PETROSYS

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Examples of GLOBE Claritas Processing

- Refraction Statics
- Removal of Noise (Land, 3D)
- Removal of Swell Noise
- Interpolation : shots/receivers
- Interpolation : 5D (STITCH)
- Demultiple : High Resolution Radon
- Demultiple : SRME
- Residual Statics
- Automatic Velocity Analysis
- Imaging

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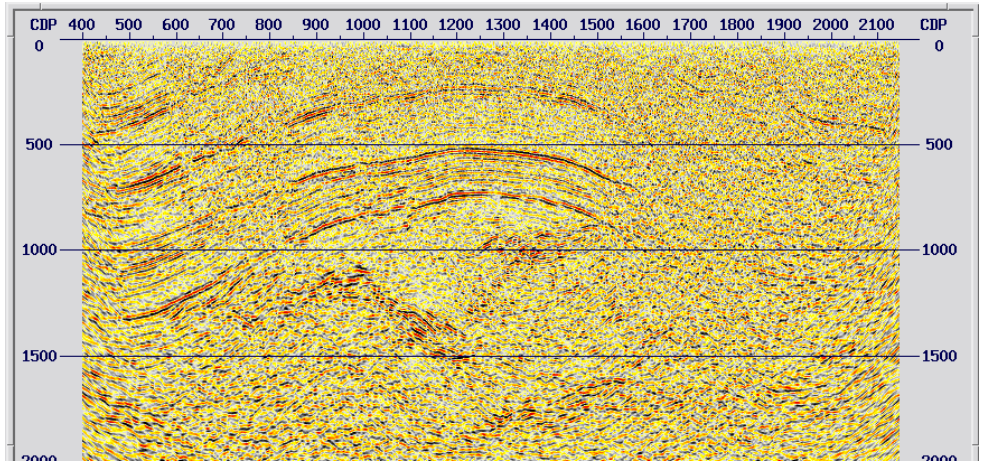
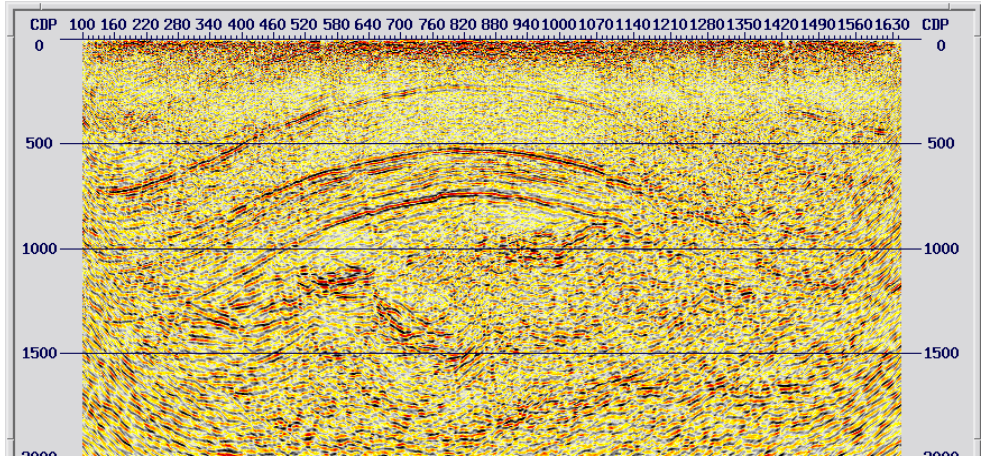
REFSTAT : 2D Refraction Statics



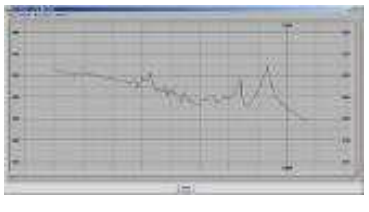
Previous Solution



GLOBE Claritas Solution

Data shot along a road with rugged topography and crooked line survey approach, with high near surface velocities (3500m/s)

***GLOBE* Claritas 2DRefstat**



Line Elevations

Line Geometry

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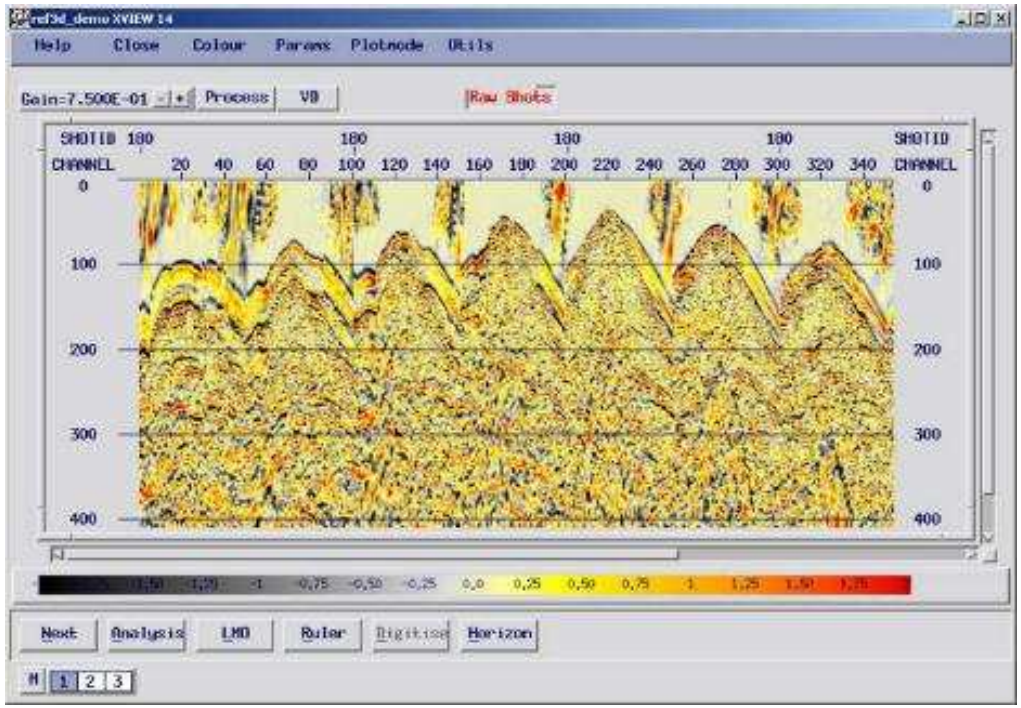
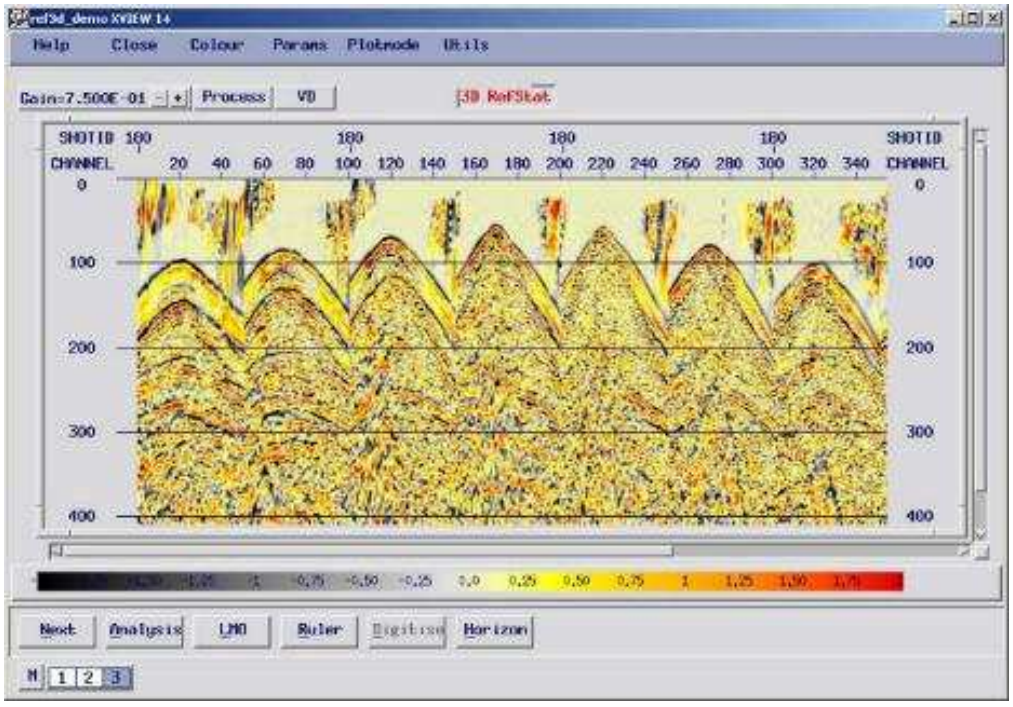
REFSTAT : 3D Refraction Statics





The RefStat approach is equally effective on 3D data or where the issue is low near surface velocity anomalies of varying thickness

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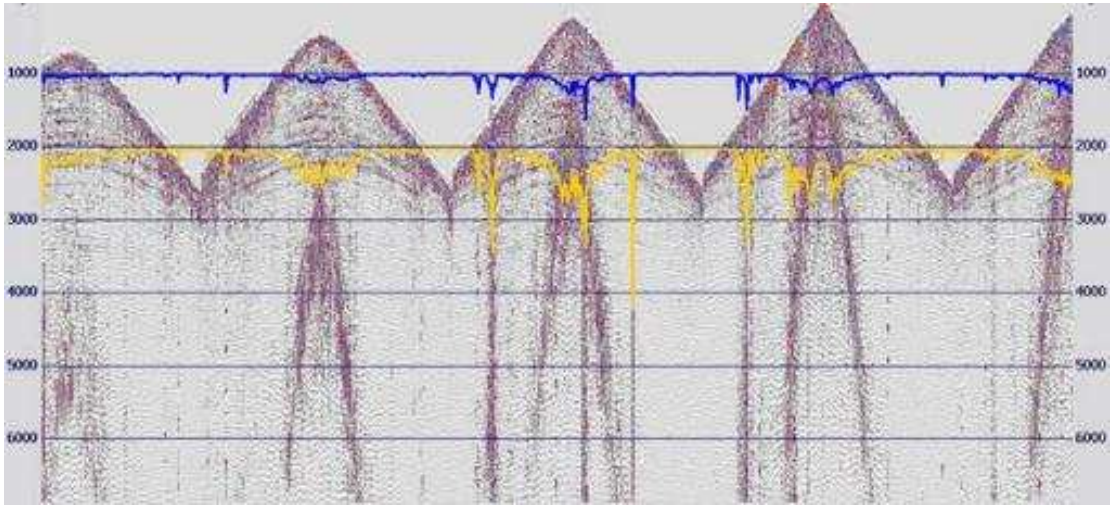
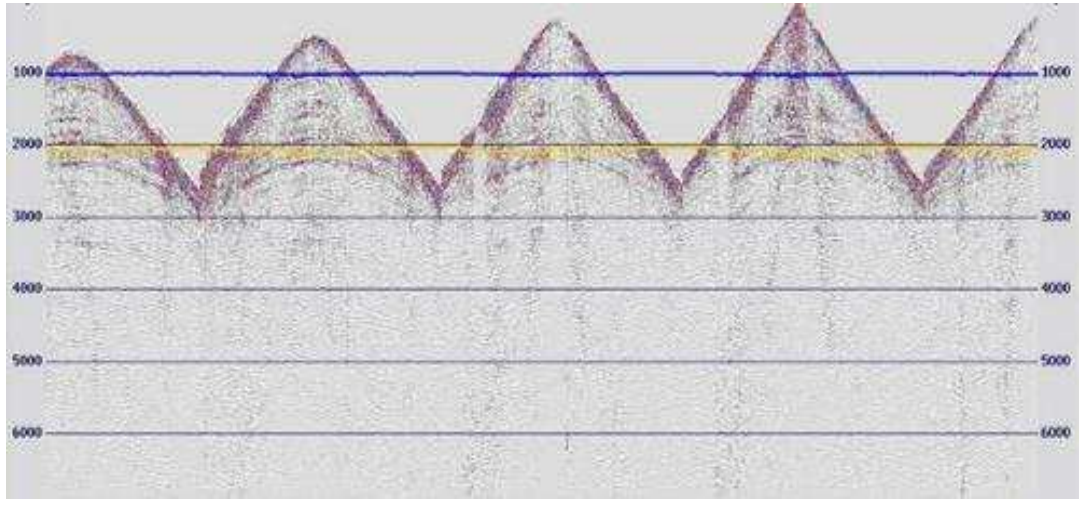
Improving the quality of 3D land shots





