



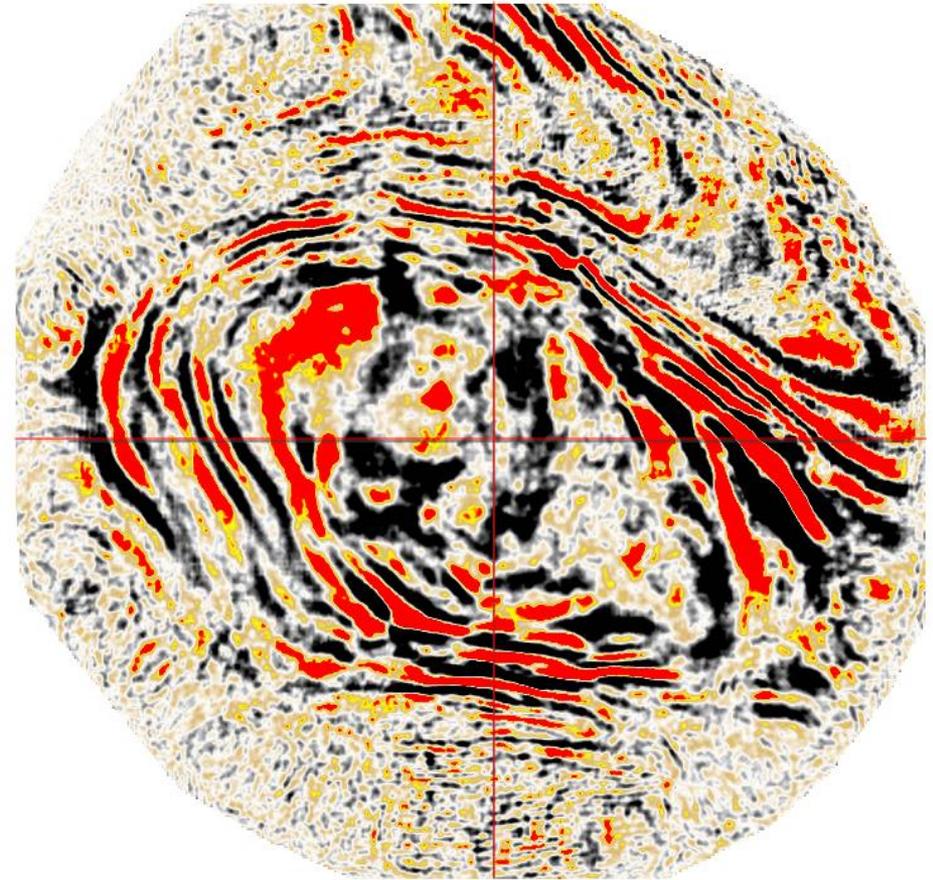
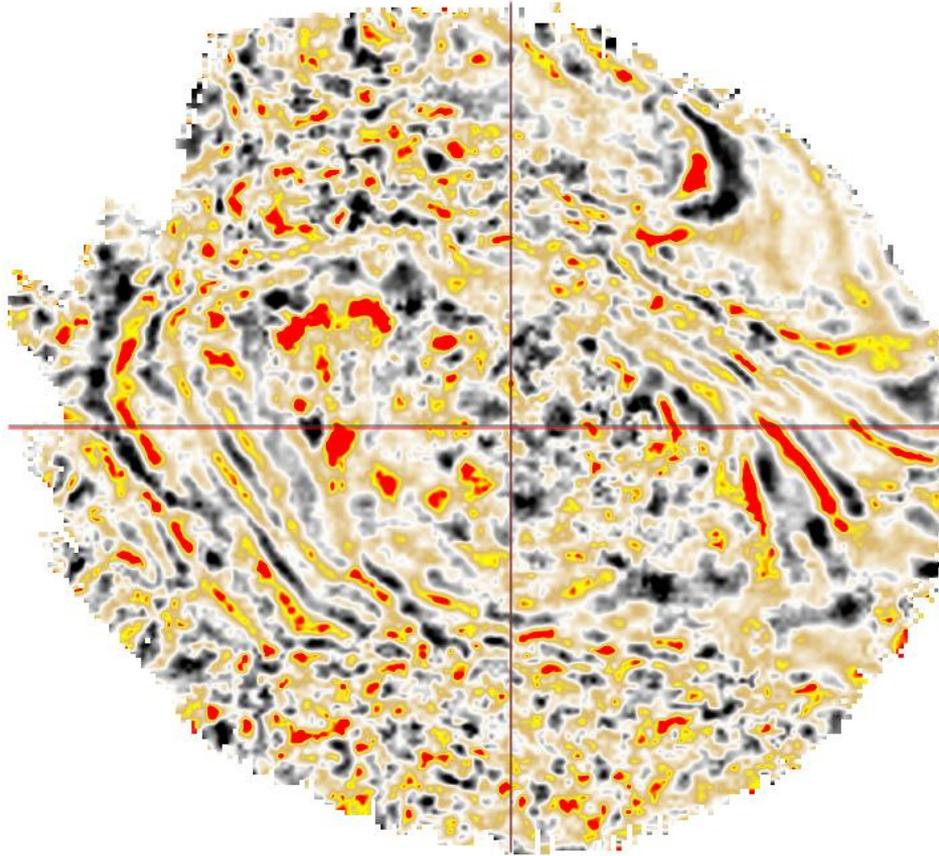
**GEOPHYSICAL SOCIETY OF HOUSTON**  
The Largest Section of the Society of Exploration Geophysicists

# MultiFocusing processing and binning of 3D data acquired over densely populated area

Marianne Rauch-Davies (Geomage)  
Steven Rutherford (Breitburn)  
Eric Campbell (LA Seismic)

