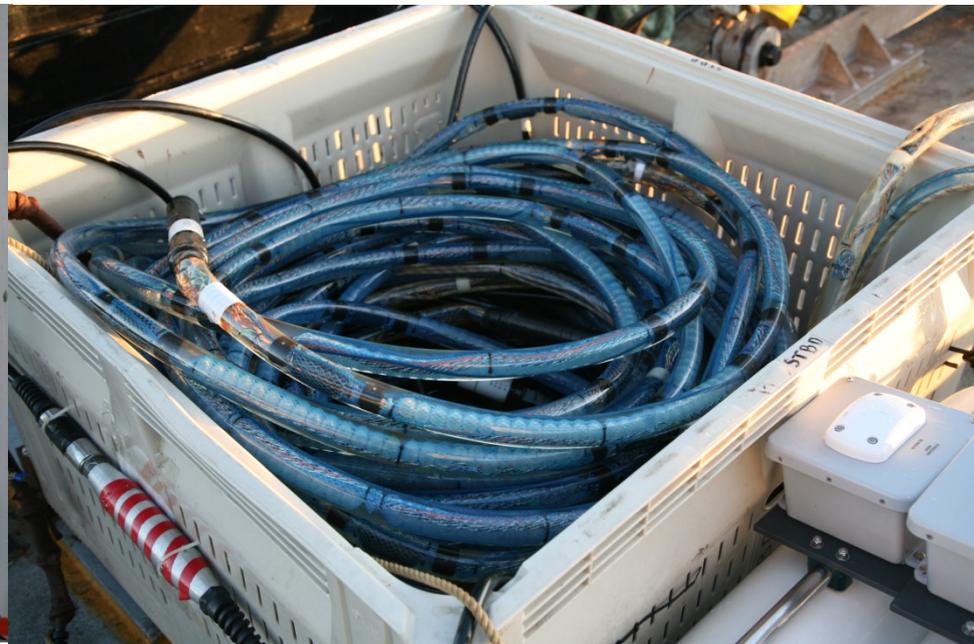


Source Parameters:

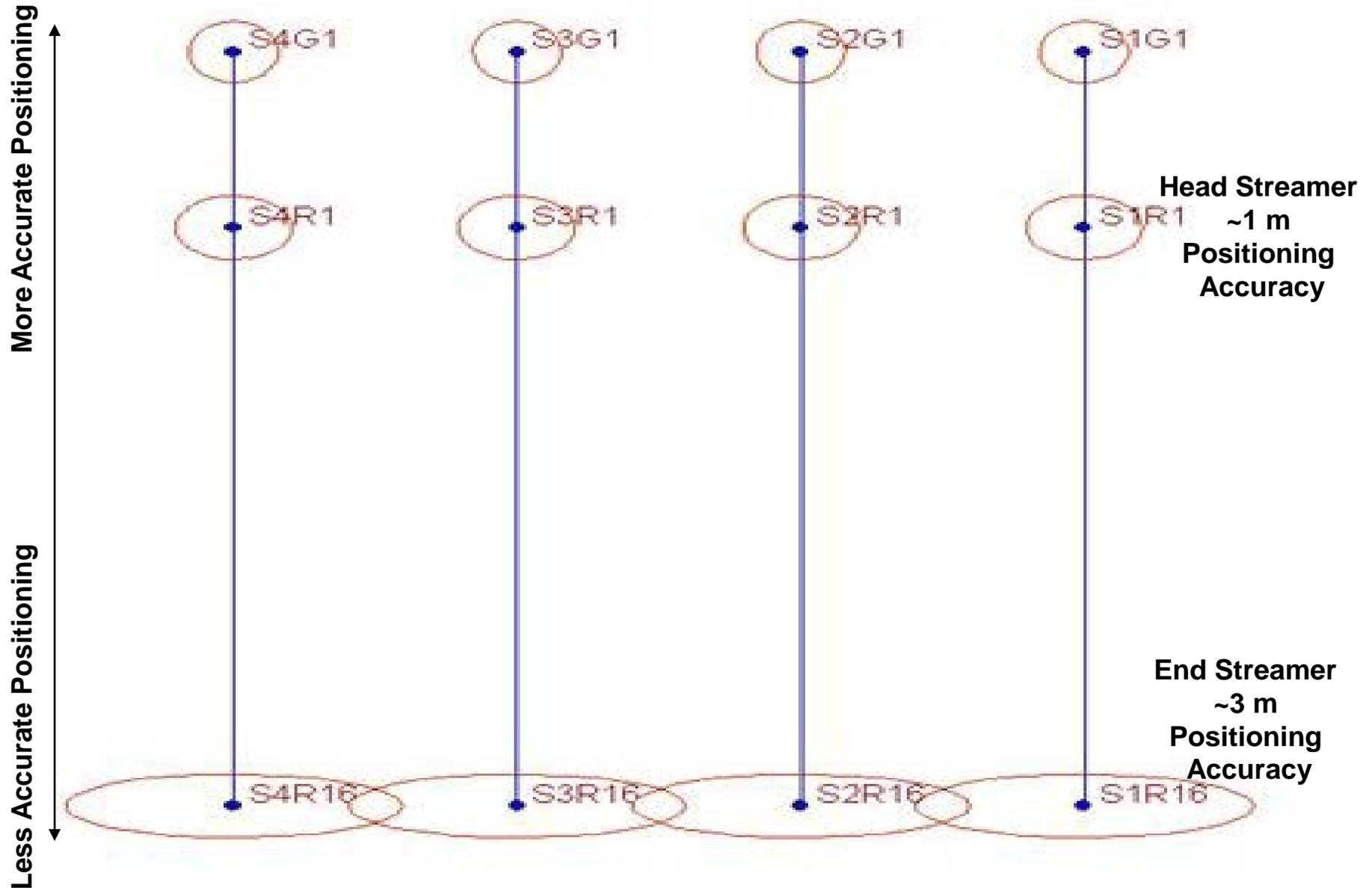
- 3 CSP-D 2400 Power Supply
- Triple Plate AP3000 Boomer
- 600 Joules per plate (2 kJ limit)
- 100-800 Hz Frequency Spectrum
- Geospace MP-24 Monitor Phone



2010/2011 2D/3D Survey



Navigation Positioning Accuracy



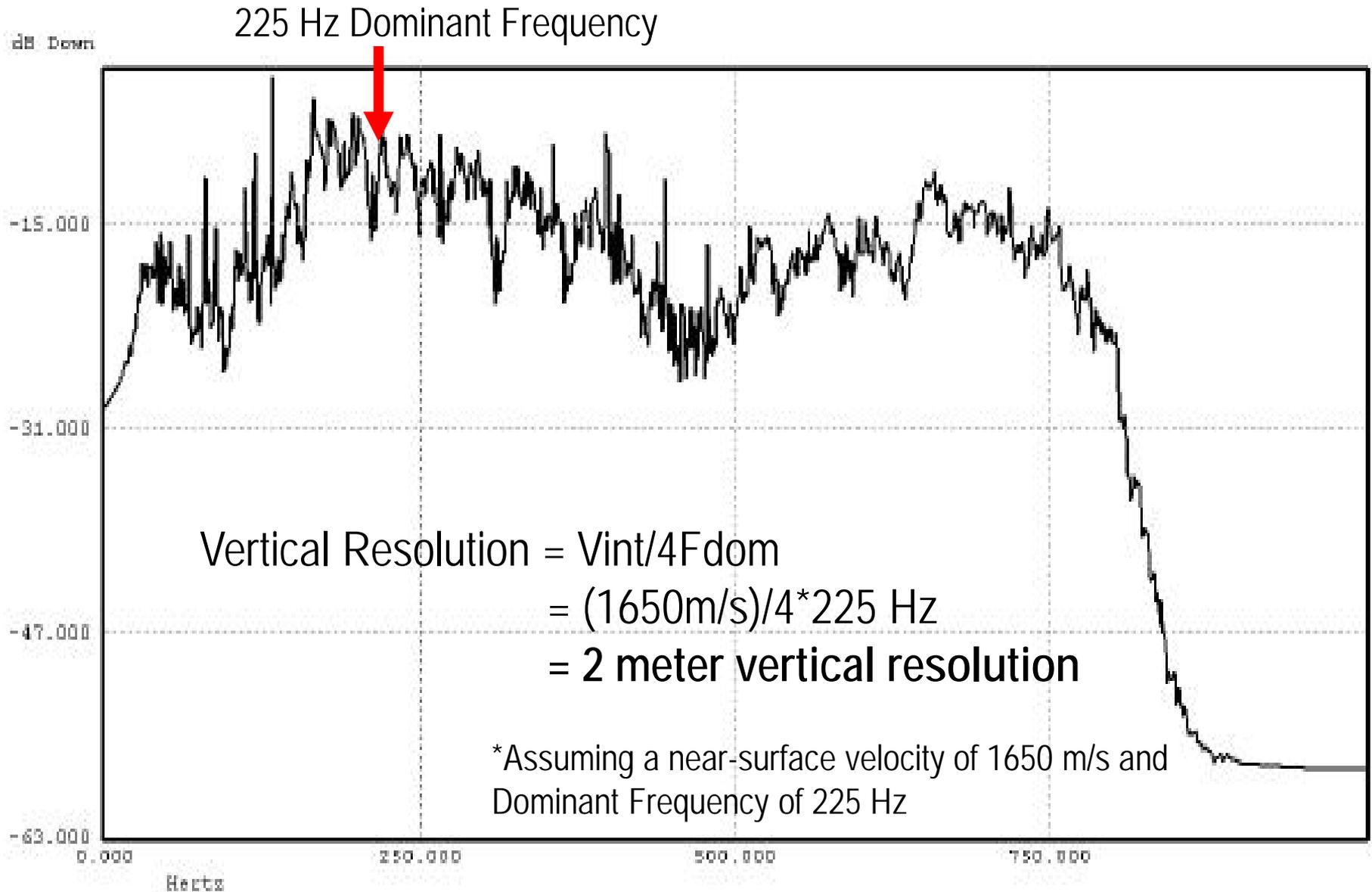
What is the vertical resolution and how is it calculated for the 2D/3D dataset?

Seismic Vertical Resolution - Concerns the minimum thickness of a bed, so that reflections from the bed's top and base can be distinguished – that is, so that one can distinguish between a bed of finite thickness from a single reflecting interface. Rayleigh resolution limit is $\frac{1}{4}$ wavelength of the dominant frequency (tuning thickness).

Tuning Thickness - A bed that is $\frac{1}{4}$ wavelength in thickness, for which reflections from its upper and lower surfaces interfere. The interference is constructive where the contrasts of the two interfaces are of opposite polarity, often resulting in an exceptionally strong reflection.

Vertical Resolution = Tuning Thickness = $\frac{1}{4}$ wavelength of dominant frequency