Interactive analysis tools and the ability to spatially vary workflows allows users to rapidly optimise the quality of pre-stack land or marine seismic data.

In this case, RMS (blue) and peak (yellow) amplitudes are used to guide land noise attenuation approaches on 3D datasets

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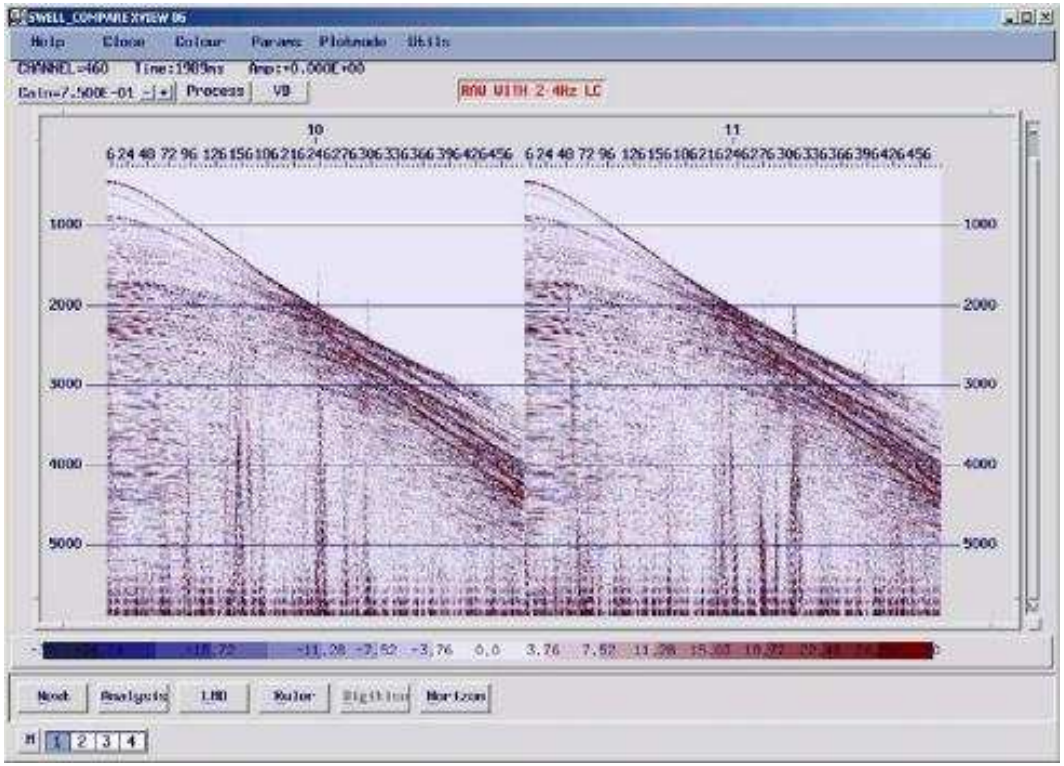
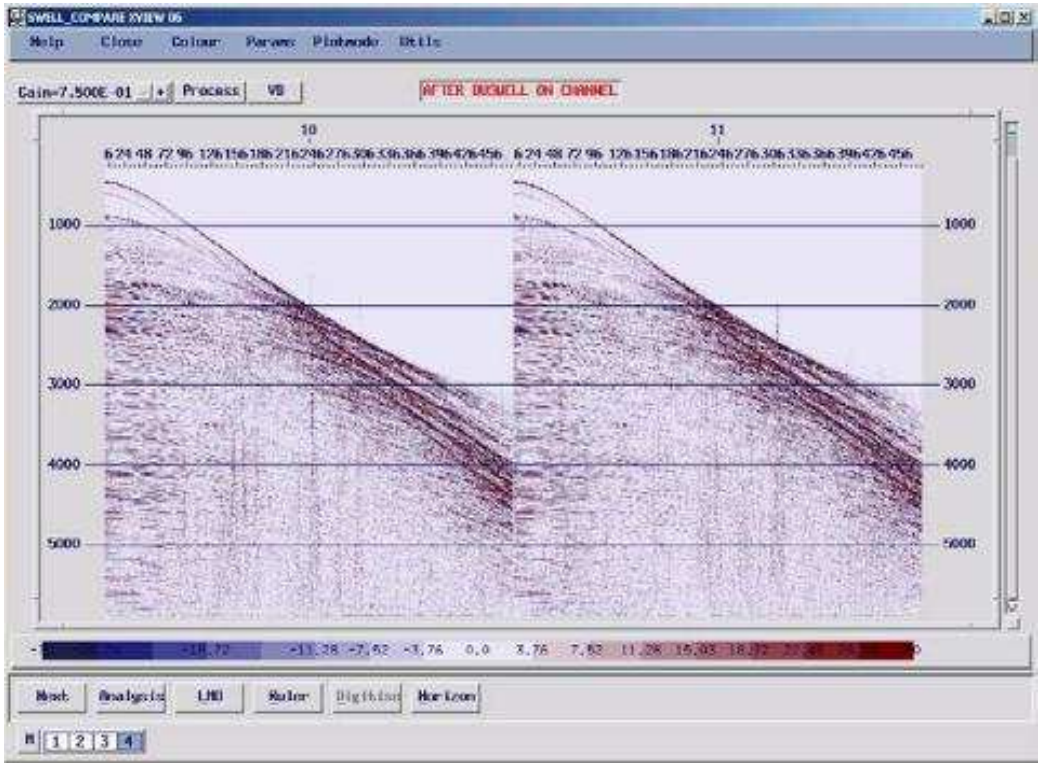
Swell Noise removal with DUSWELL





DUSWELL removes swell-noise trains from the data without compromising the overall frequency content. Like most modules, it can be run in parallel on any number of cores/CPUs.

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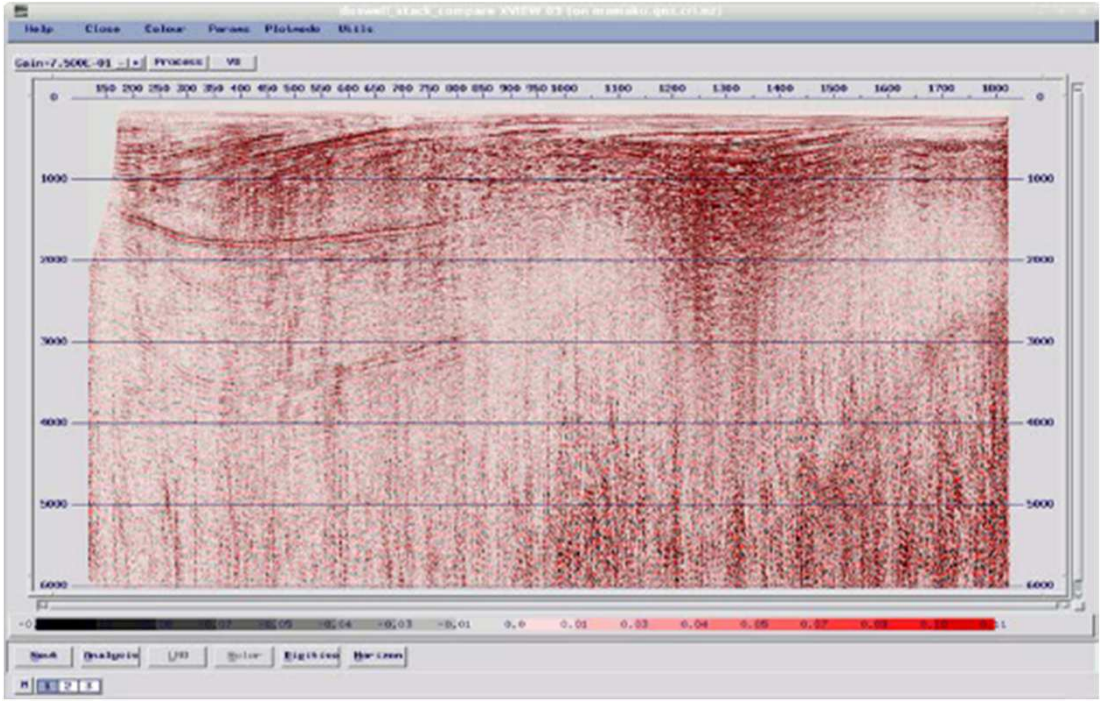
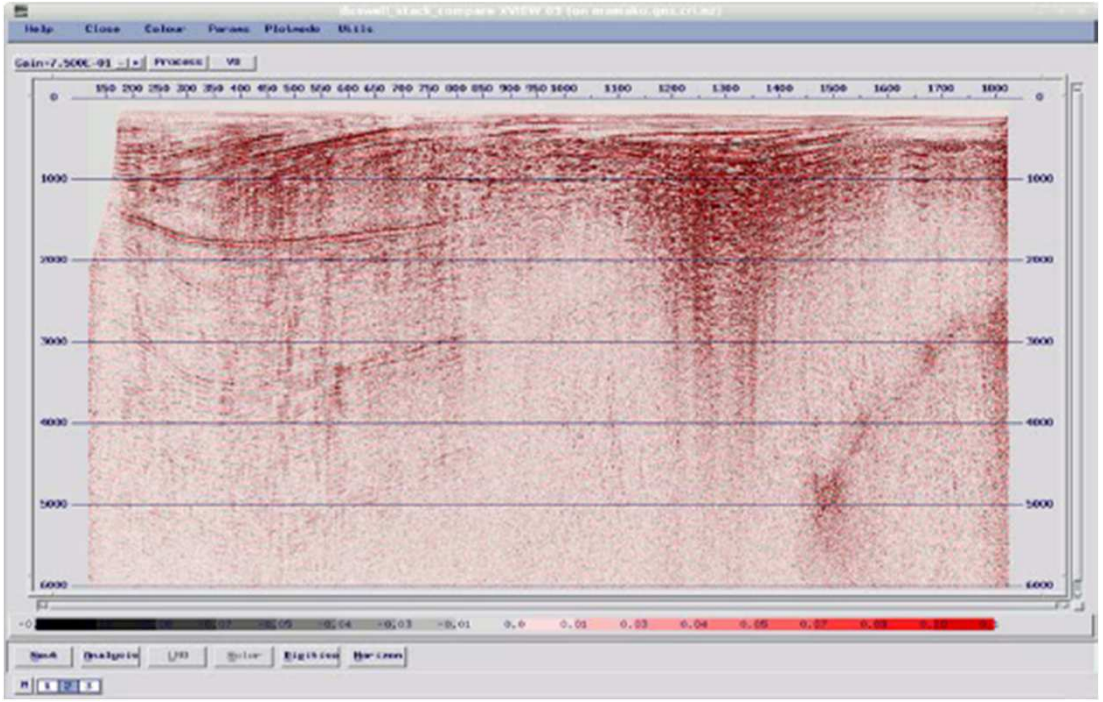
DUSWELL : impact on stacked data





DUSWELL removes swell-noise trains from the data without compromising the overall frequency content.