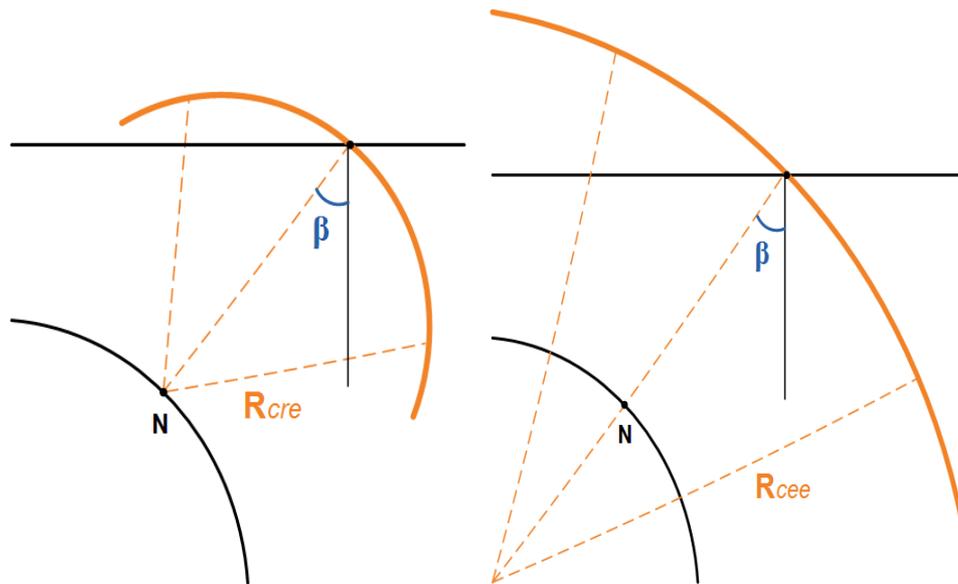


# The image is the message

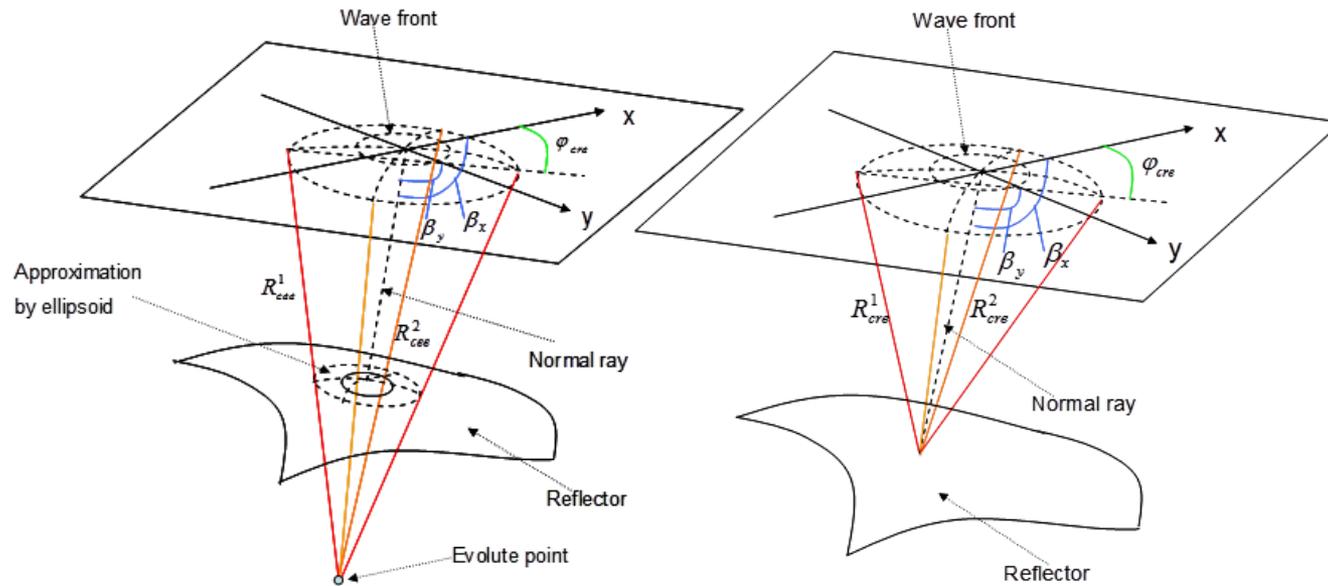


# 2D MultiFocusing

CRE radius / CEE radius / Emergence angle



# 3D MultiFocusing



# Acquisition challenges



- ❑ We were able to shoot about 120 vps per day for 18 days to complete the acquisition. There was a restriction on work hours of 9 am to 3:30 pm.
- ❑ We deployed 72 nodes per team per day and there were 8 teams of 2 men. There were a total of 1980 nodes deployed.
- ❑ We “Hot Swap” (change out old nodes) for new every 11<sup>th</sup> day.
- ❑ There were a number of areas where nodes could not be placed due to Railroad ROW and large trucking company operations that were all paved and the trucks drove everywhere. We were not allowed by the owners to core the cement. Thus the gaps you see in the surface coverage of the nodes.
- ❑ This area is a major rail and truck hub for Los Angeles and the train and truck noise was constant but varied in any one spot. And the 605 Interstate was on the west border of the project with its constant heavy traffic.
- ❑ This was overcome by having a very long sweep effort .
- ❑ We had to have police escort both in front and in back of the 4 vibrators.
- ❑ Vibrators could only be used at lower level.

# More,.....

- ❑ Public notification in an earthquake area like Los Angeles has to be intense. We have 13 people that notify every structure within 600 feet of the vibrators. They knock on every door and give a brochure and explain what the person is about to experience is not an earthquake. Also, one week before, we mail out to all the addresses within 600 feet of the operation in addition to the above exercise.
- ❑ We have a web site as well, and the brochure and web site have contact information for LA Seismic.
- ❑ The City is asked to refer any calls to us to reduce the work load on the City.
- ❑ We permitted Norwalk, Downey, County of Los Angeles (two districts), City of Santa Fe Springs and Whittier.
- ❑ To permit, survey and dig the node hole locations took almost 9 months and then to shoot only took the 18 days.
- ❑ The clean up afterward took about 3 weeks