2010/2011 High-Resolution 3D Data Frequency Spectrum

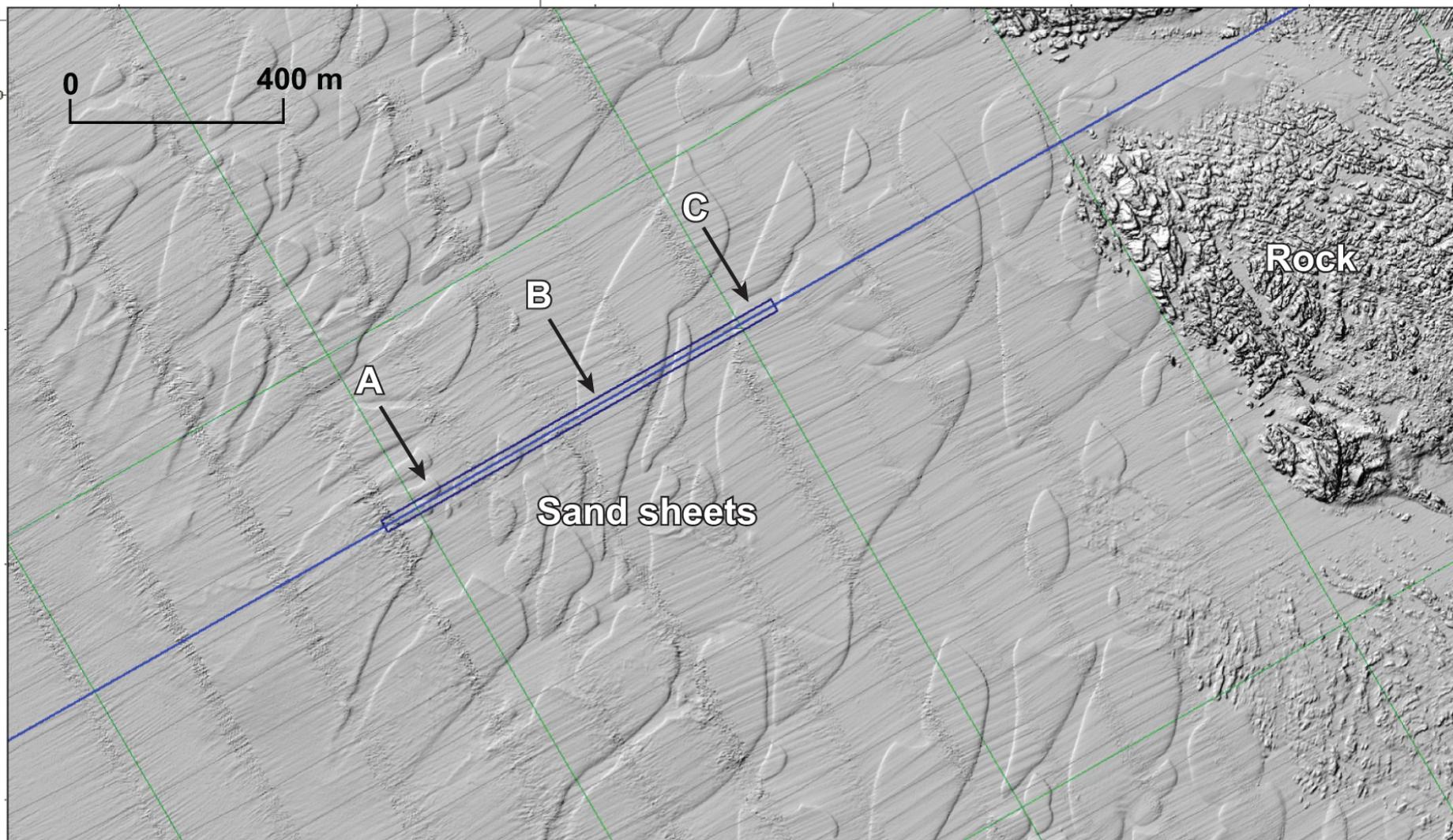


Inline 12120 Location Map



X/Y:
Meters

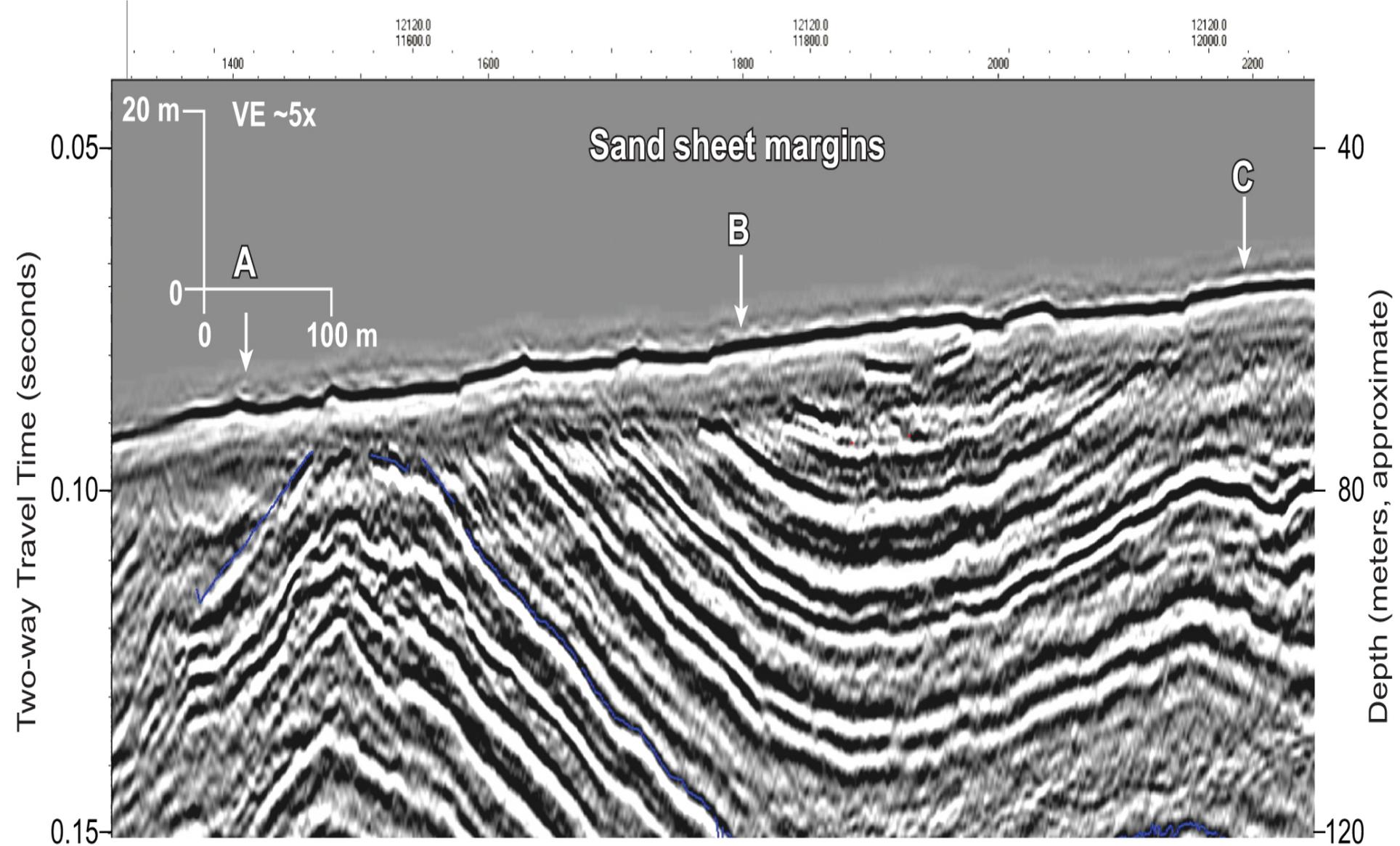
689500



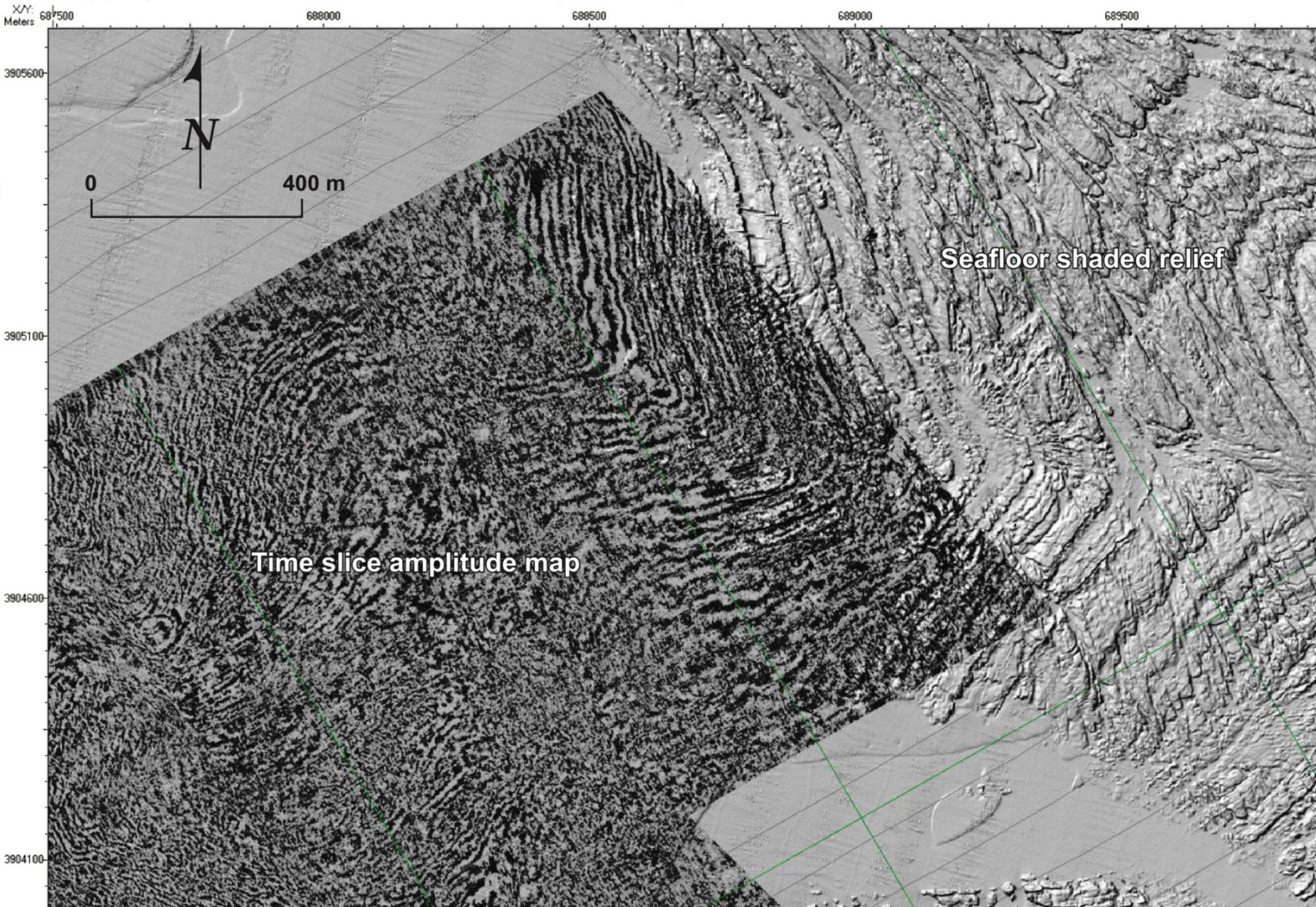
Rock

Sand sheets

Inline 12120



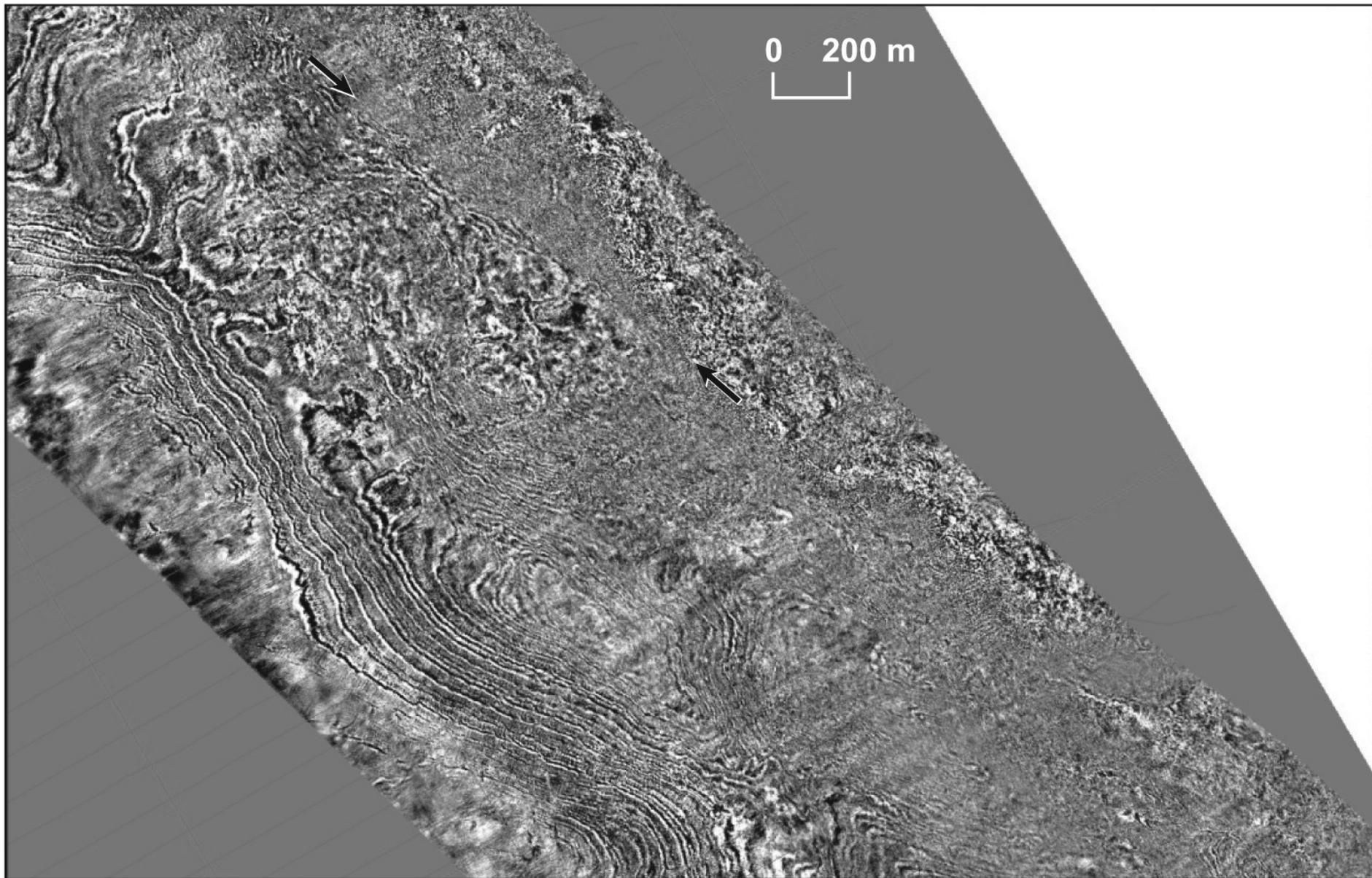
Amplitude Timeslice at 0.138 seconds TWTT against 2009 MBES Data



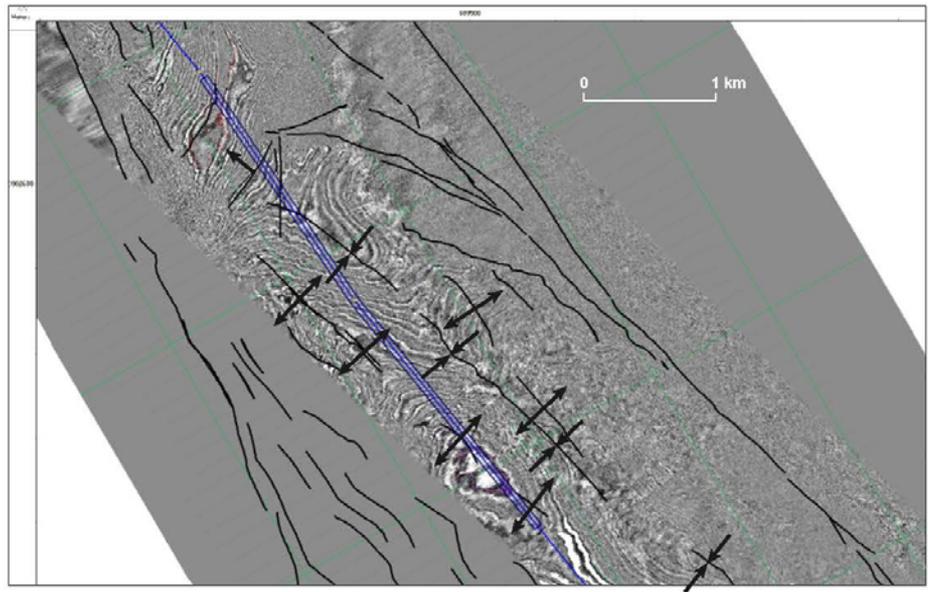
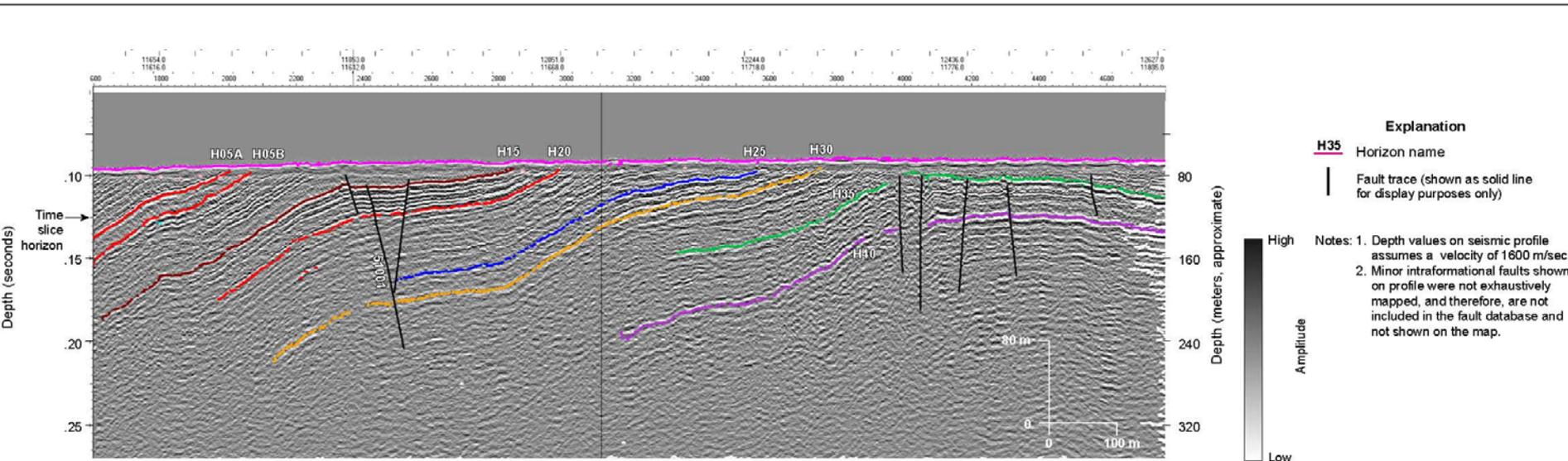
Amplitude Timeslice at 0.150 seconds TWTT