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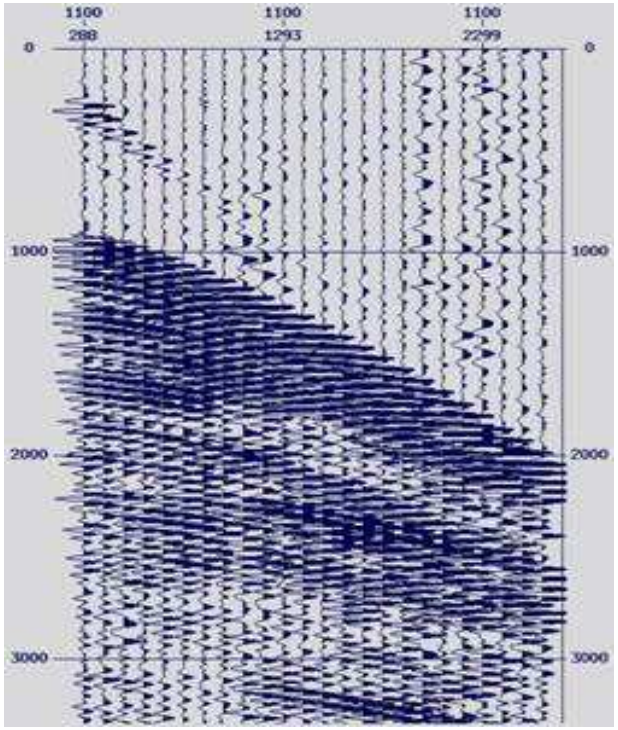
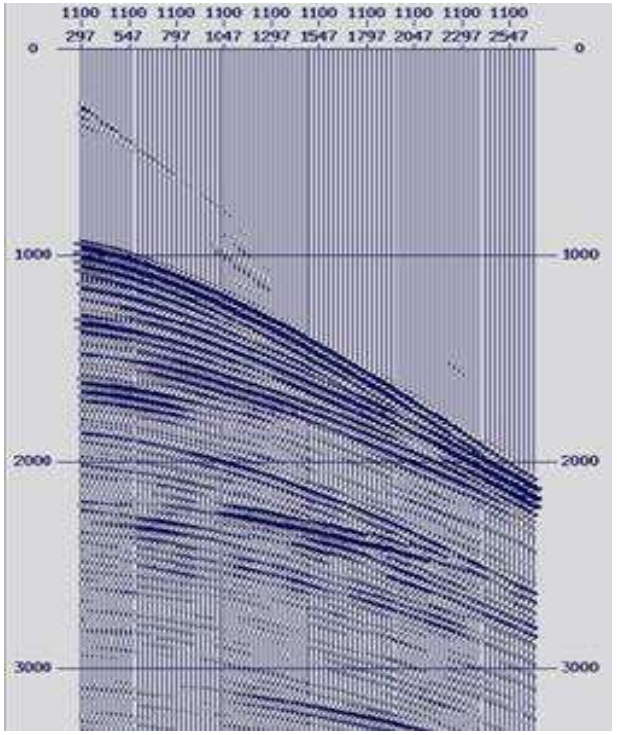
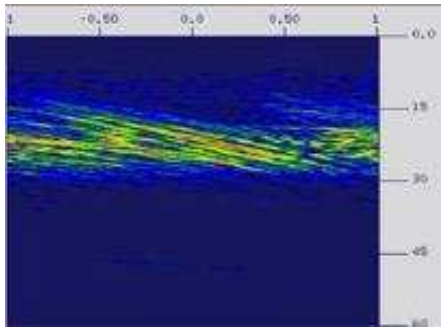
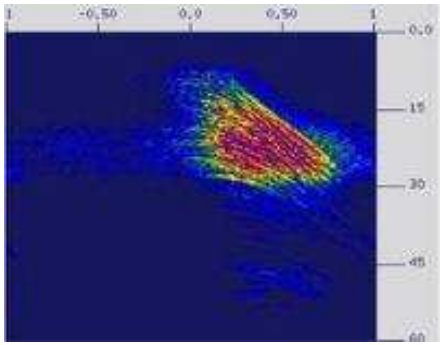
Interpolation : Shots









Interpolation Results

Example of interpolating a shot record from 24 fold to 96 fold using the OFFREG spatial resampling processor.

Original group interval (100m) has been interpolated to 25m.

FK plots (below) illustrate the extent to which this has unwrapped the steep-dip spatial aliasing issues caused by the course group interval.

Original data was acquired in 1974.

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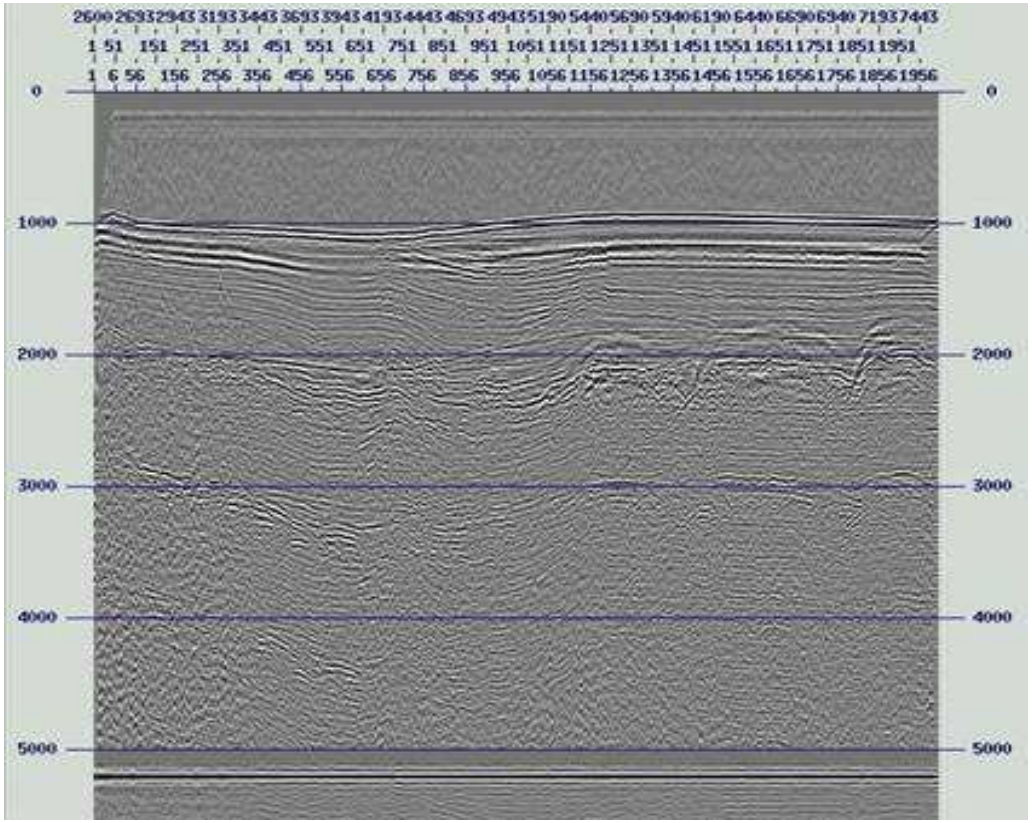
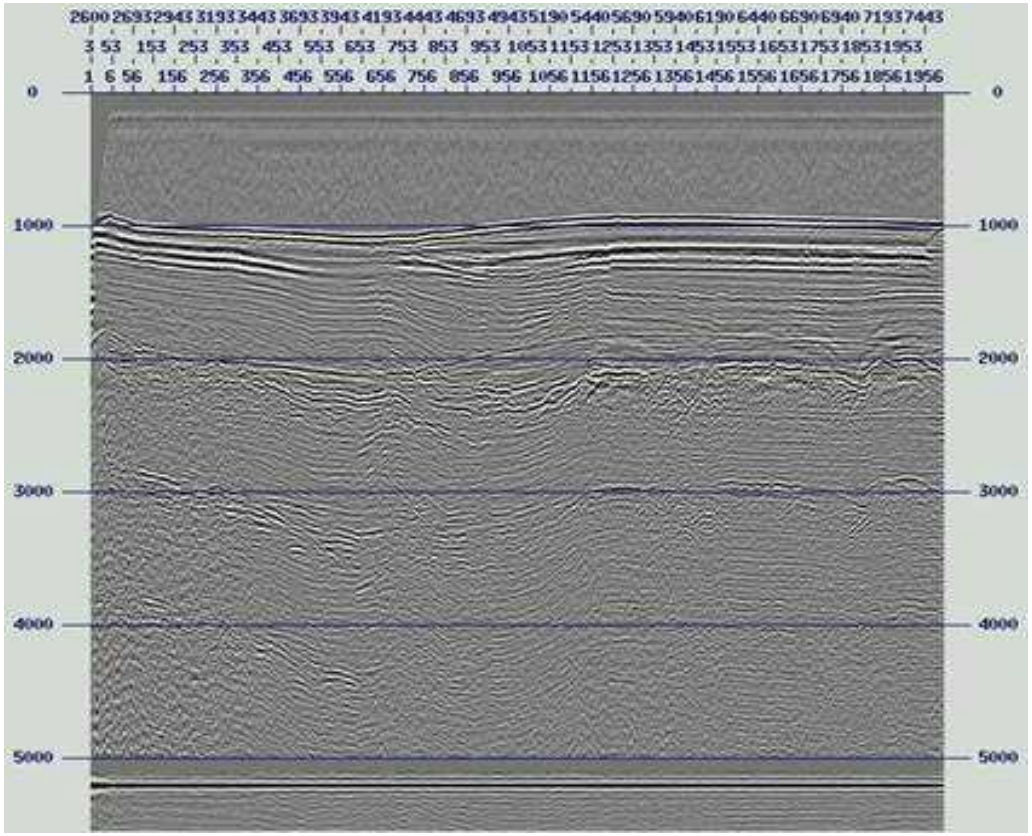
Interpolation : Stacks, reprocessing old data