# Notifiers



# Nodes were planted



# Nodes were planted



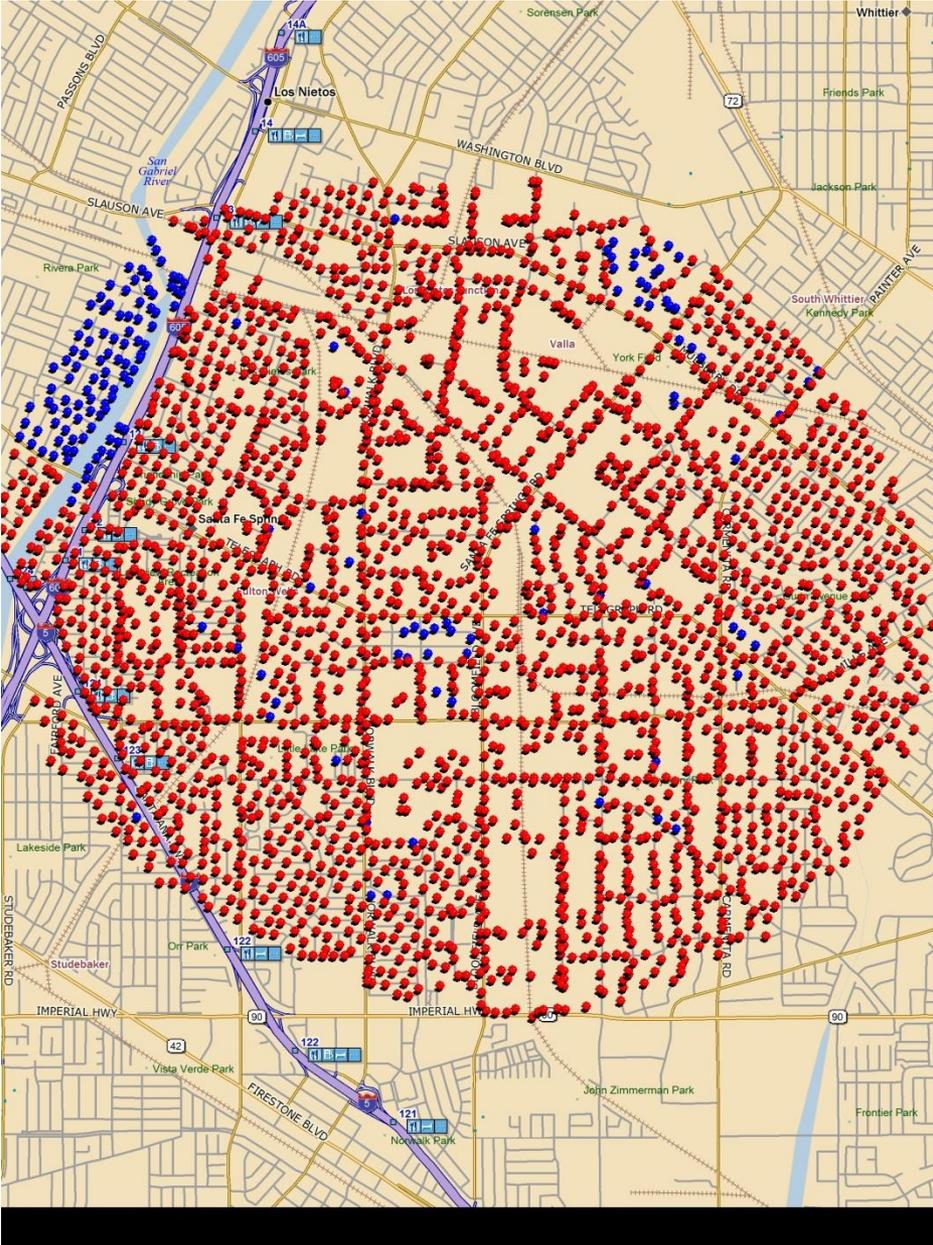
# Vibrators with police



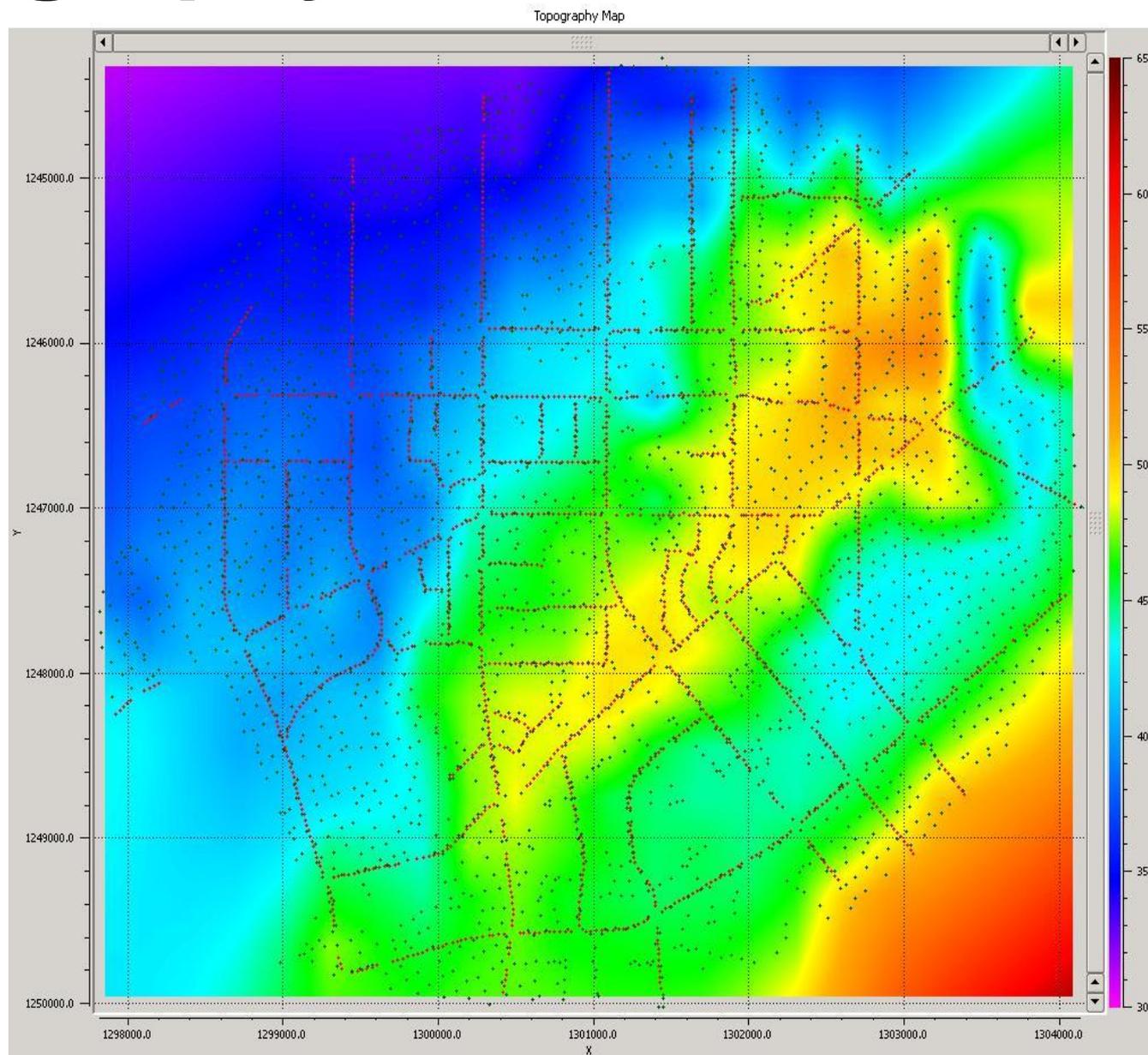