Uninterpreted



Timeslice at 0.150 seconds and Arbitrary Seismic Line



Time slice at 0.150 seconds

Explanation

— Location of seismic profile



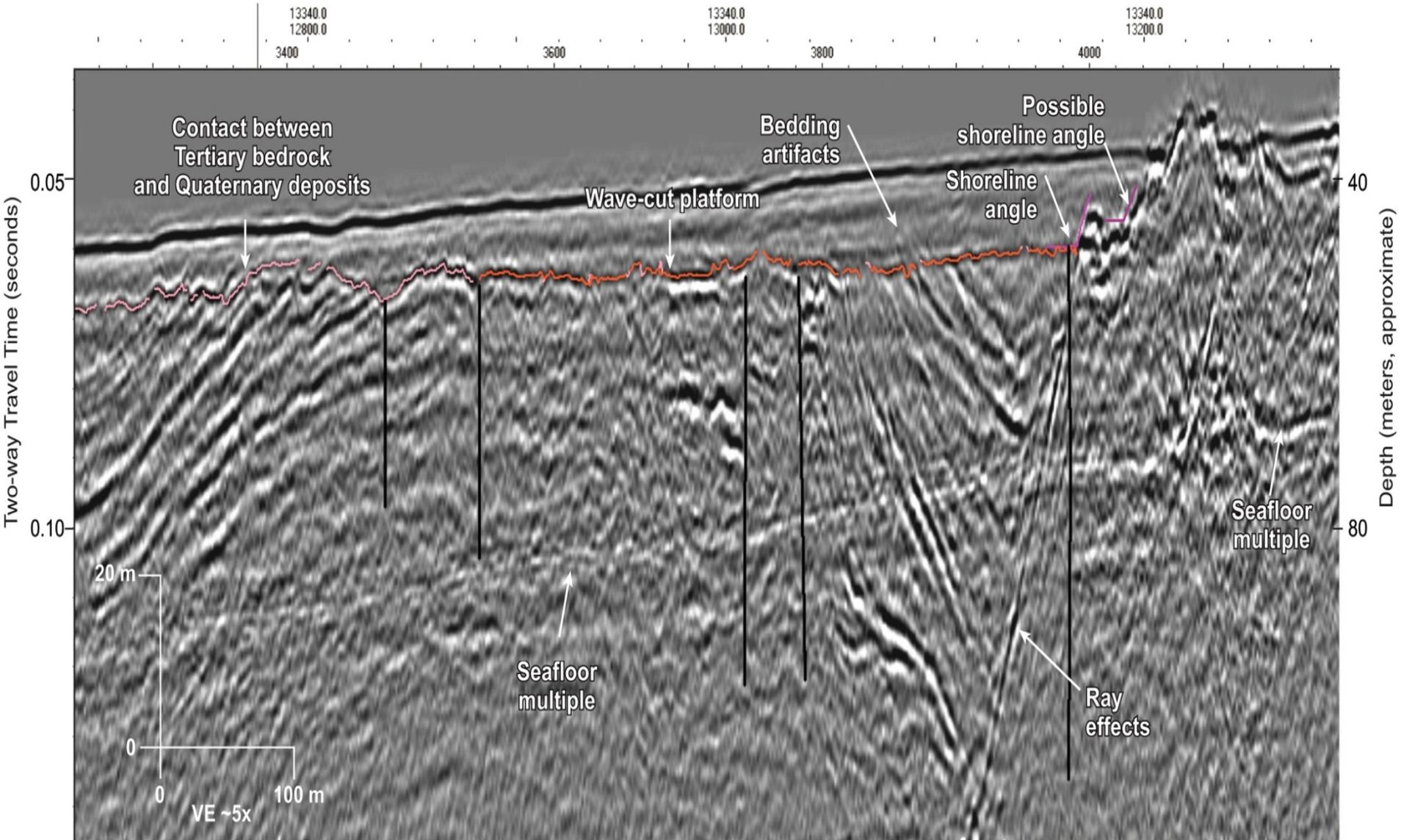
Arbitrary 3D Seismic Profile
 Showing Marker Horizons
 Mapped within the 2D and 3D Seismic Surveys

DCPP 2D/3D Seismic-reflection Investigation

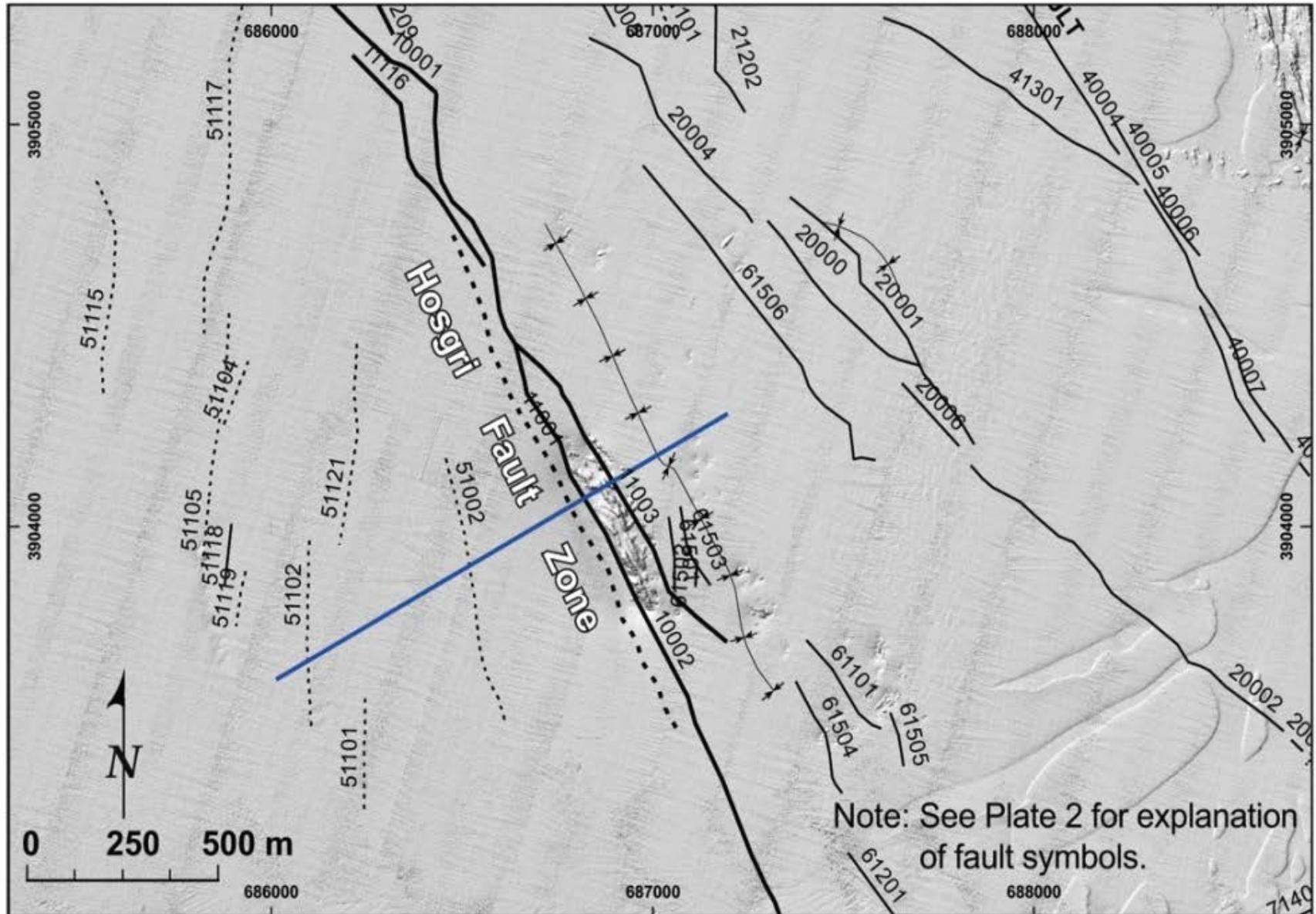
Pacific Gas and Electric Company

Foldout **B**

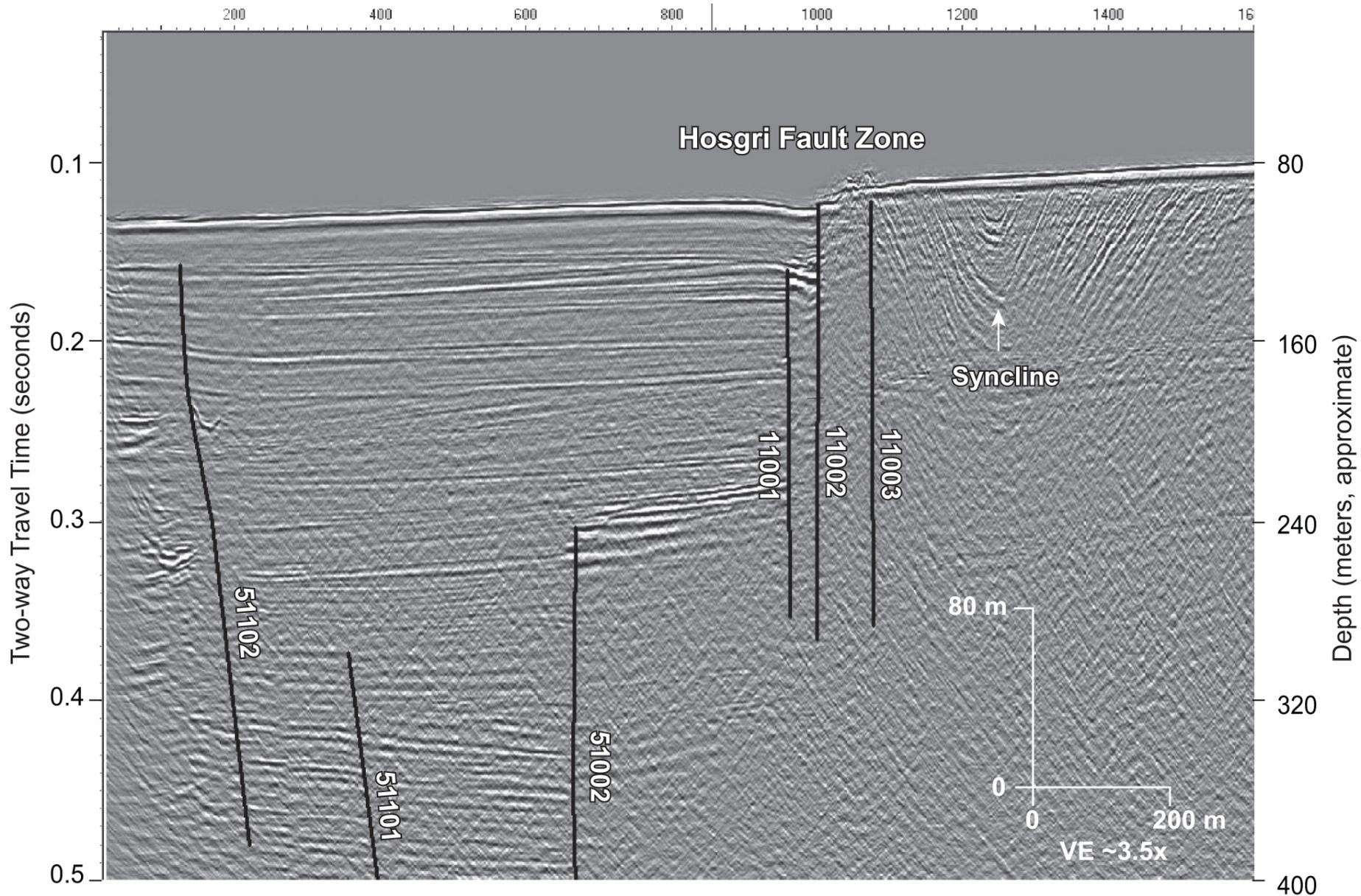
Inline 13340



Inline 11180 Across Hosgri Fault Zone



Inline 11180



Data Quality and Depth of Penetration

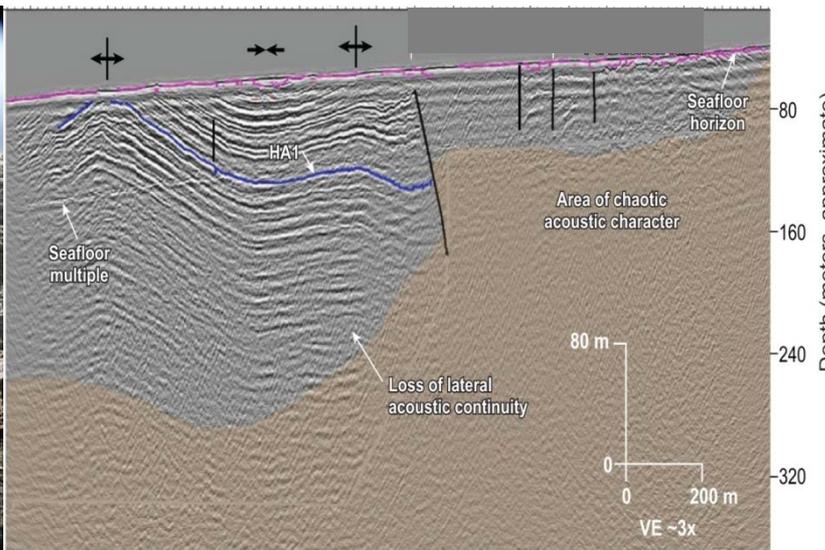
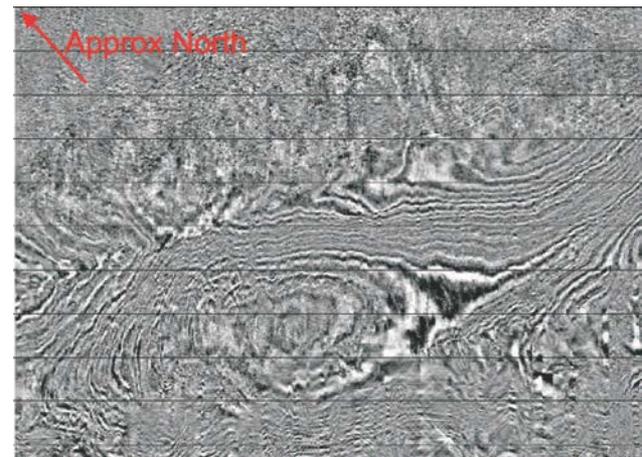
Good Data Quality in most areas