No Interpolation Applied: 16 fold



Interpolation applied : 96 fold

The OFFREG interpolation routines fully resample the waveform with offset and so regularises and interpolates the dataset. Used in this example in conjunction with shot point interpolation

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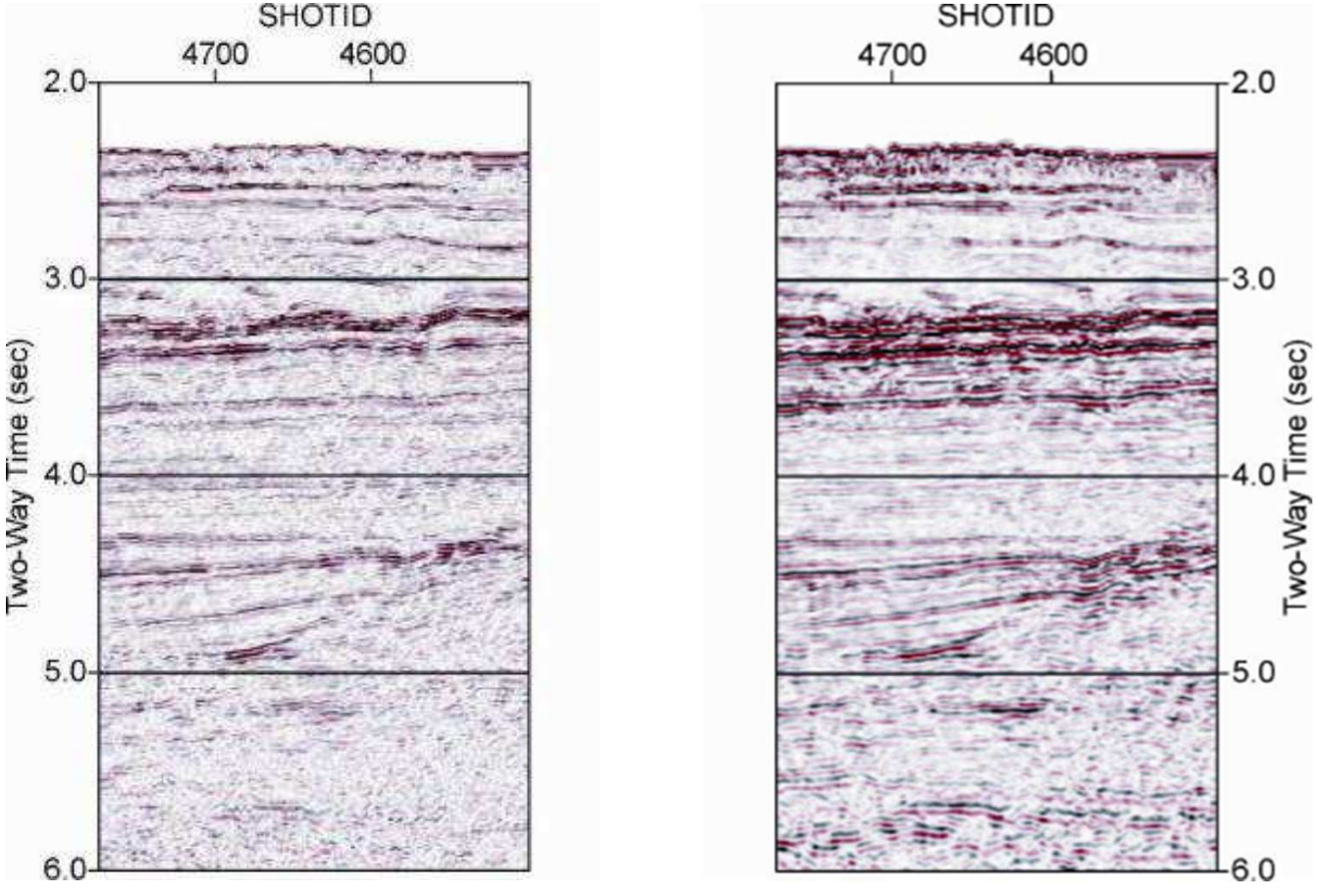
Offset Regularisation and Interpolation



Regularised and interpolated results have no spatial aliasing and better resolution

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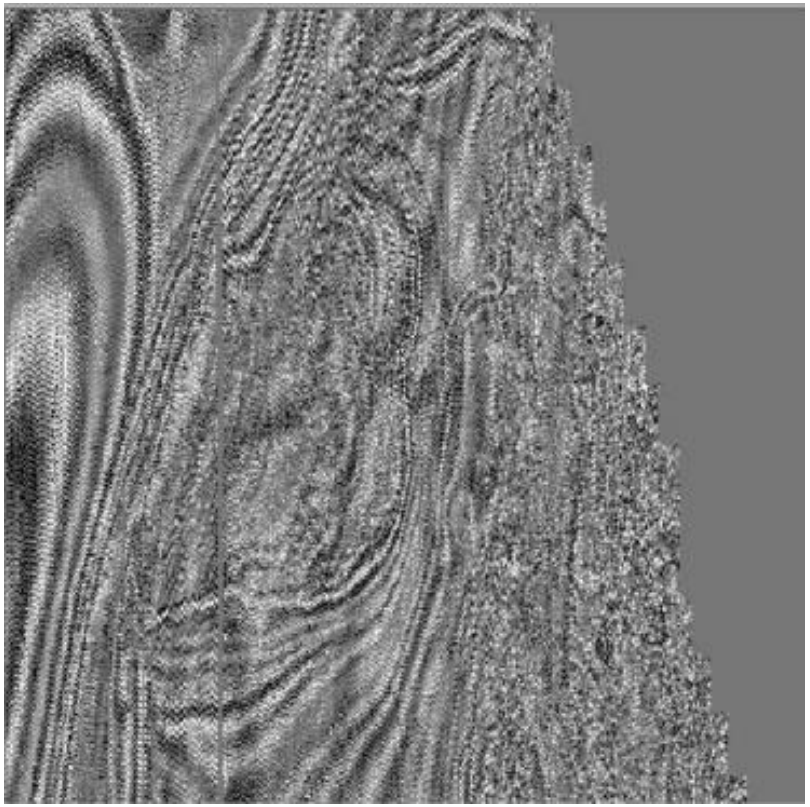
5D Interpolation : STITCH



Input data : single offset plane

STITCH applied to regularise, interpolate

480m offset plane, 900ms timeslice

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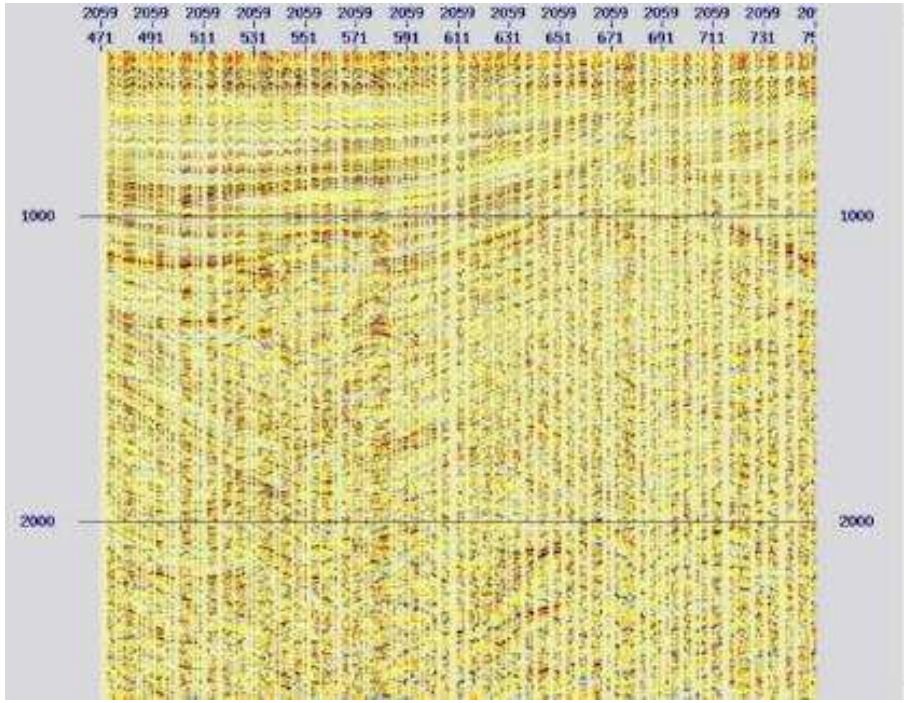
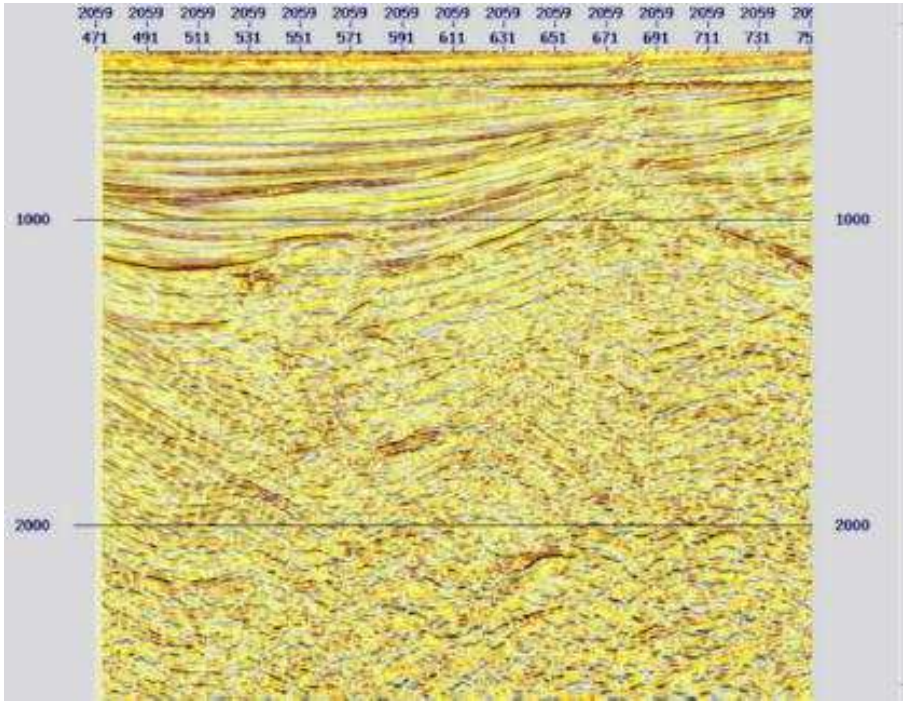
5D Interpolation : STITCH