# Vibrators with police



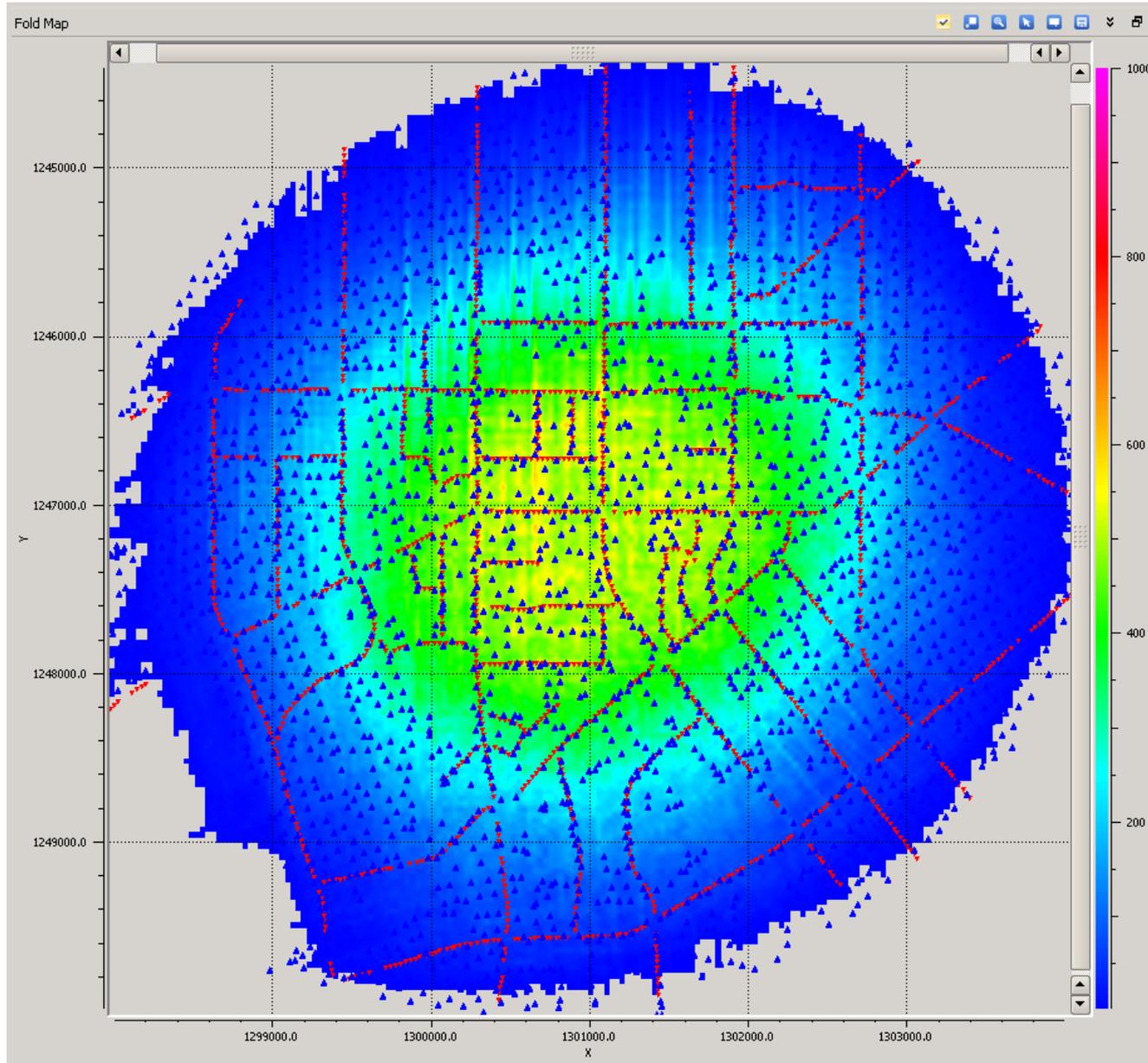
# Acquisition design



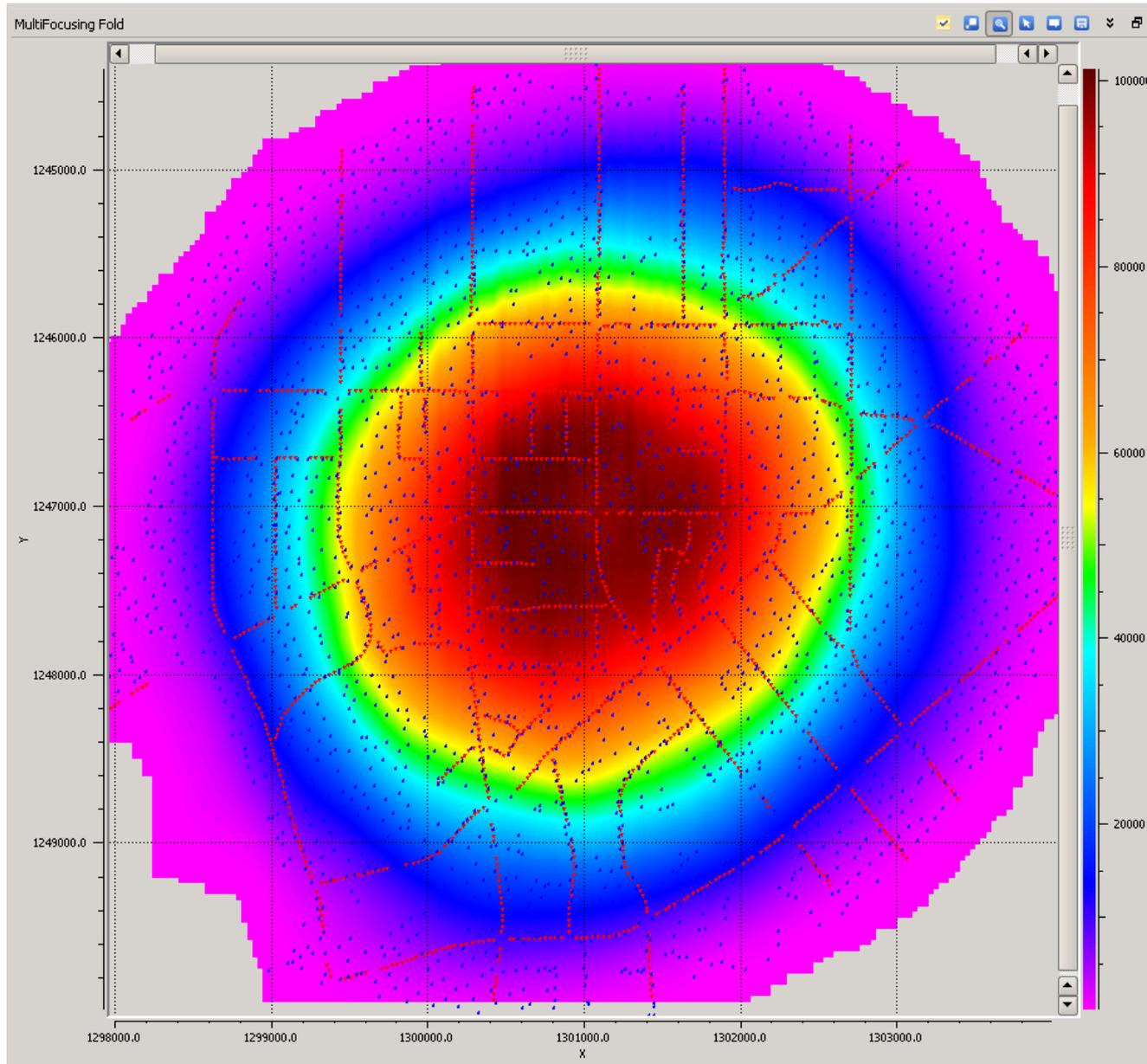
# Topography



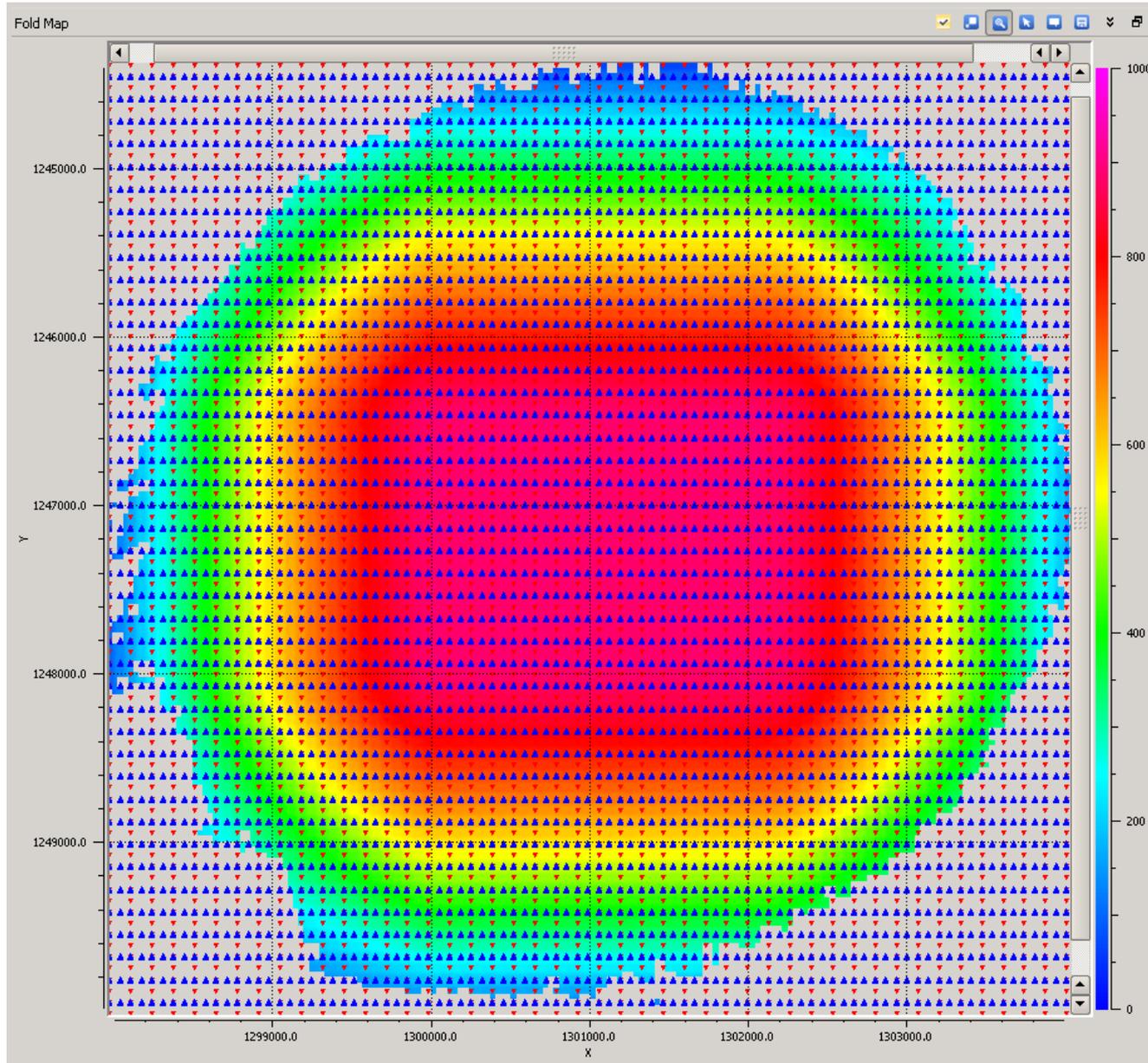