Depth of penetration up to 500ms

Deepest penetration west of Hosgri Fault

Poor penetration and chaotic acoustic character in some areas

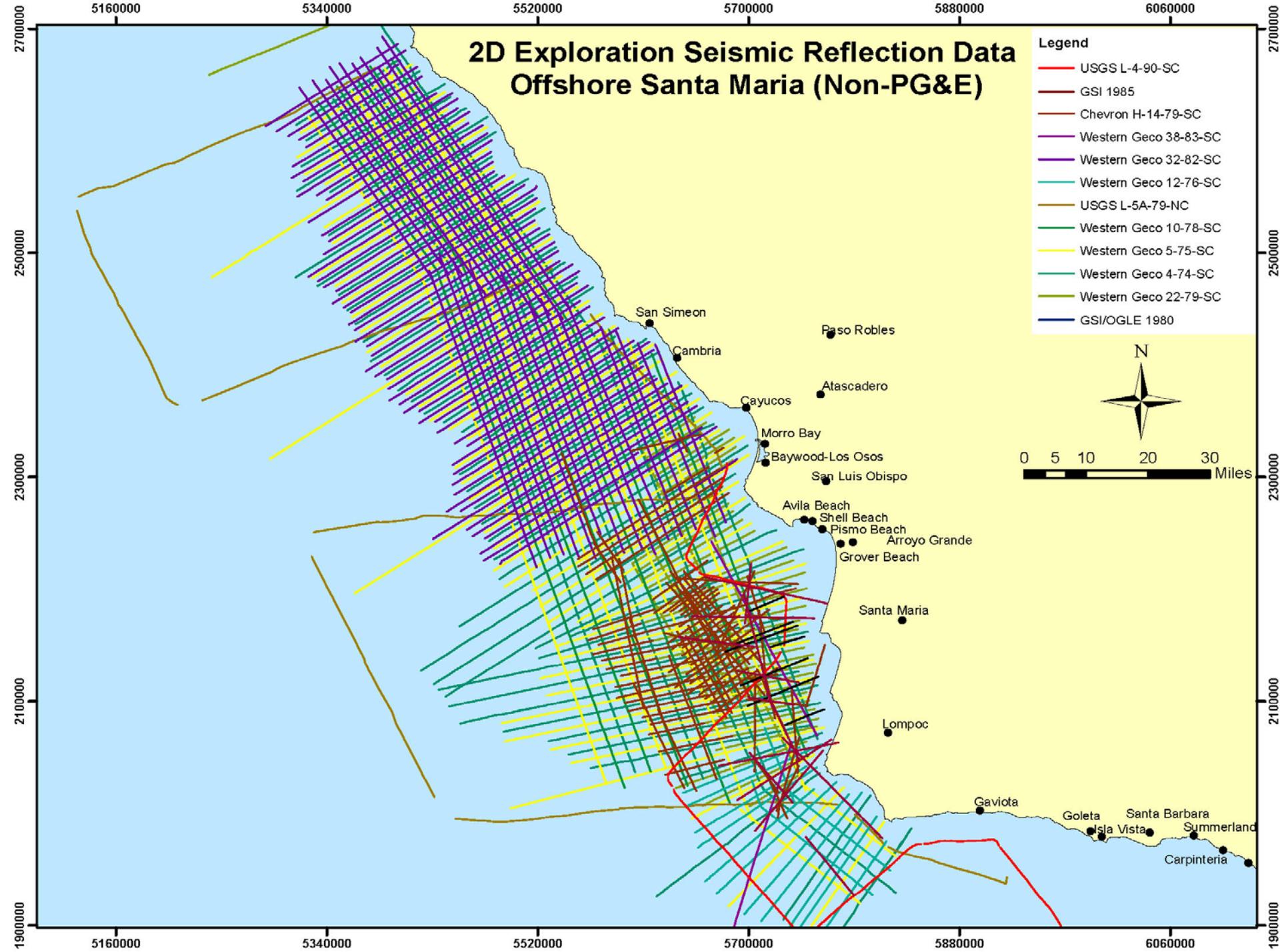
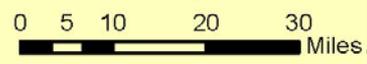
- Rock lithology
- Steeply dipping strata
- Marine and non-marine granular materials



- A Legacy Archive SMT Kingdom Project of digital seismic reflection data was created to allow PG&E and interpretation team to have access to as much data as possible to assist with seismic source characterization and future survey planning
- Almost 40 years' worth of digital seismic reflection data was loaded into the SMT Project

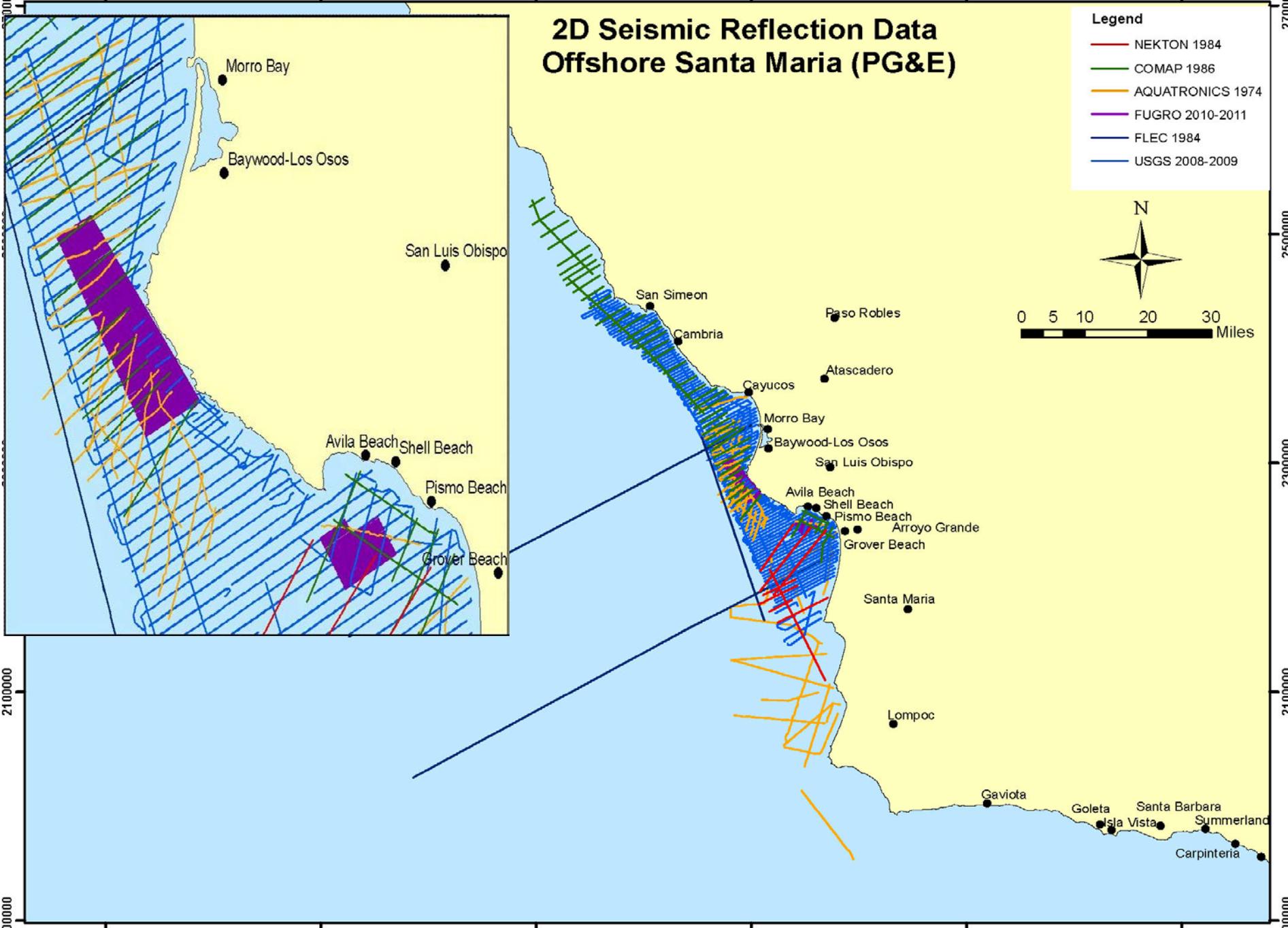
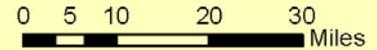
2D Exploration Seismic Reflection Data Offshore Santa Maria (Non-PG&E)

- Legend**
- USGS L-4-90-SC
 - GSI 1985
 - Chevron H-14-79-SC
 - Western Geco 38-83-SC
 - Western Geco 32-82-SC
 - Western Geco 12-76-SC
 - USGS L-5A-79-NC
 - Western Geco 10-78-SC
 - Western Geco 5-75-SC
 - Western Geco 4-74-SC
 - Western Geco 22-79-SC
 - GSI/OGLE 1980



2D Seismic Reflection Data Offshore Santa Maria (PG&E)