Input data : single offset plane



STITCH applied to regularise, interpolate

480m offset, crossline

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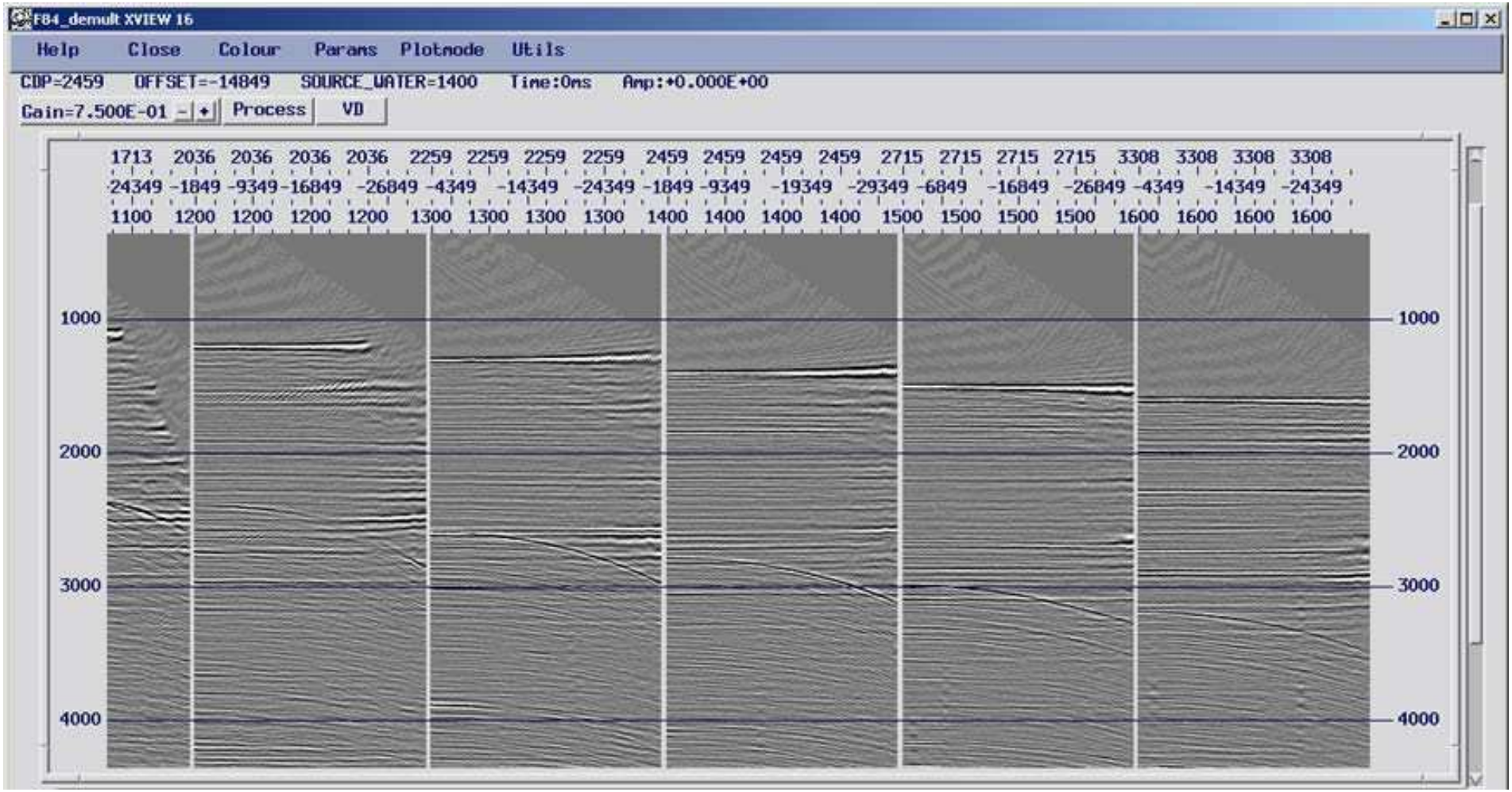
Demultiple : Input Data



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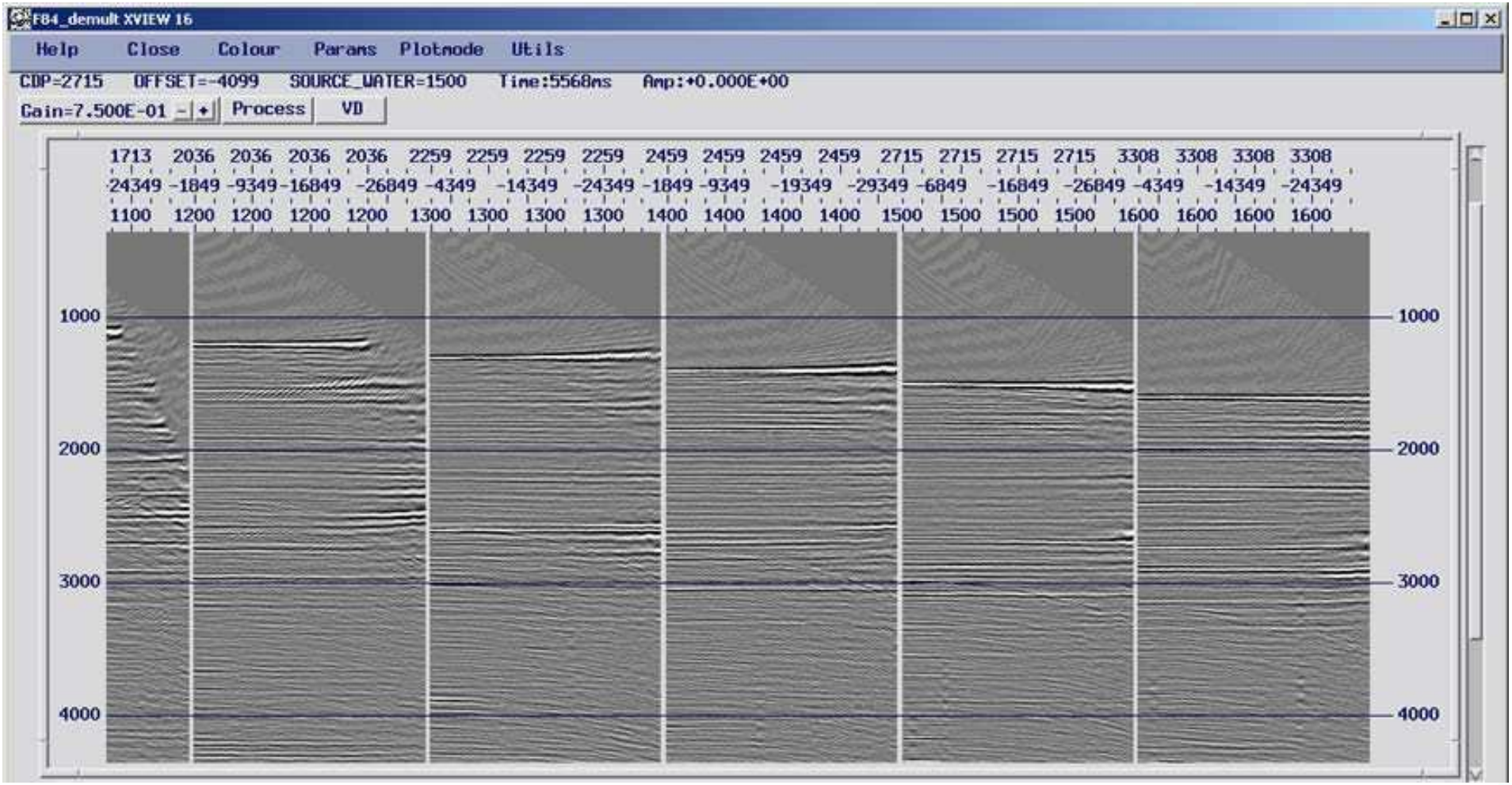
High Resolution Radon Demultiple



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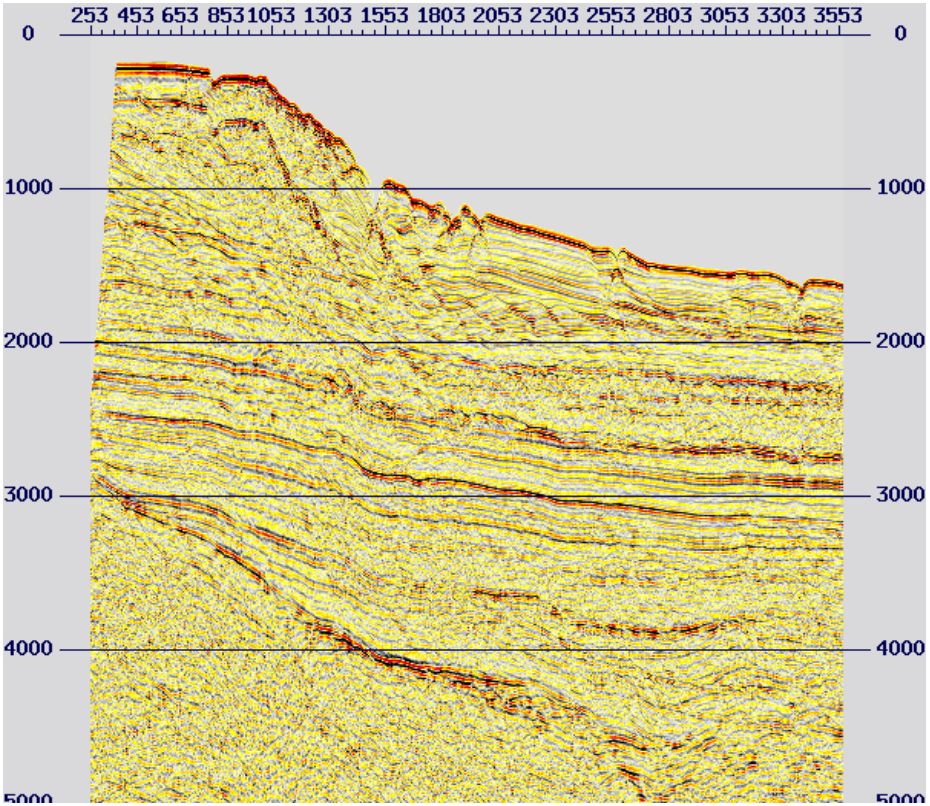
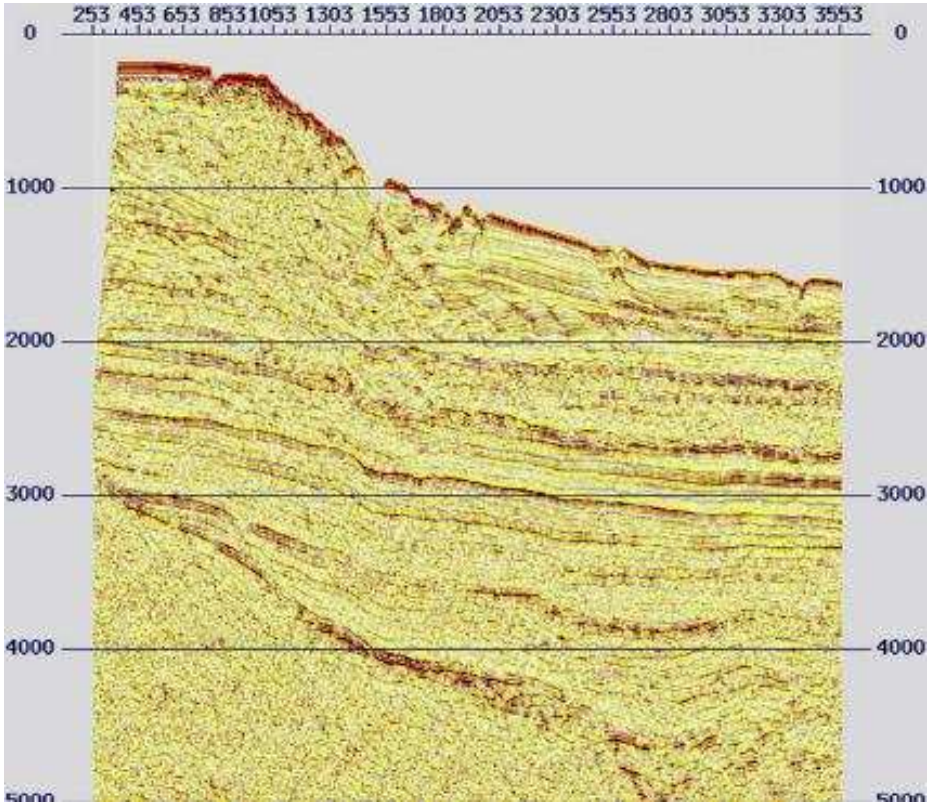
SRME : Model-based demulitple





SRME models can be generated in parallel on a cluster, complete with a spatial aperture for more complex multiple systems.