# CDP fold map



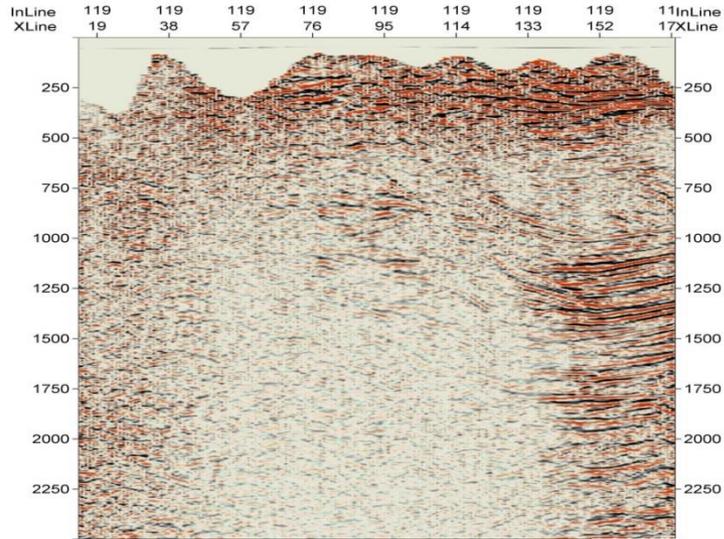
# MF fold map



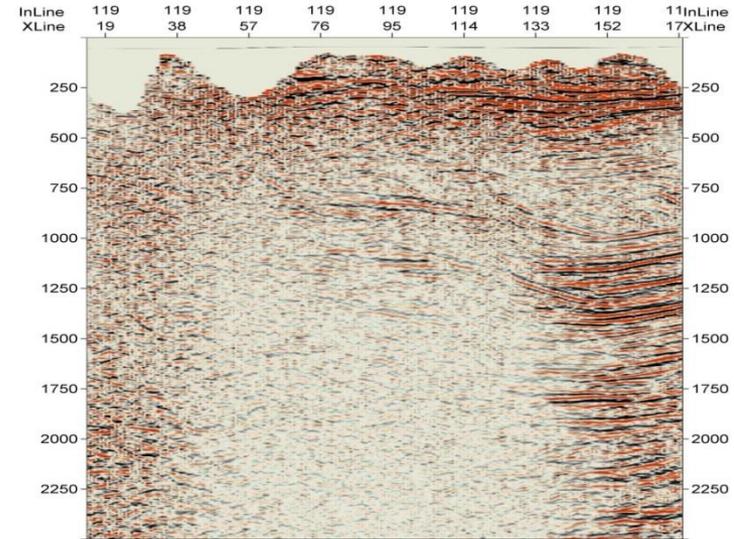
# MF regularization