- Legend**
- NEKTON 1984
 - COMAP 1986
 - AQUATRONICS 1974
 - FUGRO 2010-2011
 - FLEC 1984
 - USGS 2008-2009



Morro Bay

Baywood-Los Osos

San Luis Obispo

San Simeon

Cambria

Paso Robles

Atascadero

Cayucos

Morro Bay

Baywood-Los Osos

San Luis Obispo

Avila Beach

Shell Beach

Pismo Beach

Grover Beach

Avila Beach

Shell Beach

Pismo Beach

Arroyo Grande

Grover Beach

Santa Maria

Lompoc

Gaviota

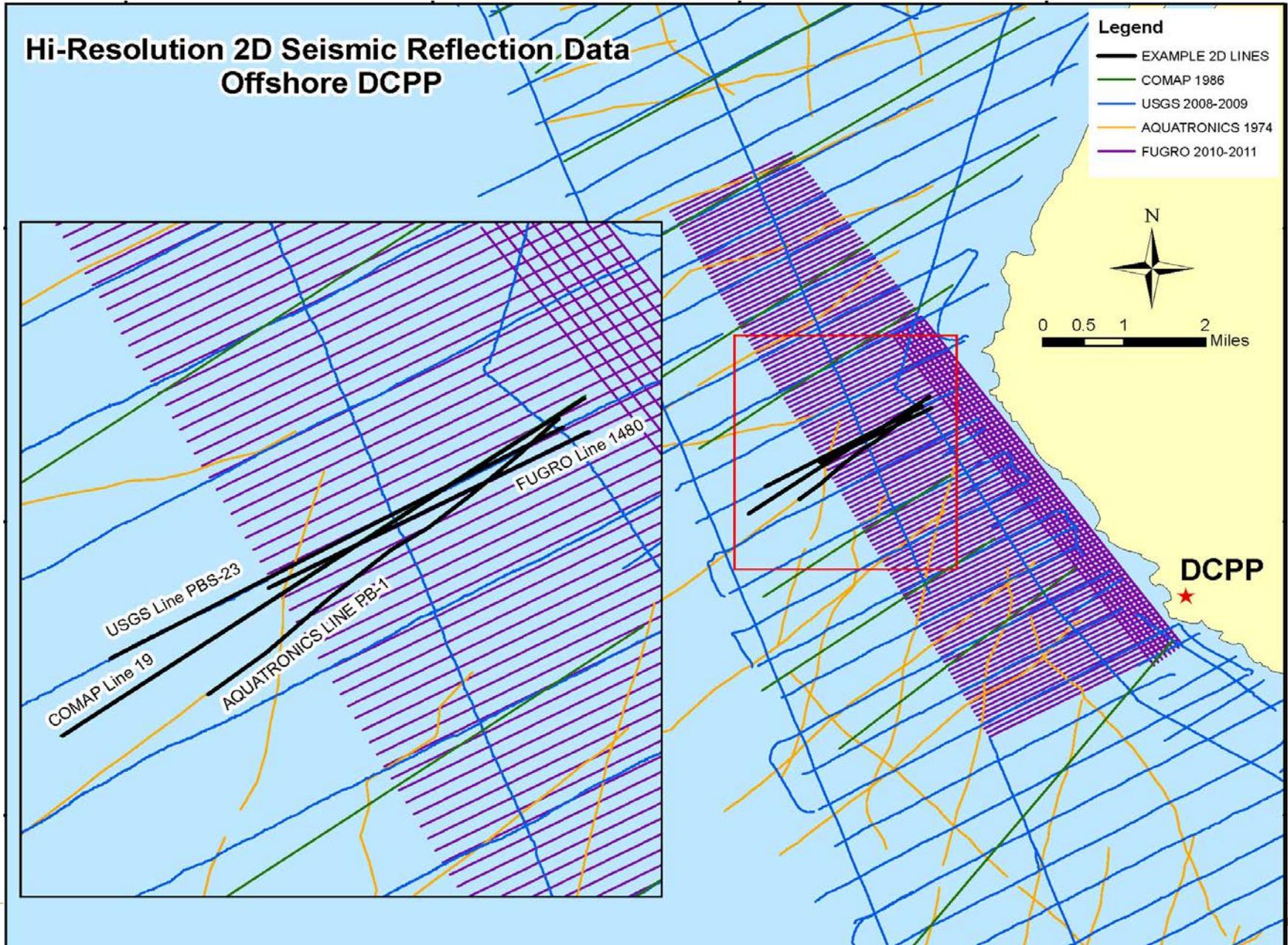
Goleta

Santa Barbara

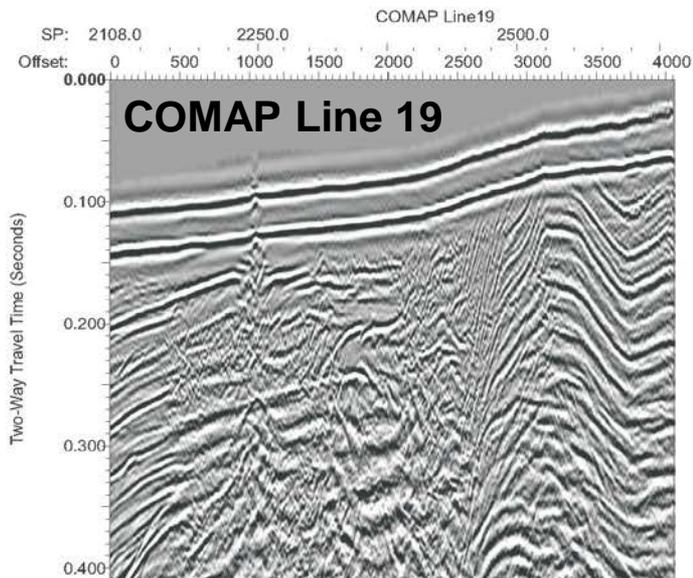
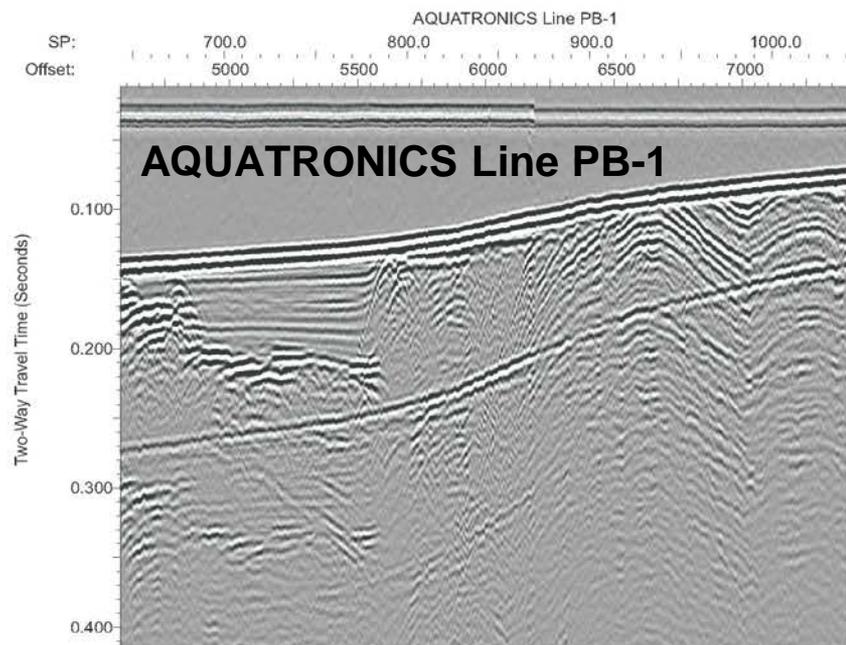
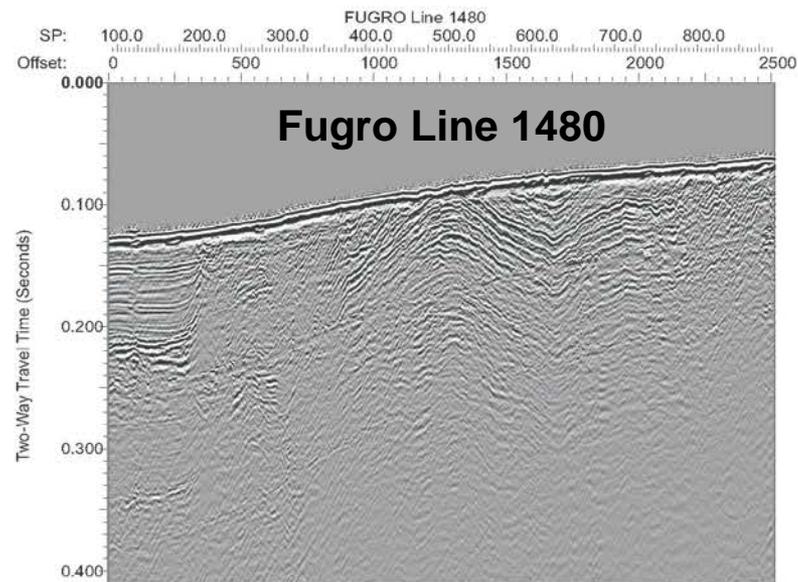
Summerland

Carpinteria

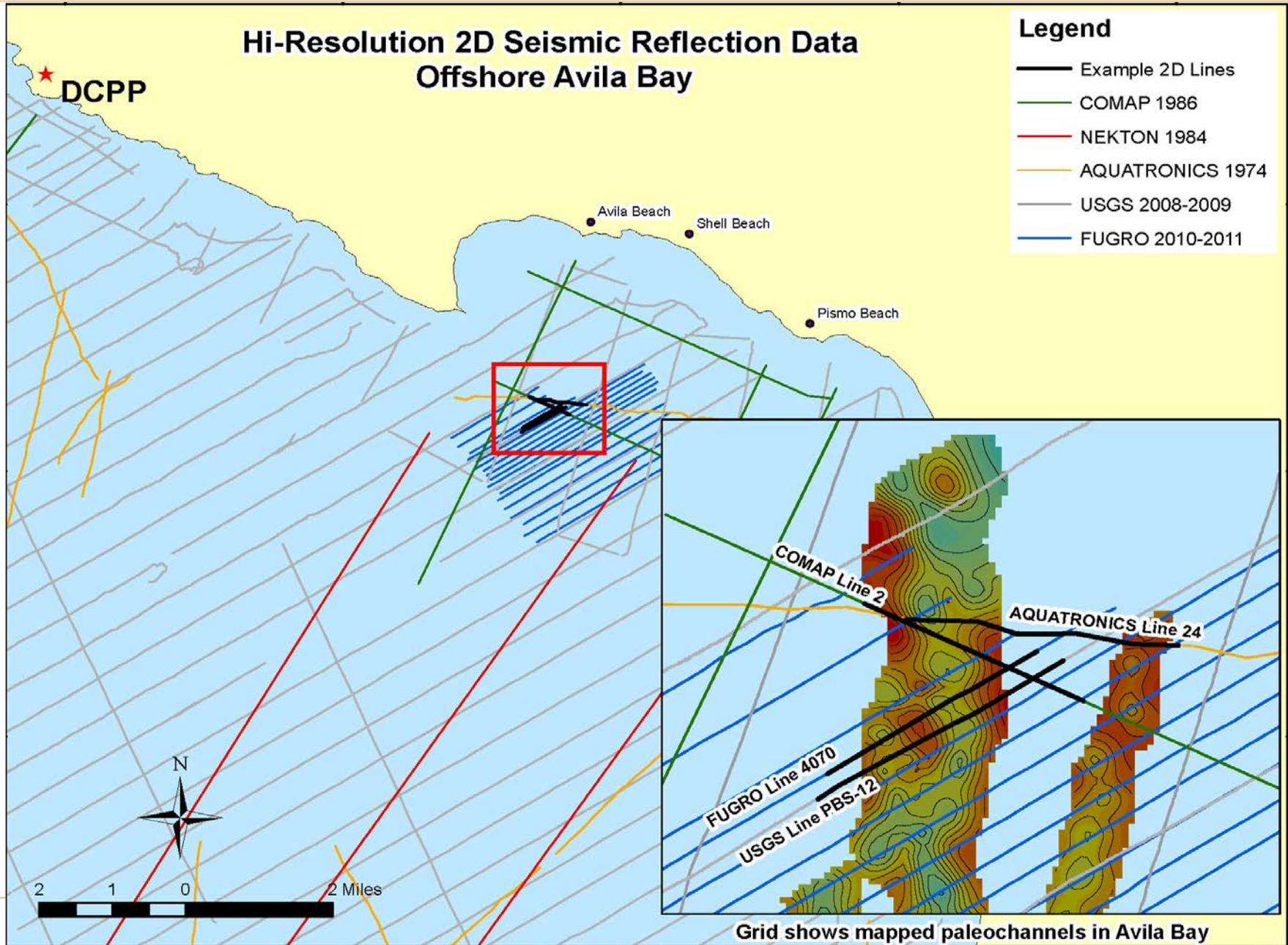
Legacy Archive Data Examples



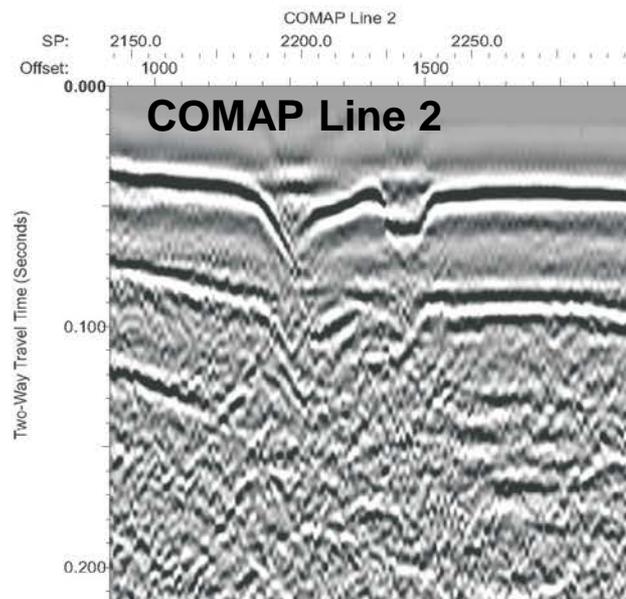
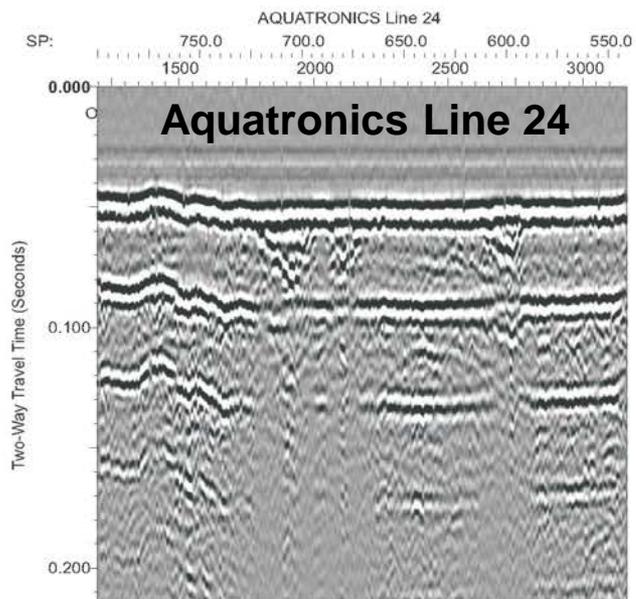
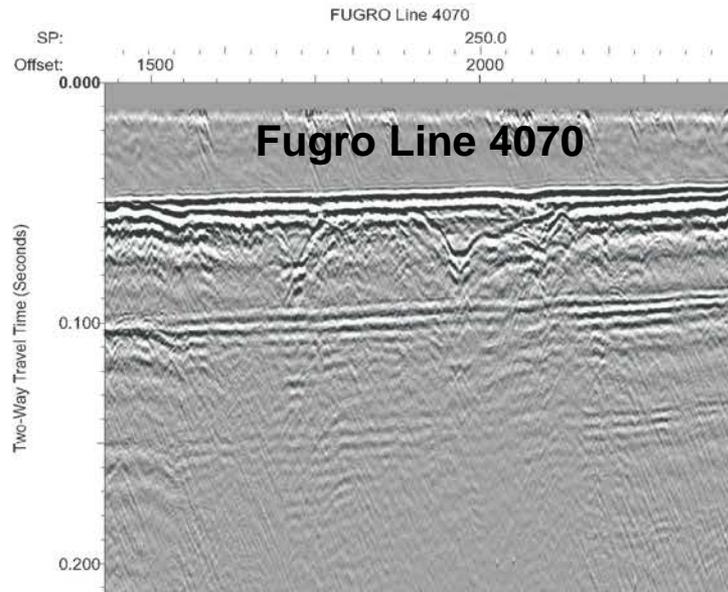
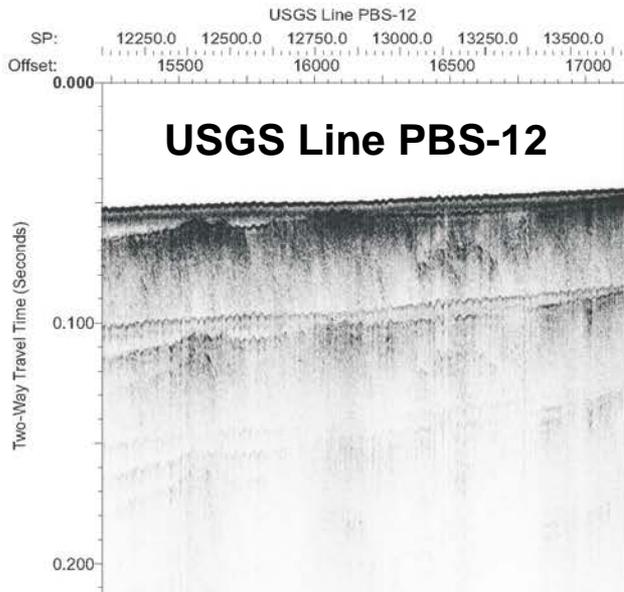
Legacy Archive Data Examples



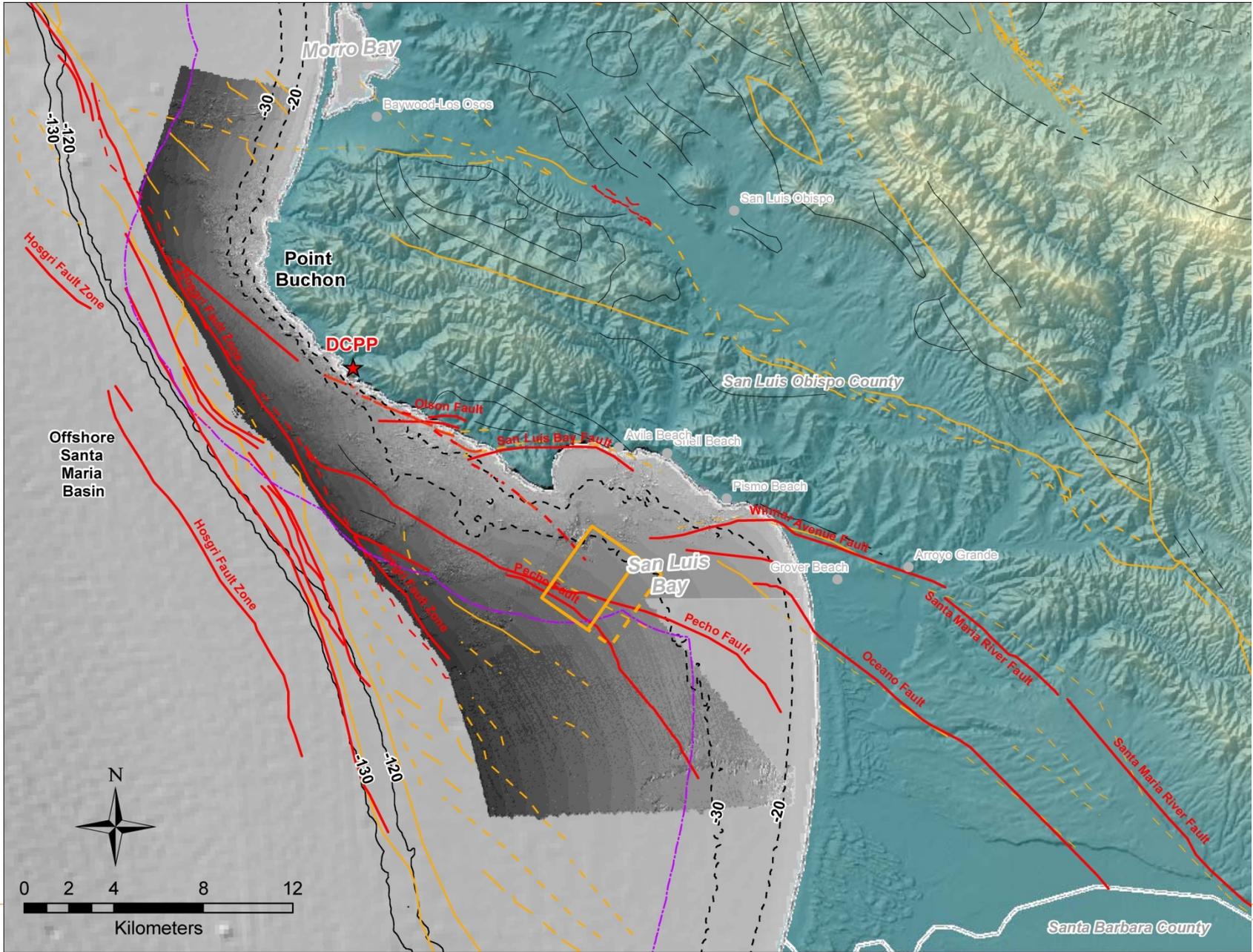
Legacy Archive Data Examples-San Luis Bay