Adaptive subtractions to remove mutliples also run in parallel

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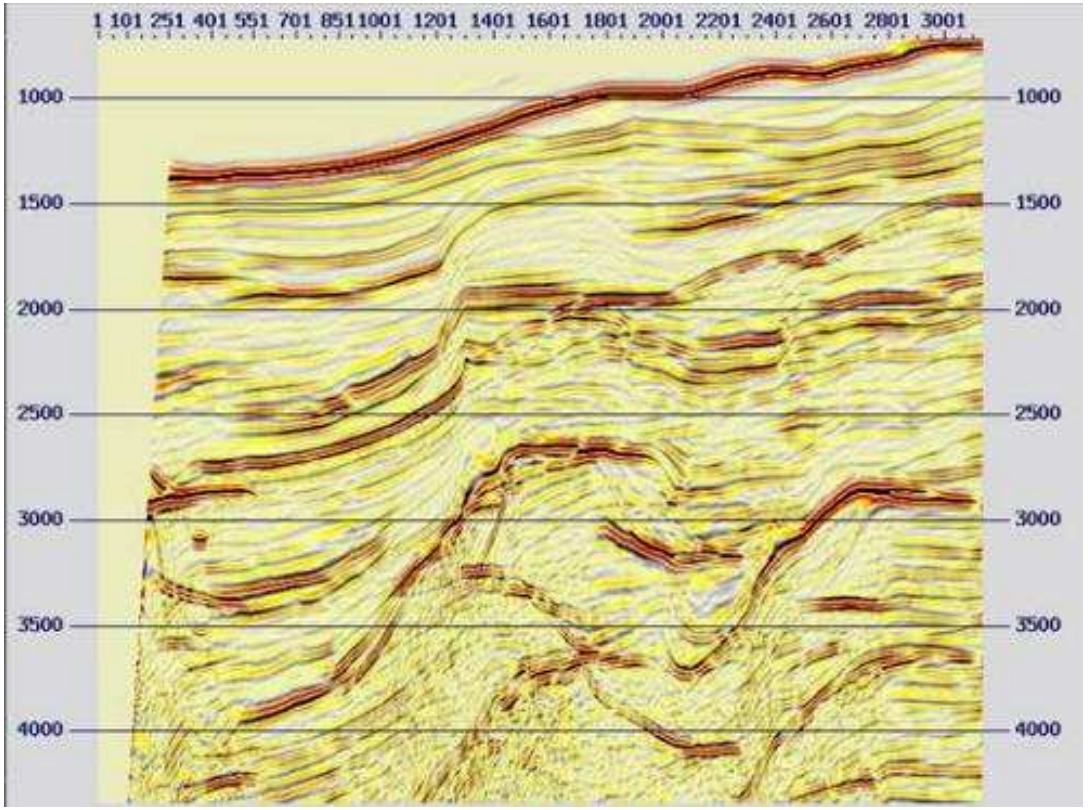
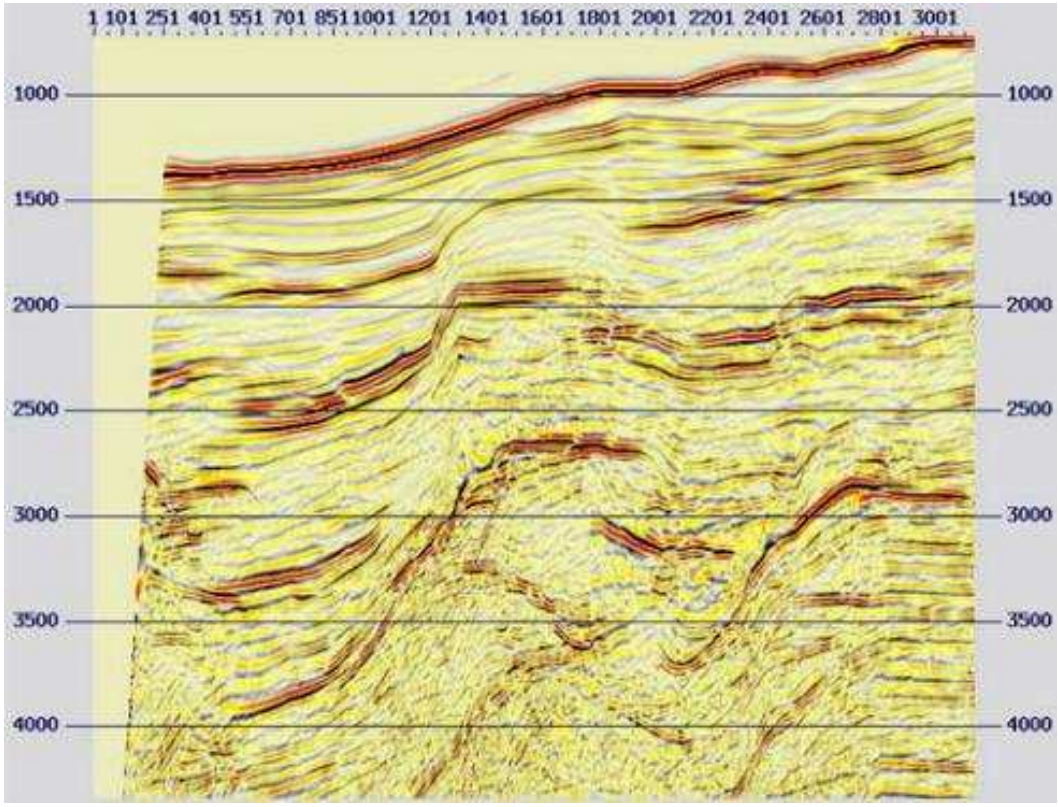
SRME : Applied to Pluto synthetic dataset





Addresses first and second multiple “bounce” issues

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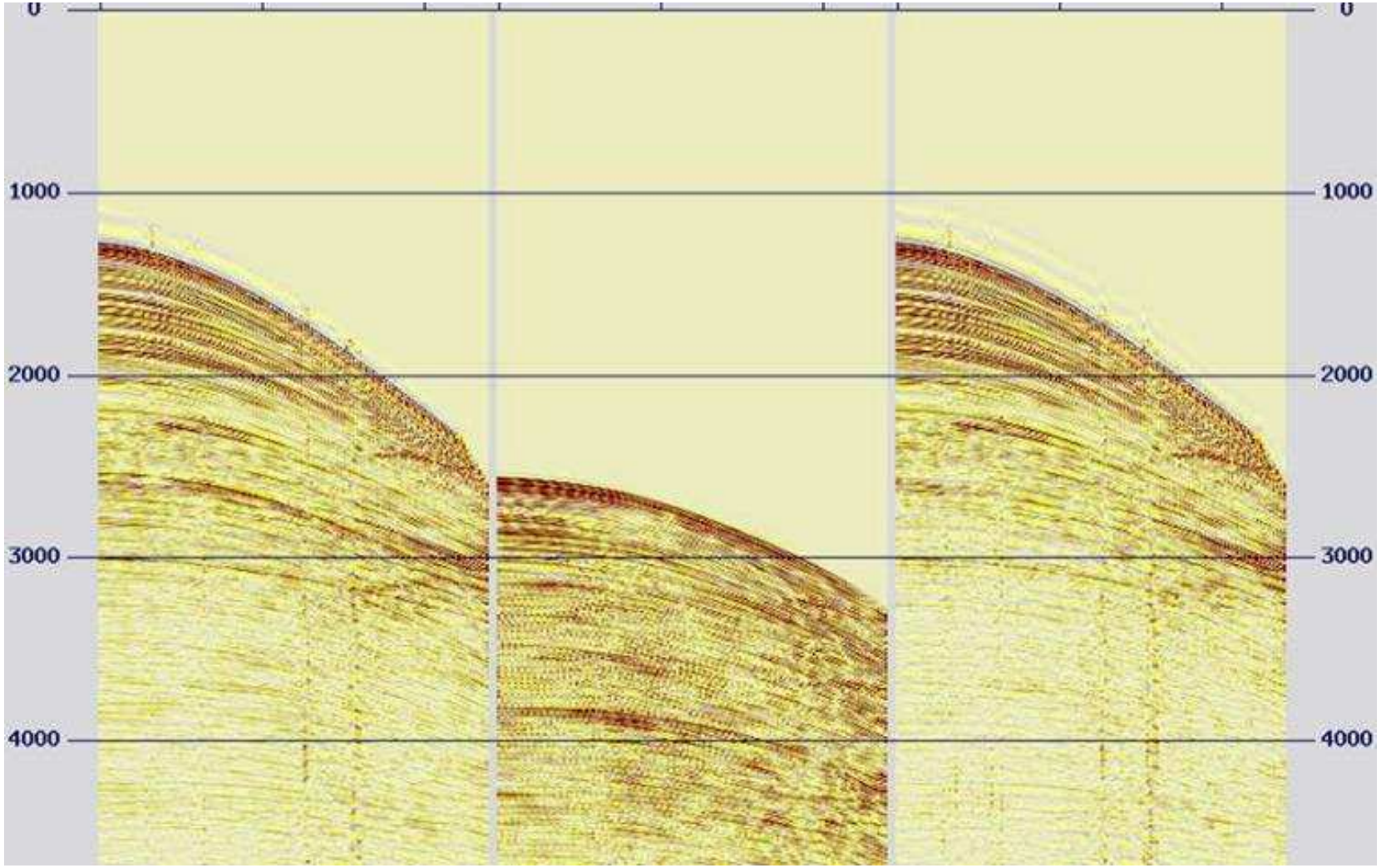
SRME Example