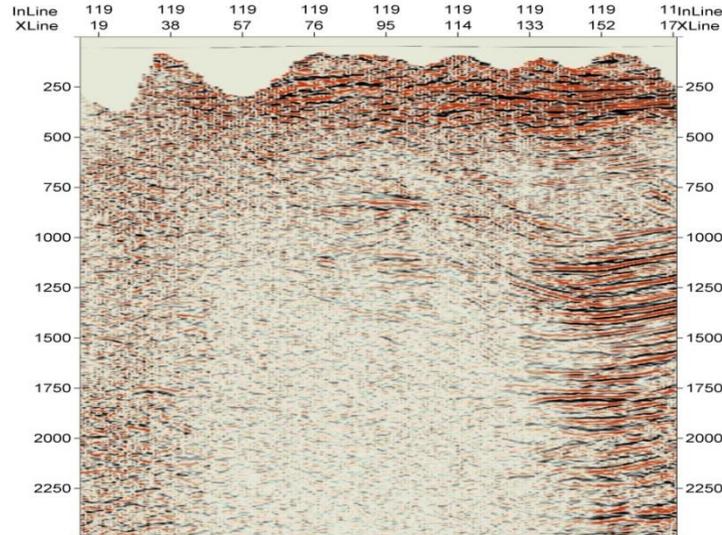
# Projected Fresnel Zone testing



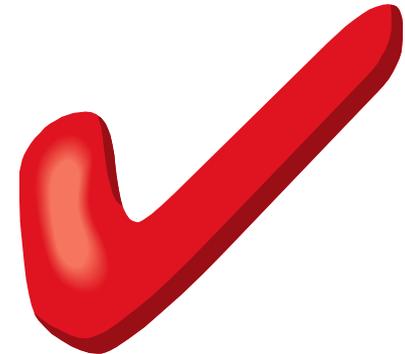
20% x 20%



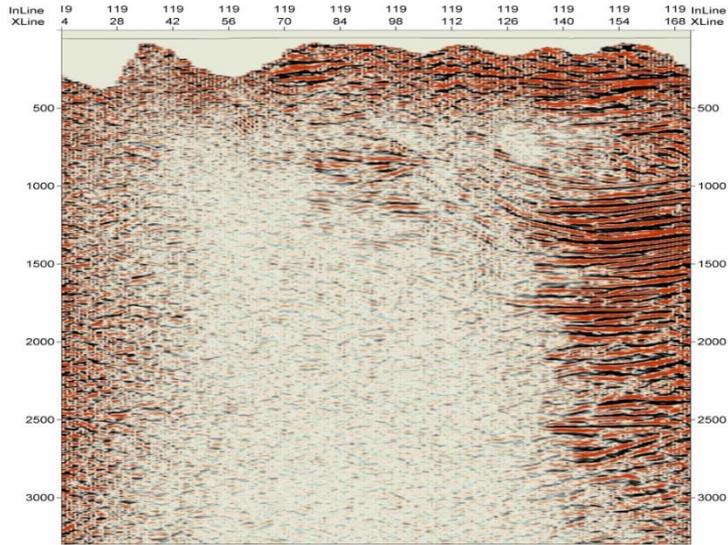