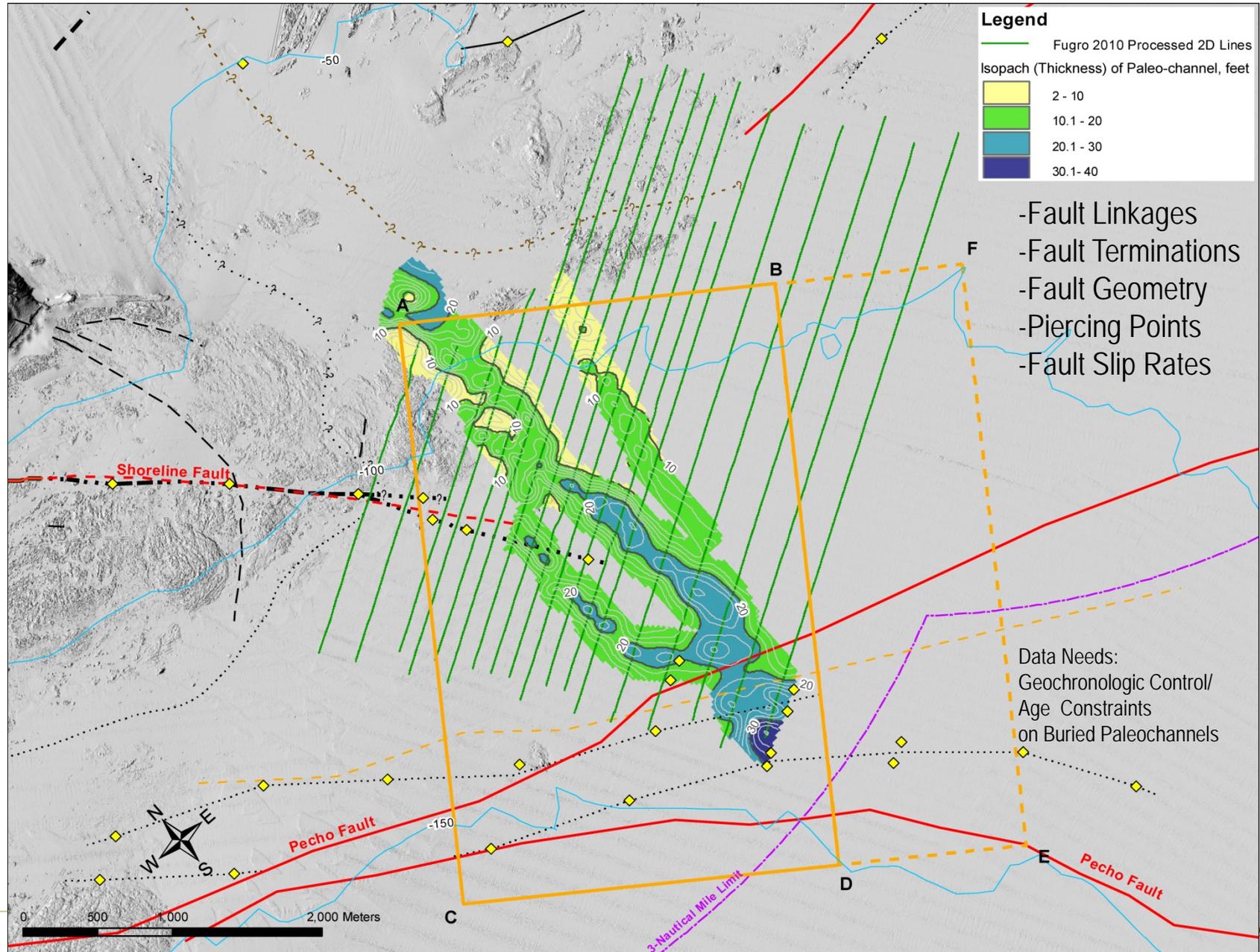
Legacy Archive Data Examples



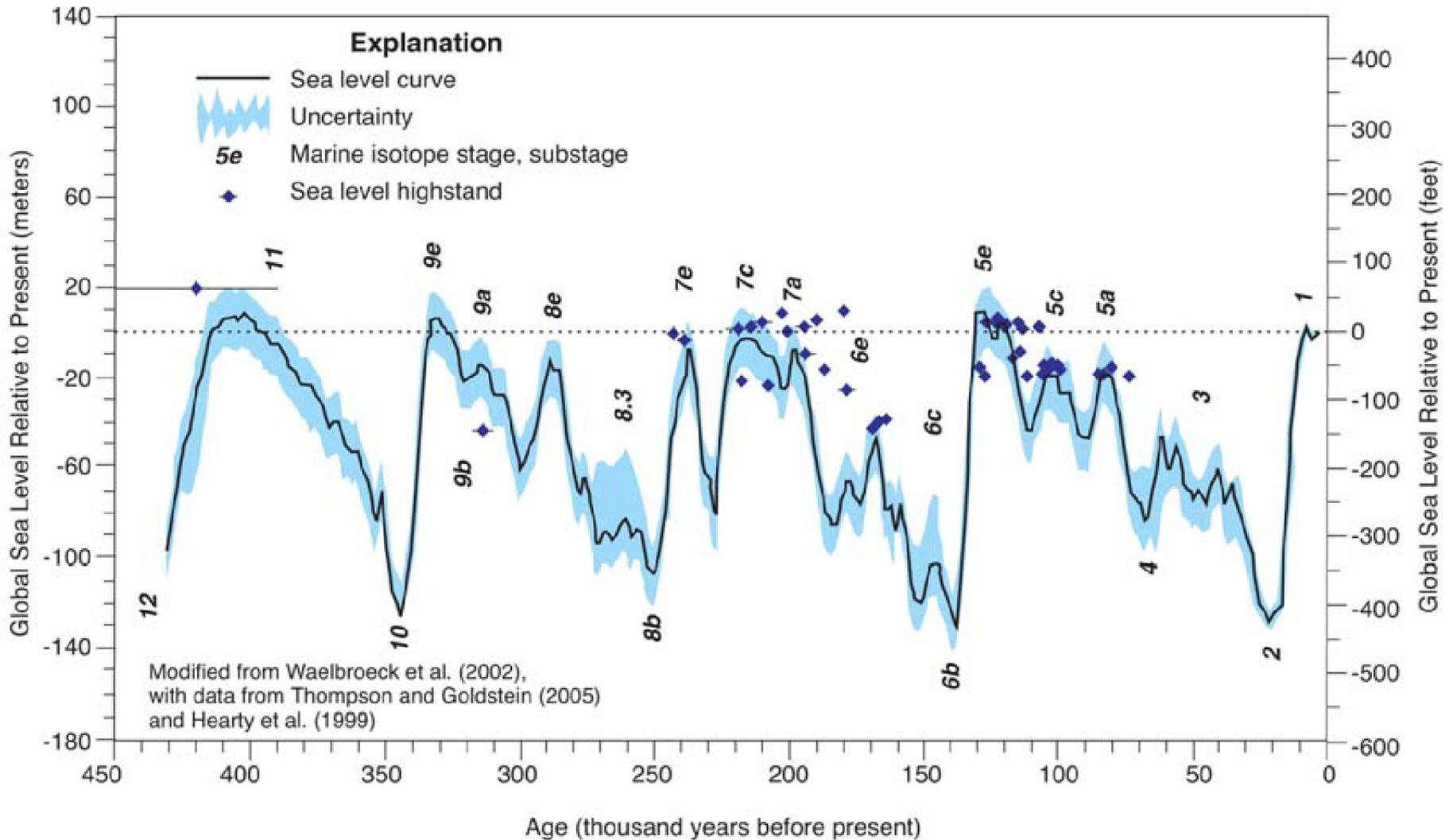
December 2011 3D High-Resolution Surveys



2011 Survey Area and Paleochannels in San Luis Bay

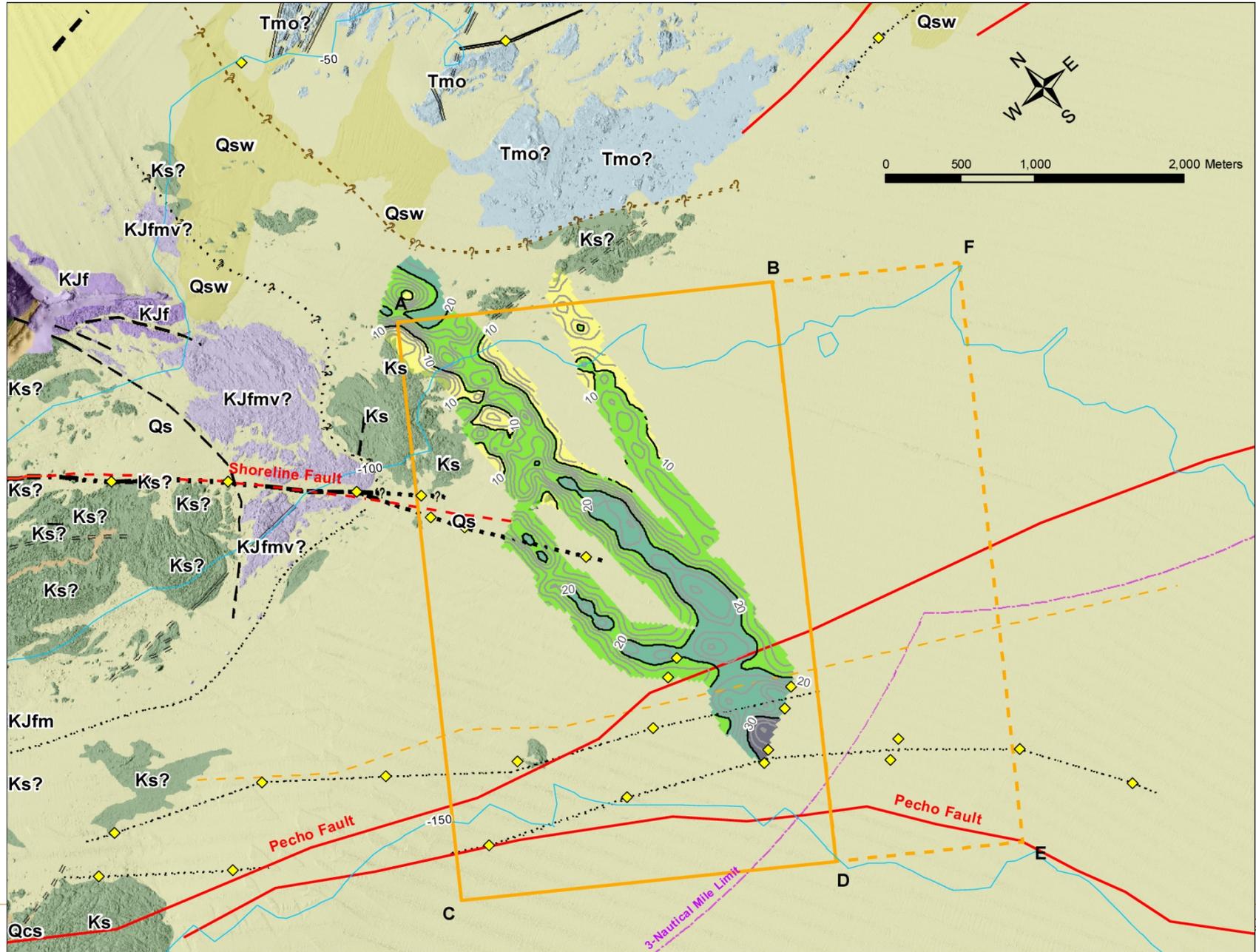


Sea Level History Past 500,000 Years



(Modified from Waelbroeck and others, 2000).

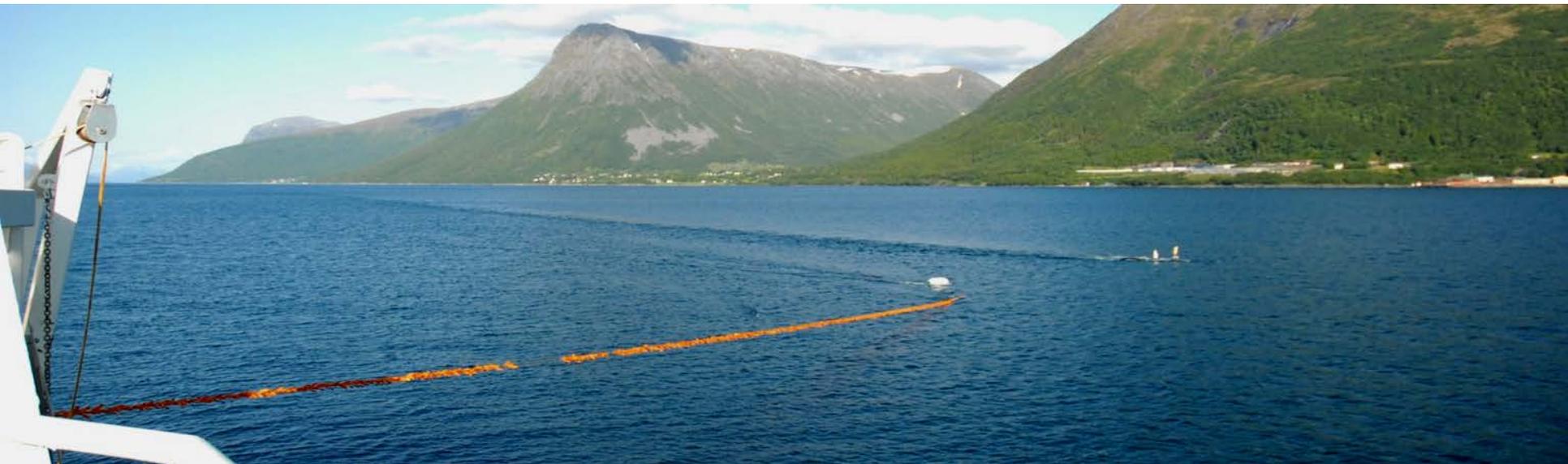
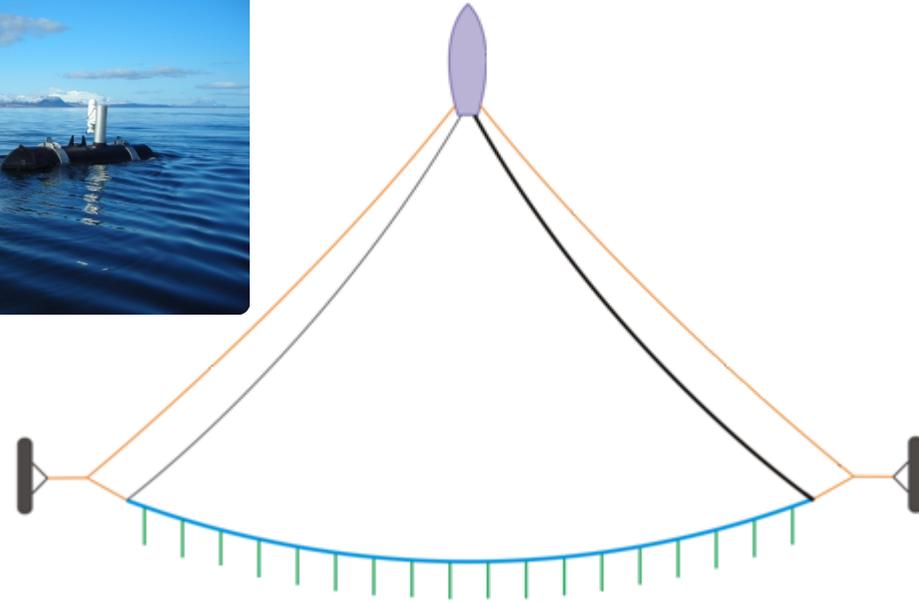
December 2011 3D Survey Area