Original Shot | SRME Model | Subtracted Result



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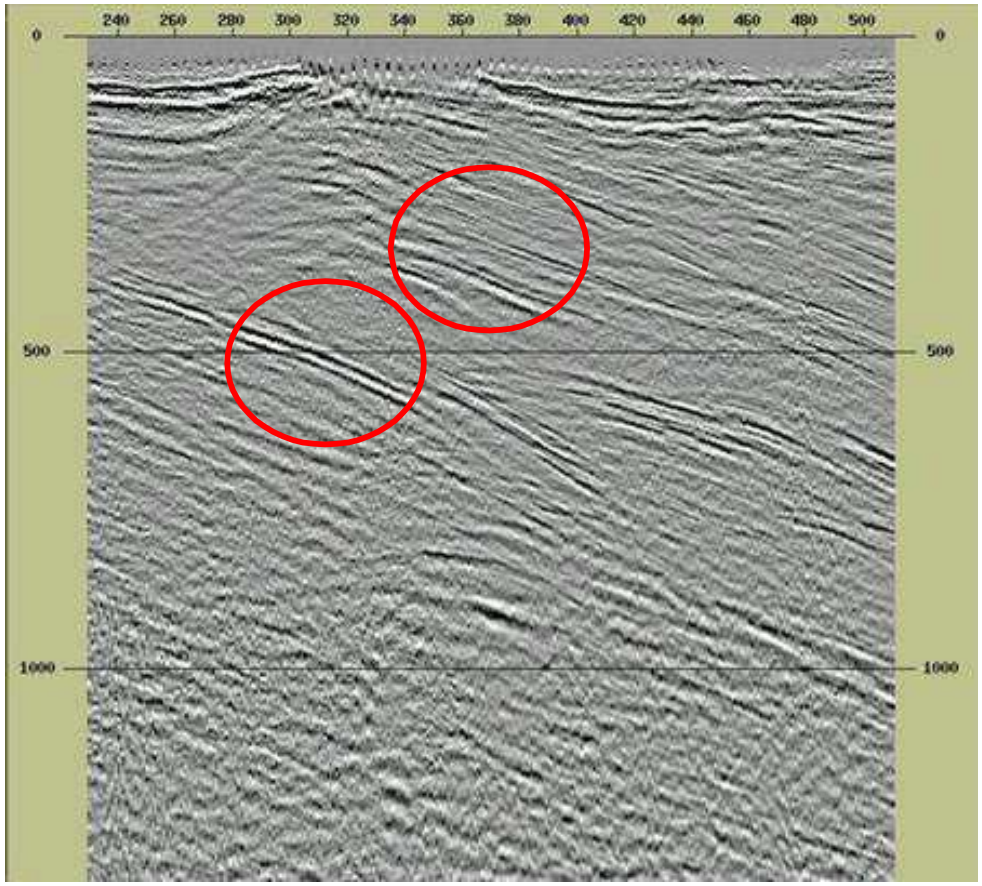
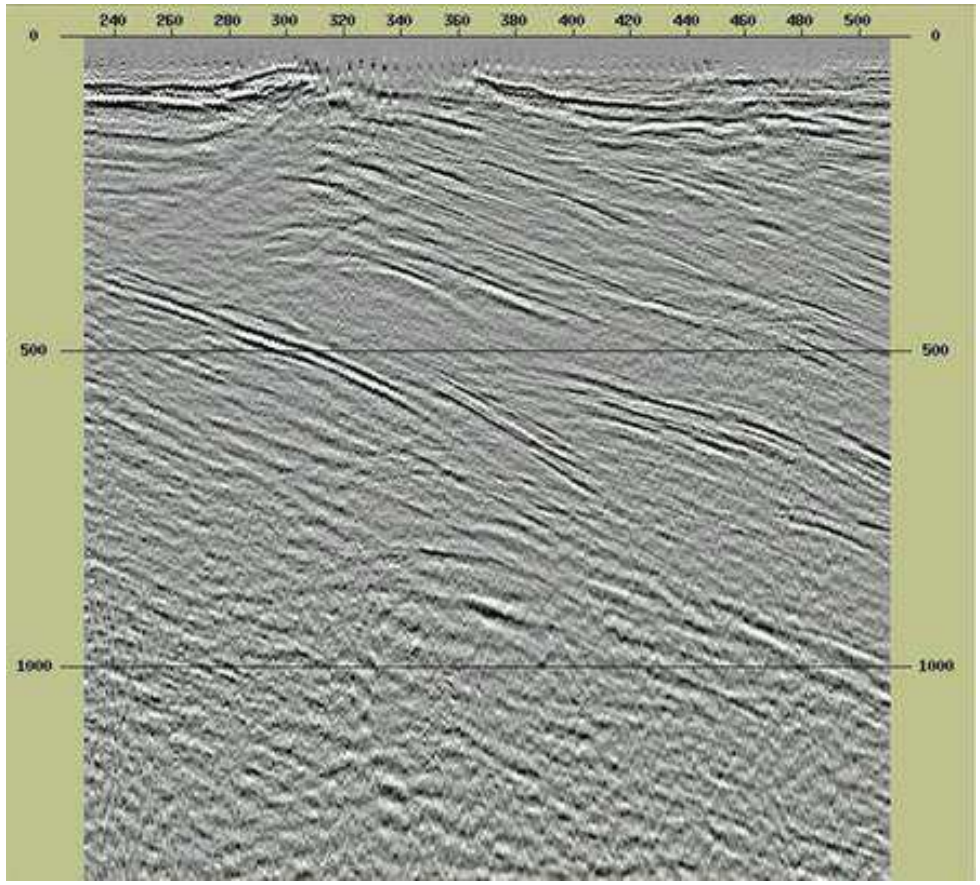
Residual Statics Example

Stack After 1st Pass velocities



After Residual Statics



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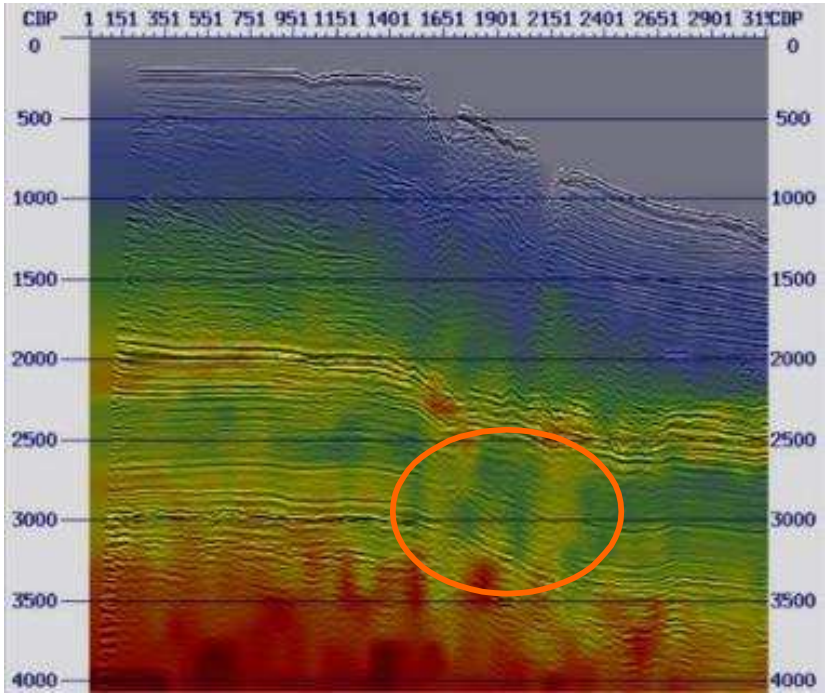
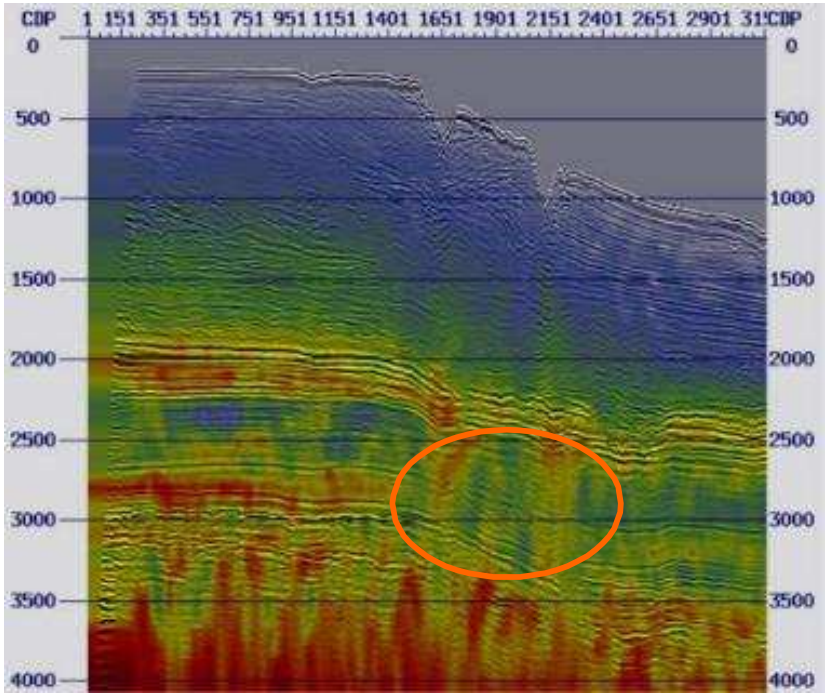
Improved Velocity Analysis Results

Manual Velocities : 2km spacing



Original Picking

Automated High Density Velocities



GLOBE Claritas Result

- Interval velocities overlaid on stacked seismic image
- Manual, fixed increment picking gives a poor result under canyons
- GLOBE Claritas automated picking gives an improved result