50% x 25%



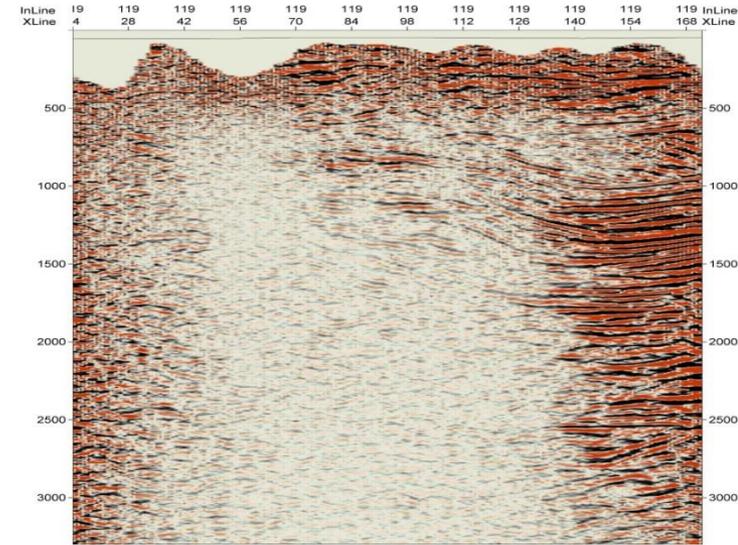
40% x 40%



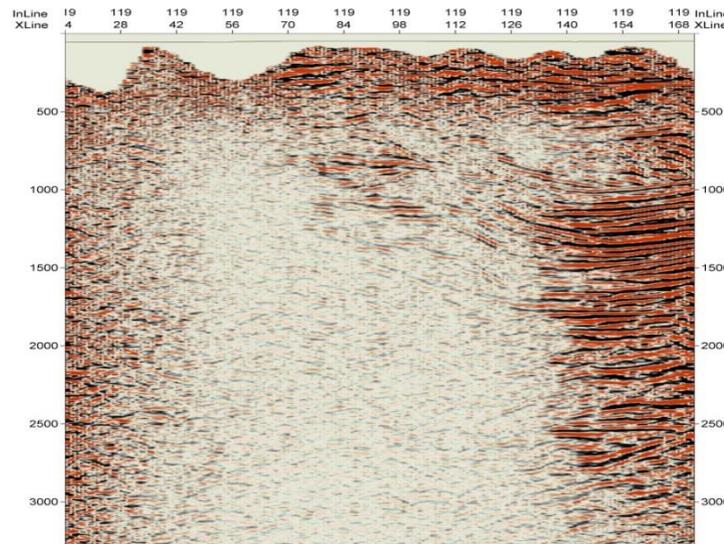
# Emergence angle testing



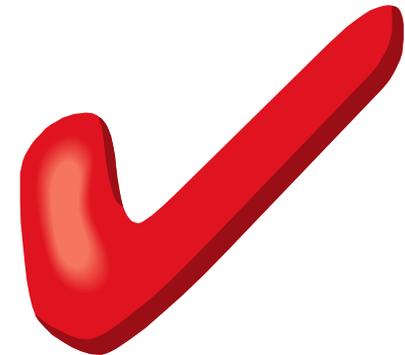