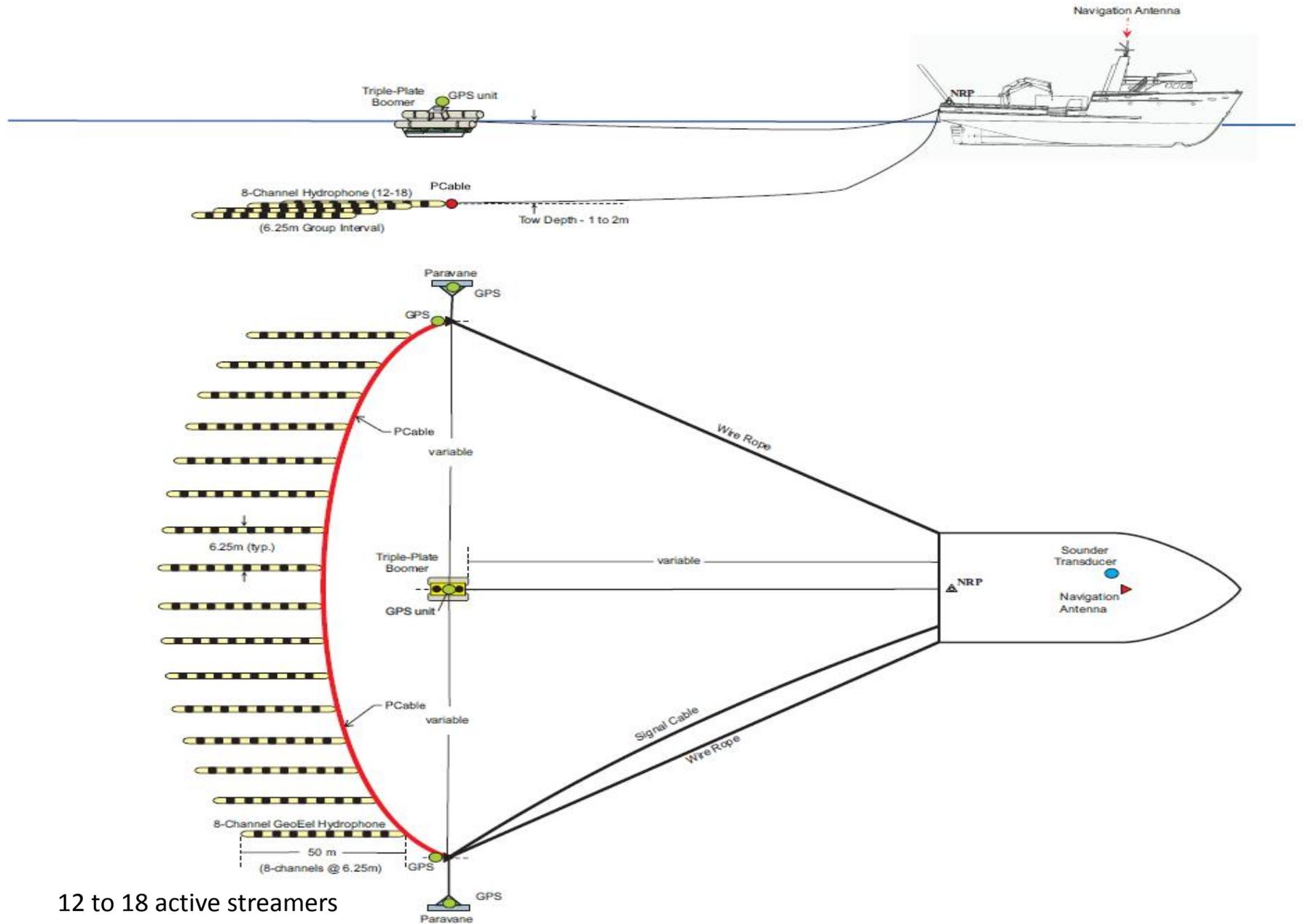
December 2011 3D PCable Surveys



- Active sections, Geometrics GeoEel
- Number of streamers: 12 – 18
- Array width: 75 – 112.5 m
- Streamer length: 50 m
- Group interval: 6.25 m
- Channels per streamer: 8
- Streamer separation: 6.25m



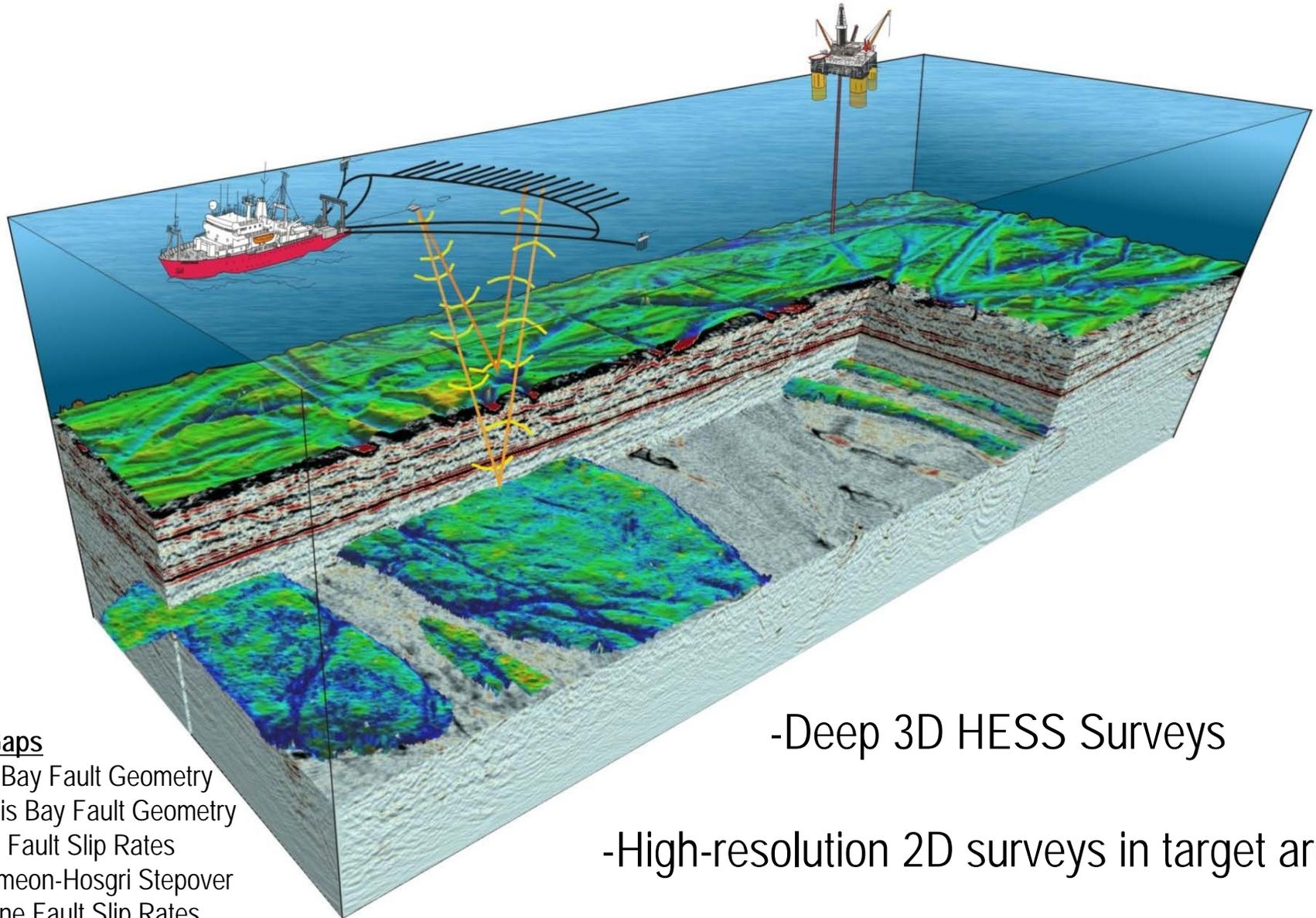
December 2011 3D P-Cable Survey Layback Diagram



Pcable 3D Survey Equipment



Possible Future Surveys



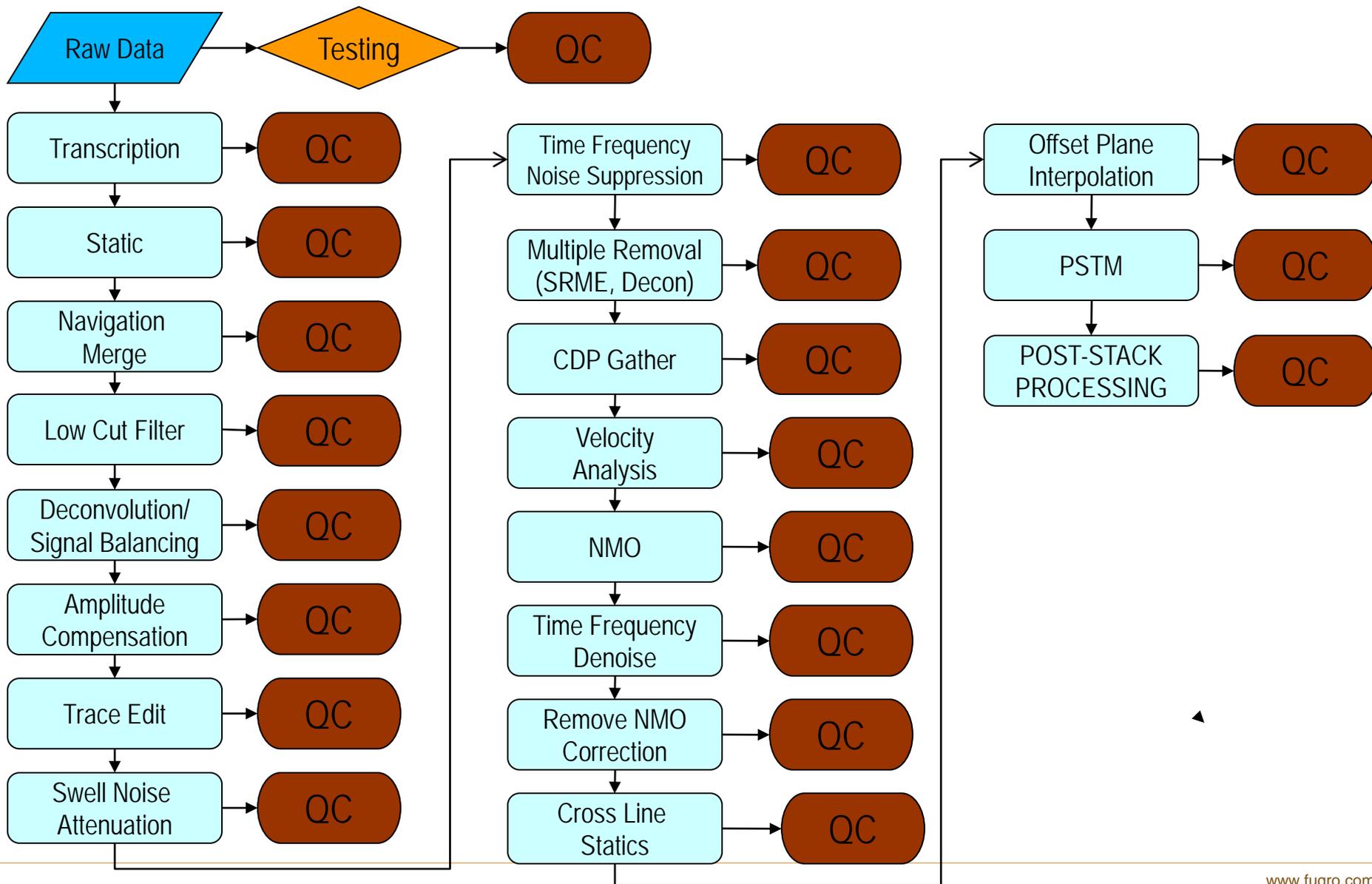
Data Gaps

- Estero Bay Fault Geometry
- San Luis Bay Fault Geometry
- Hosgri Fault Slip Rates
- San Simeon-Hosgri Stepmover
- Shoreline Fault Slip Rates
- Shoreline Fault Termination/Truncation/Fault Linkages