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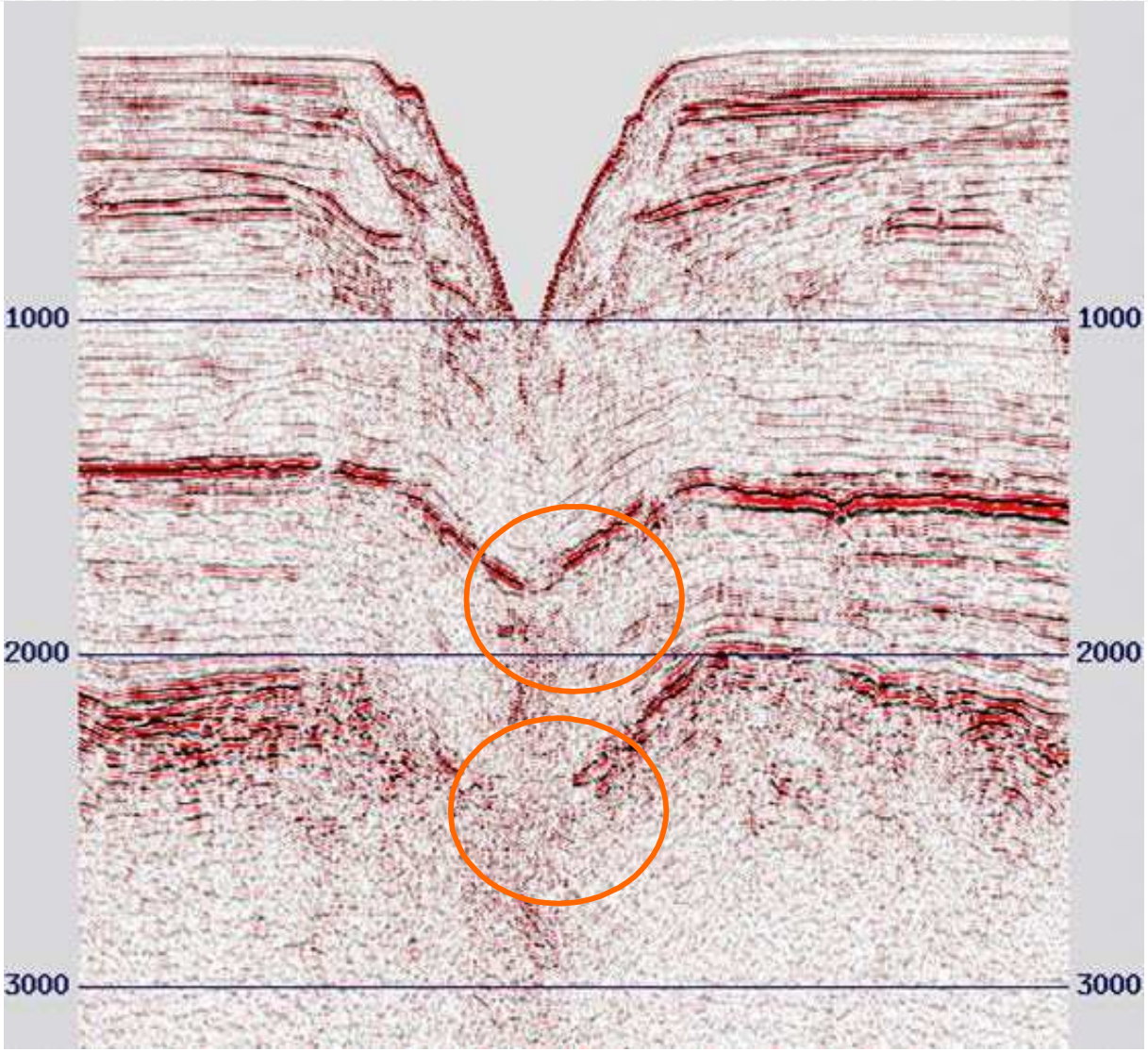
Solution : Imaging Under Channel, original



Original post stack migration

The channel creates a low velocity zone with steeply dipping sides that defocuses seismic energy.

Imaging is severely disrupted under the channels.

Channels are all across the prospect area.

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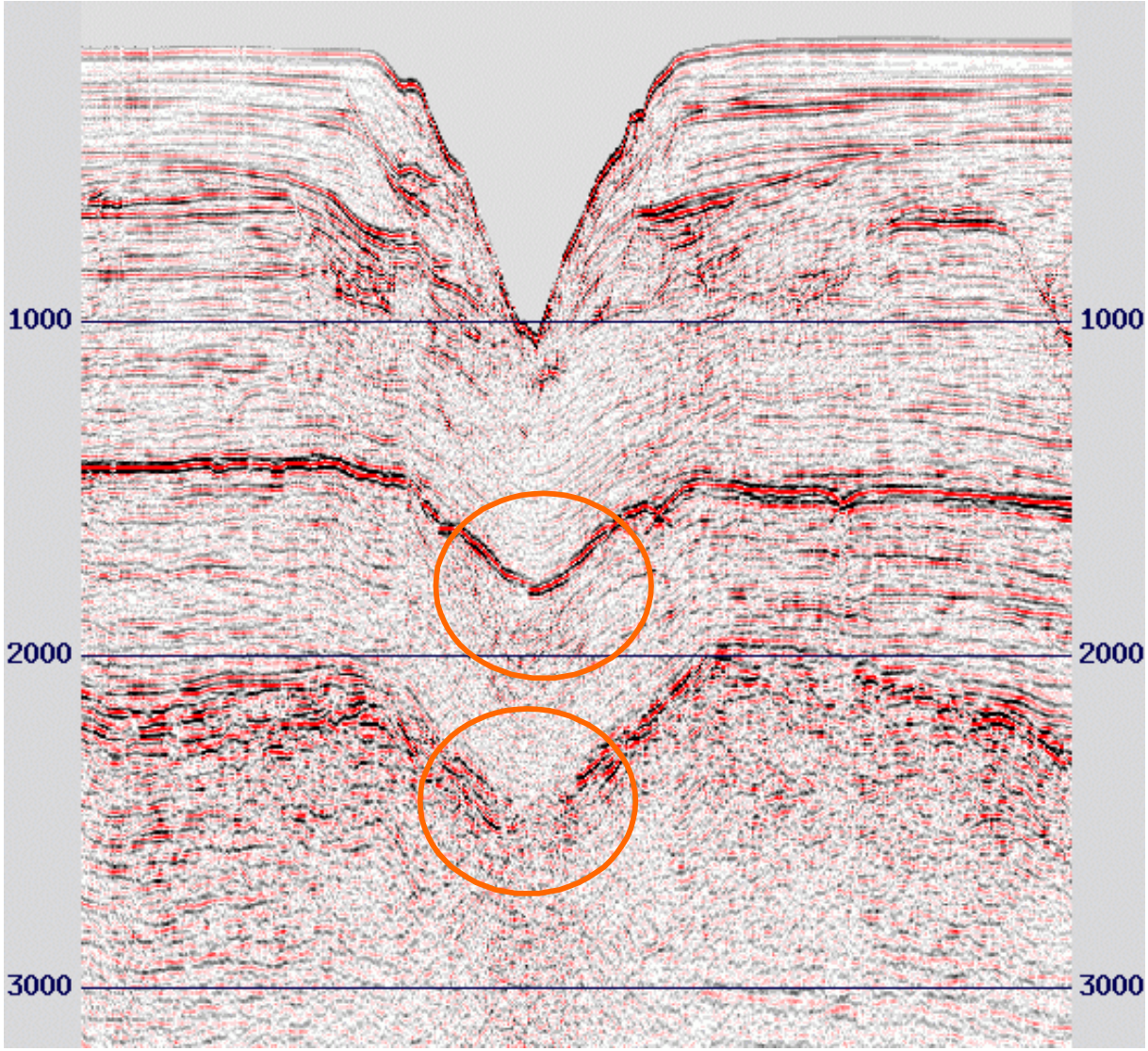
Solution : Imaging Under Channel, PreSTM



Pre-stack Time Migration using HDVA velocities

Solution is improved, but not complete.

Ray path bending is not fully accounted for by the preSTM alone, and additional imaging is needed

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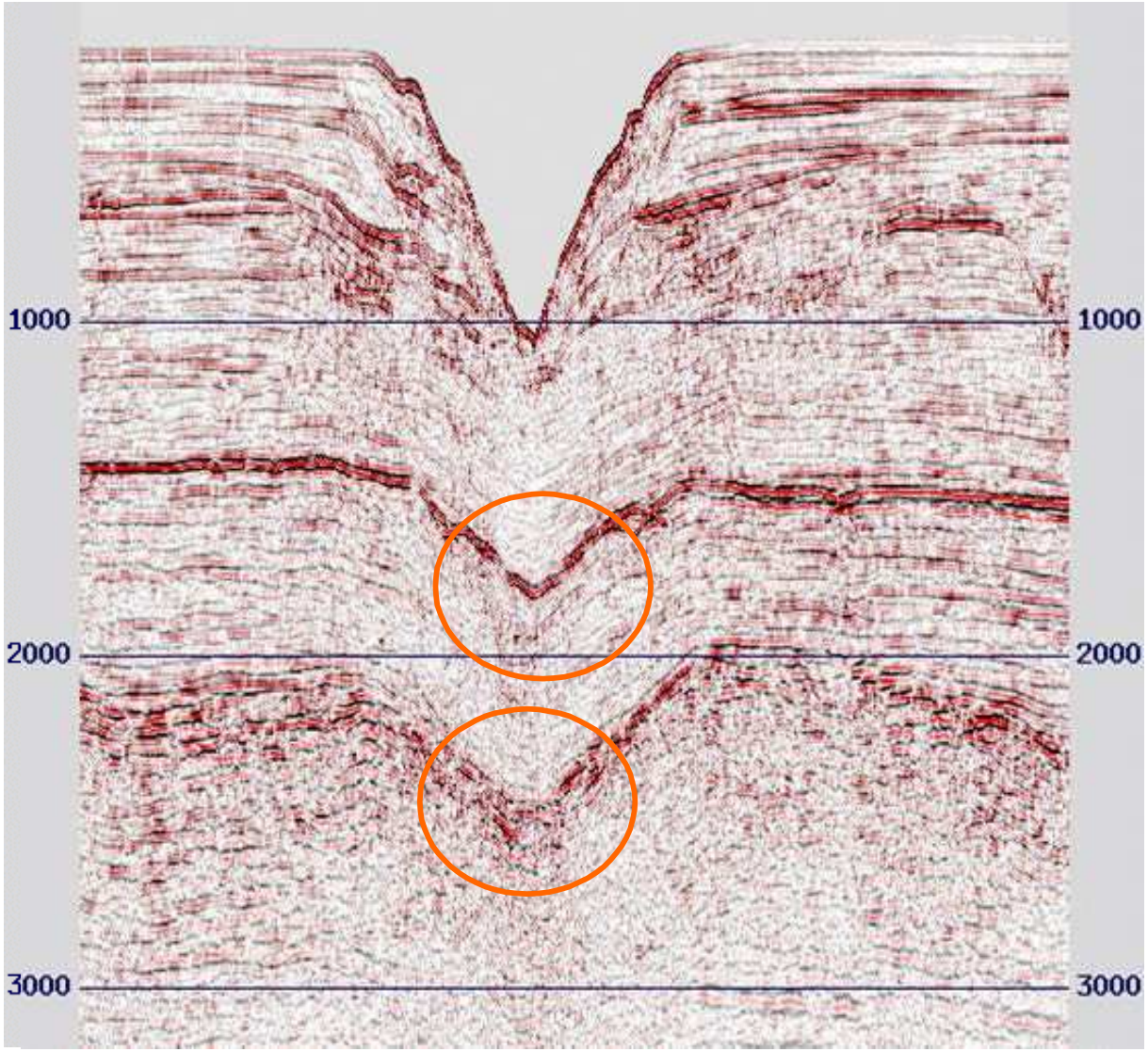
Solution : Imaging Under Channel, PreSDM



Pre-stack Depth Migration

Complete solution.

Modelled channel and near surface velocities successfully correct for the ray-path bending at the sea-floor, as well as the bright limestone event (approx 1500ms)

Channel shape is unchanged in all cases – but the velocity variation is correctly modelled.

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