-Deep 3D HESS Surveys

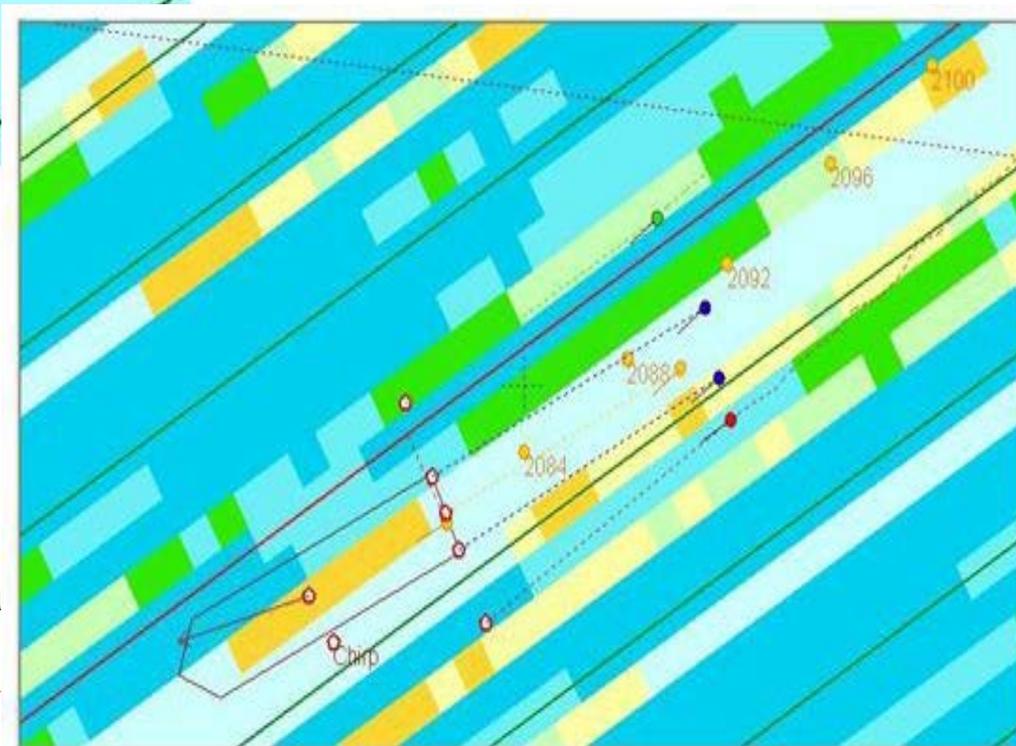
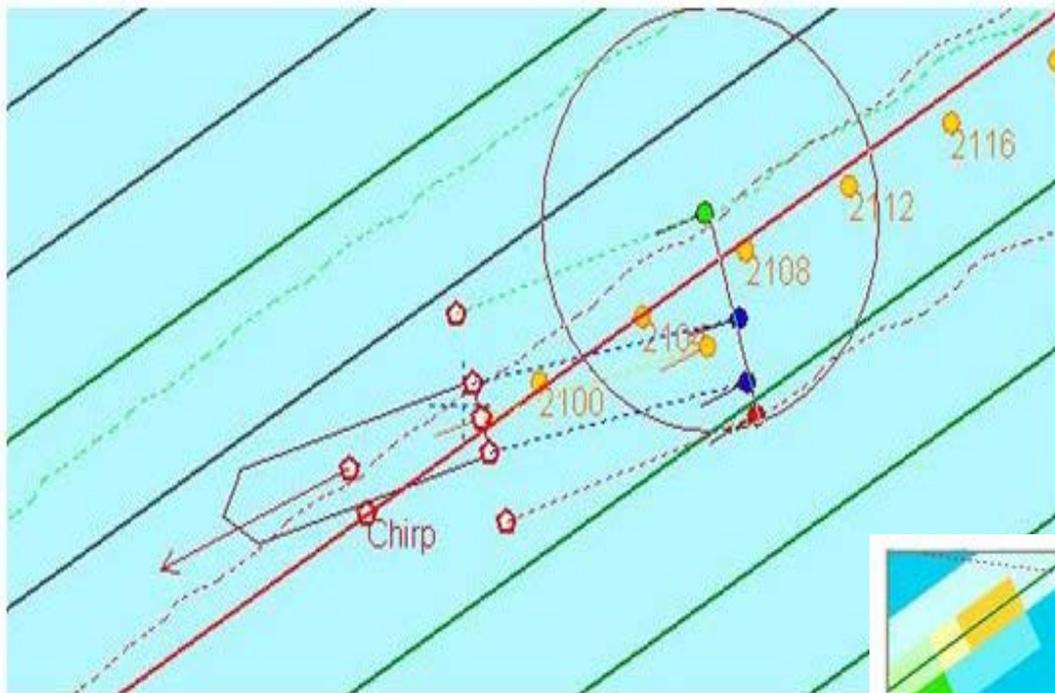
-High-resolution 2D surveys in target areas

3D Processing Workflow



Data Coverage

Example of Streamer Displacement During Survey Operations



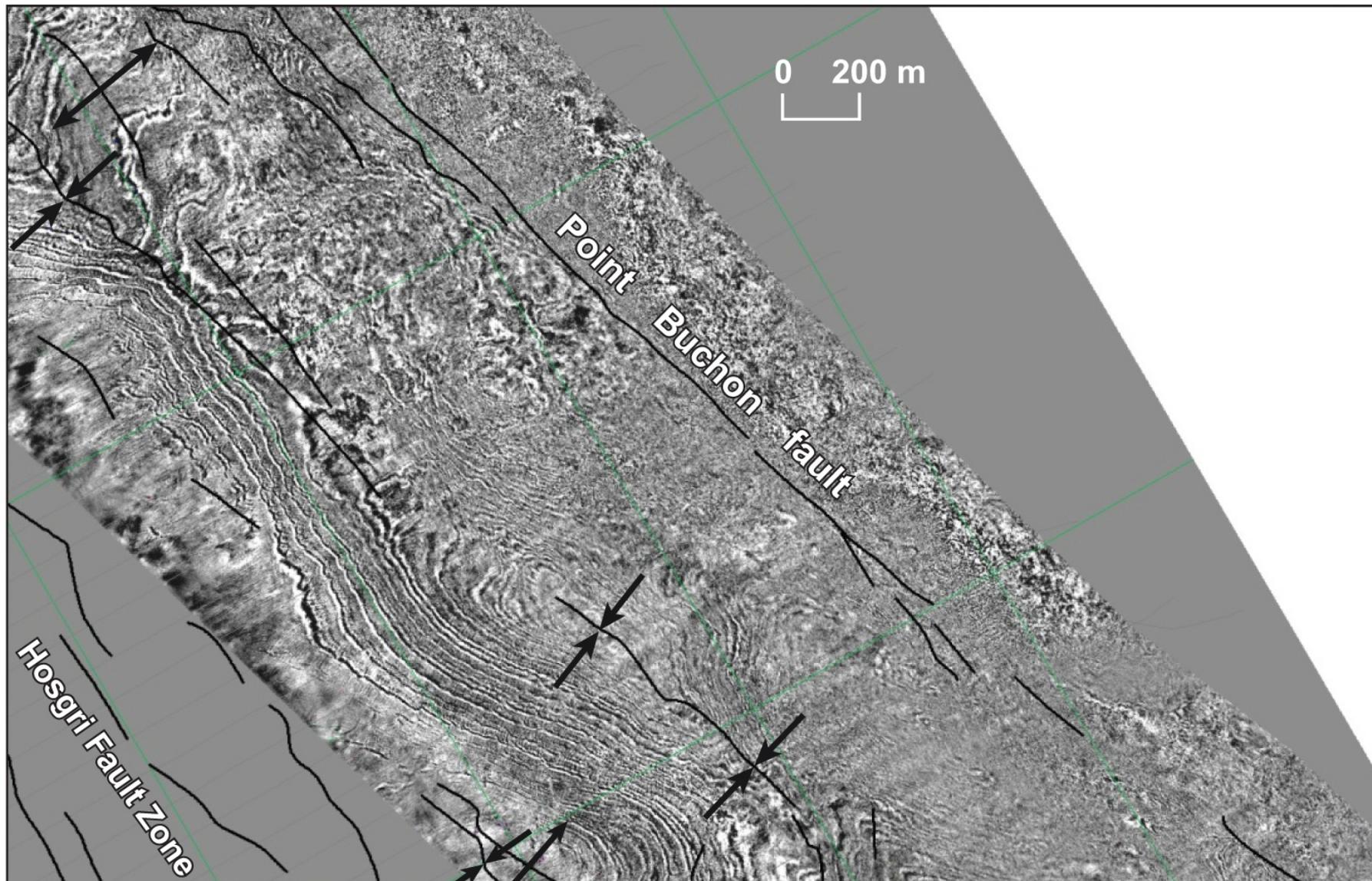
Subsequent Infill of bins without data

Amplitude Timeslice at 0.150 seconds TWTT

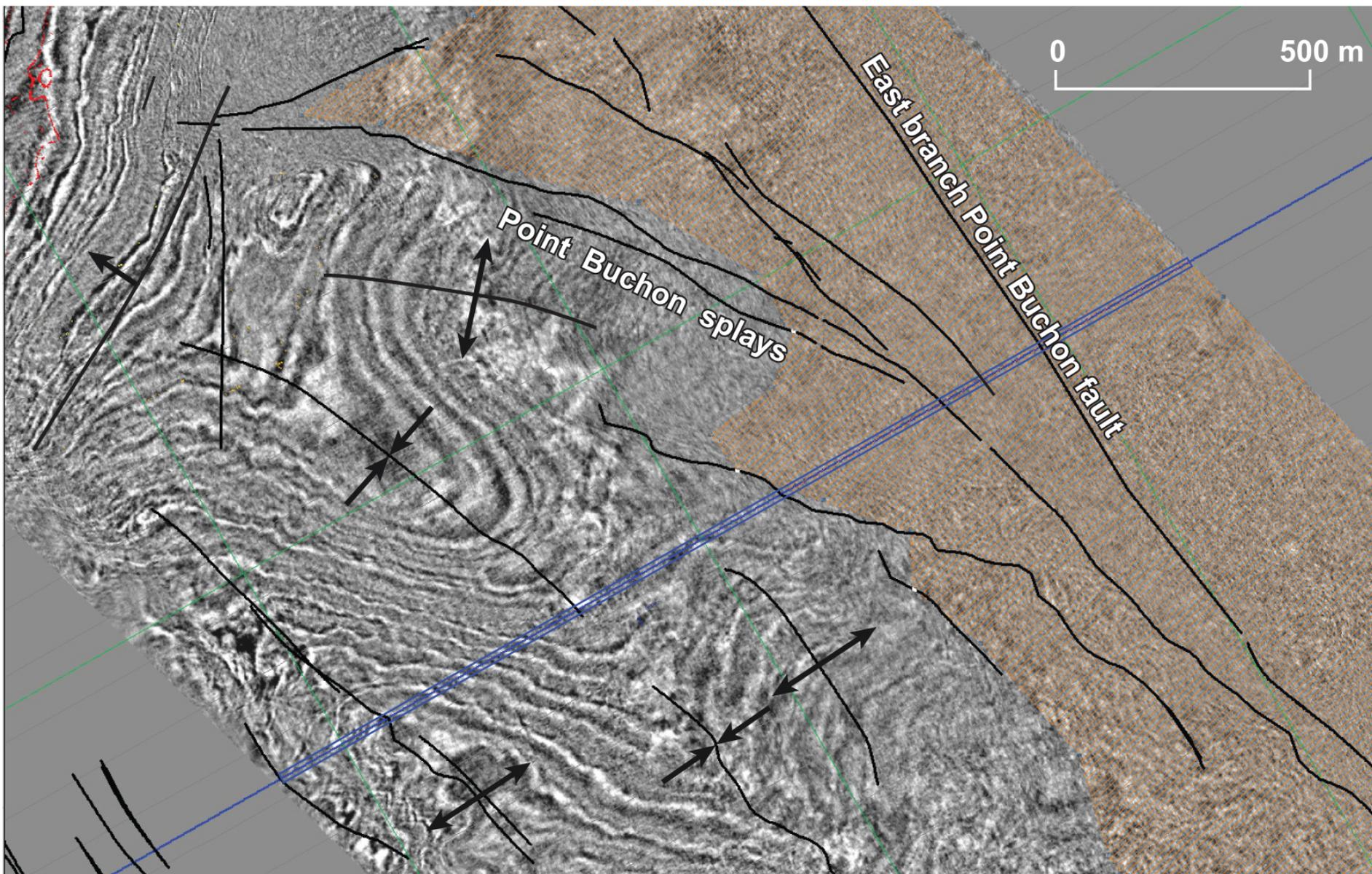


Interpreted

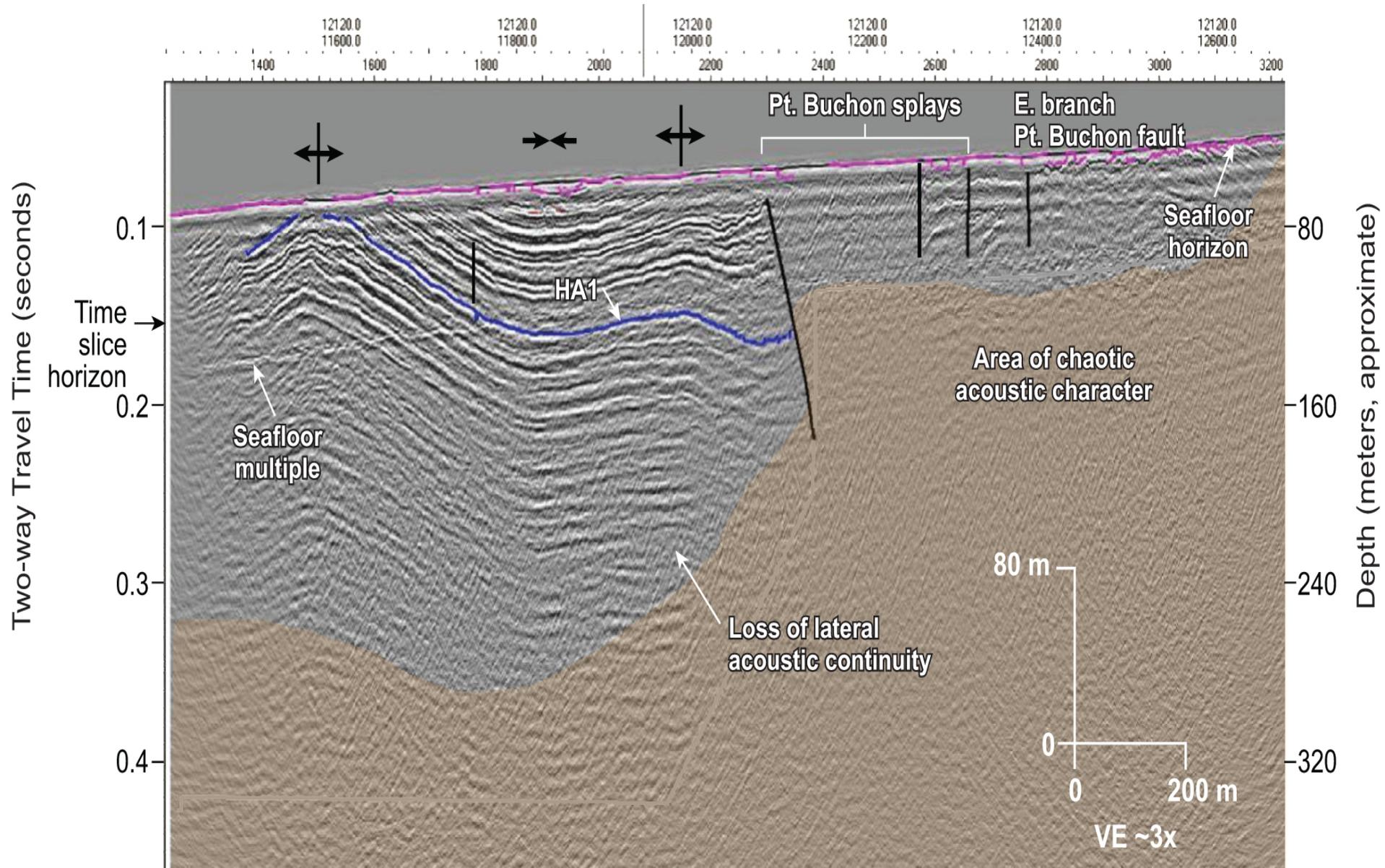
B)



Amplitude Timeslice at 0.150 seconds TWTT



Inline 12120



“Bubble Pulse” at Seafloor