+40, -40 degrees



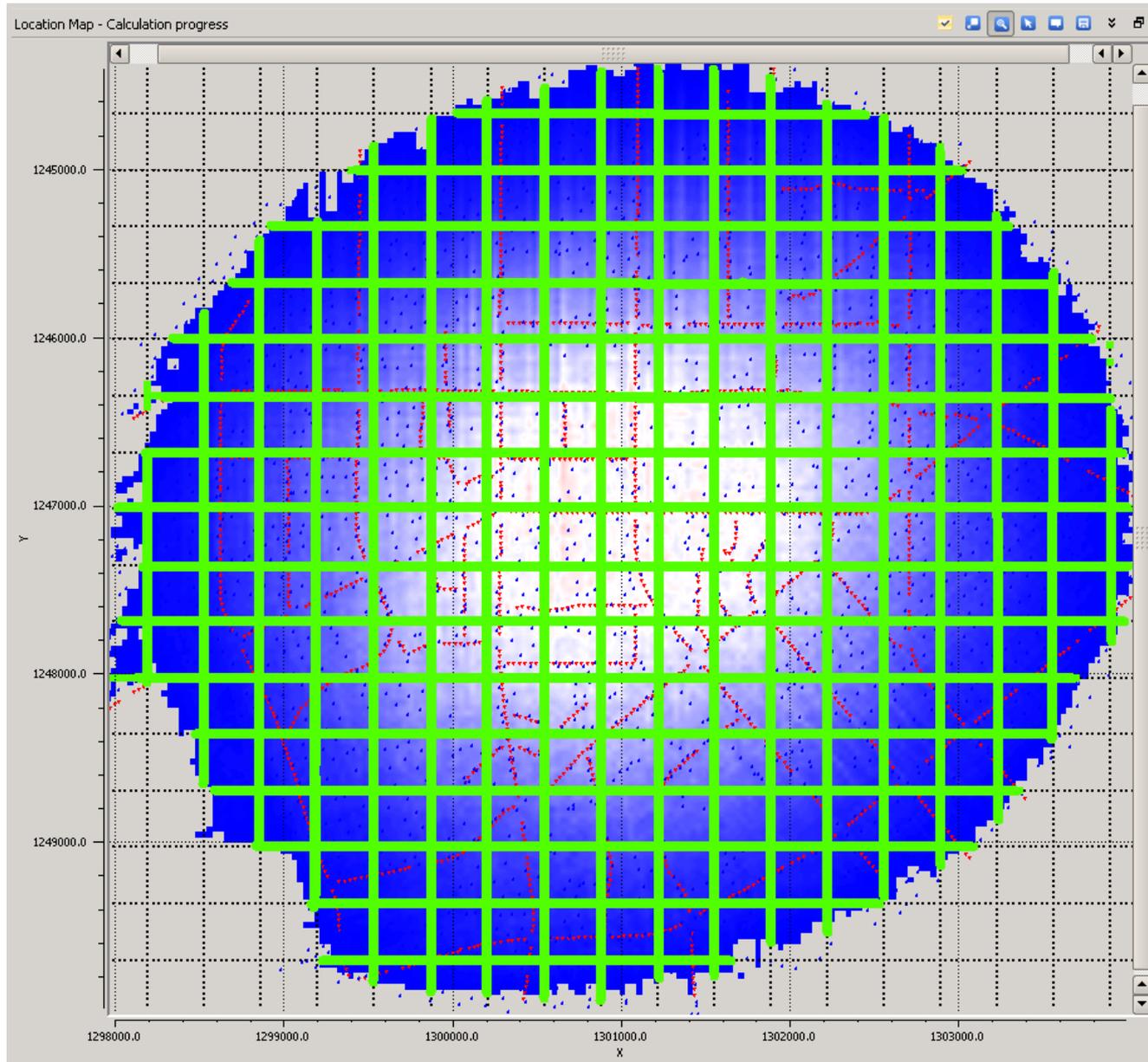
+20, -20 degrees



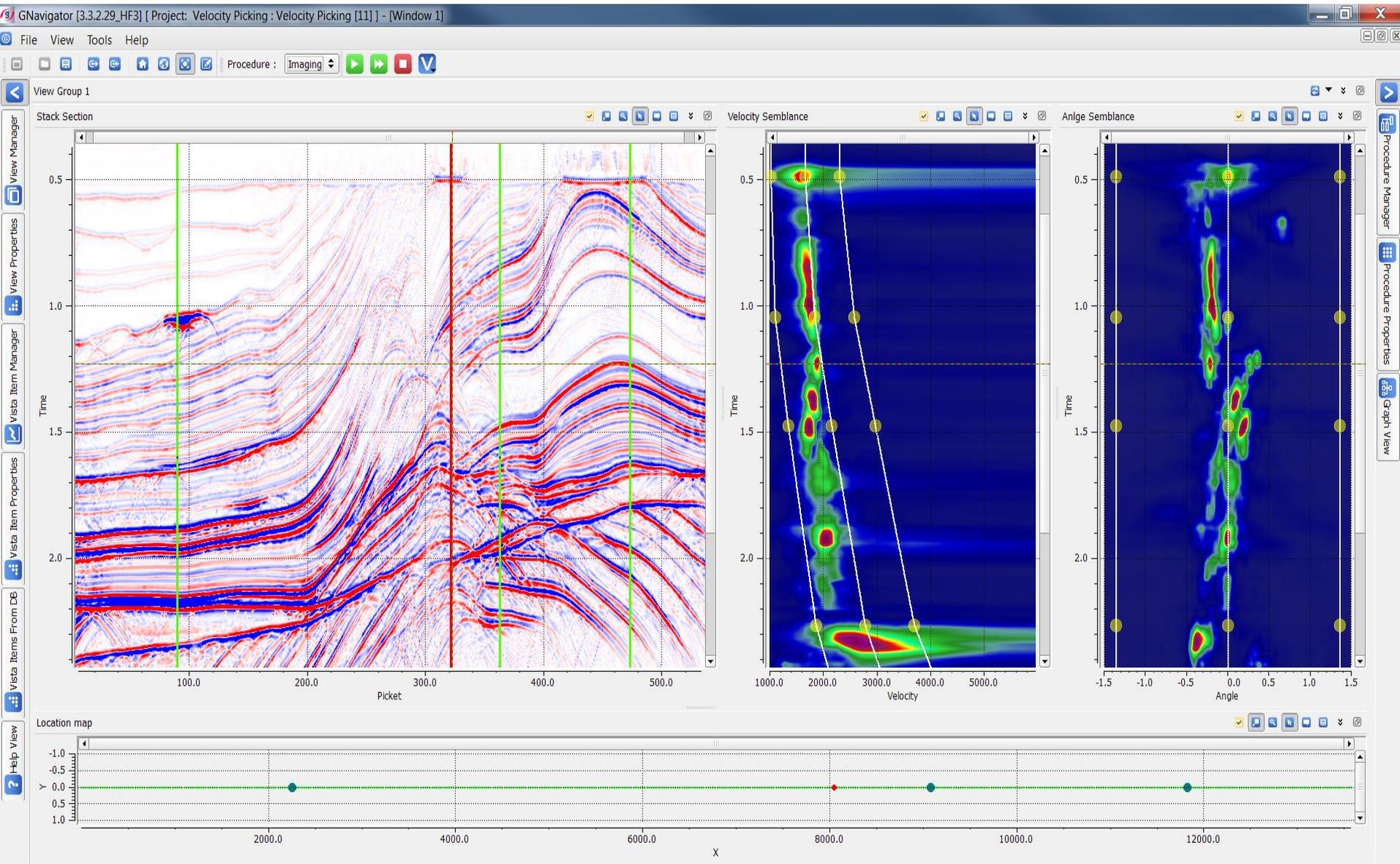
+30, -30 degrees



# MF velocity picking

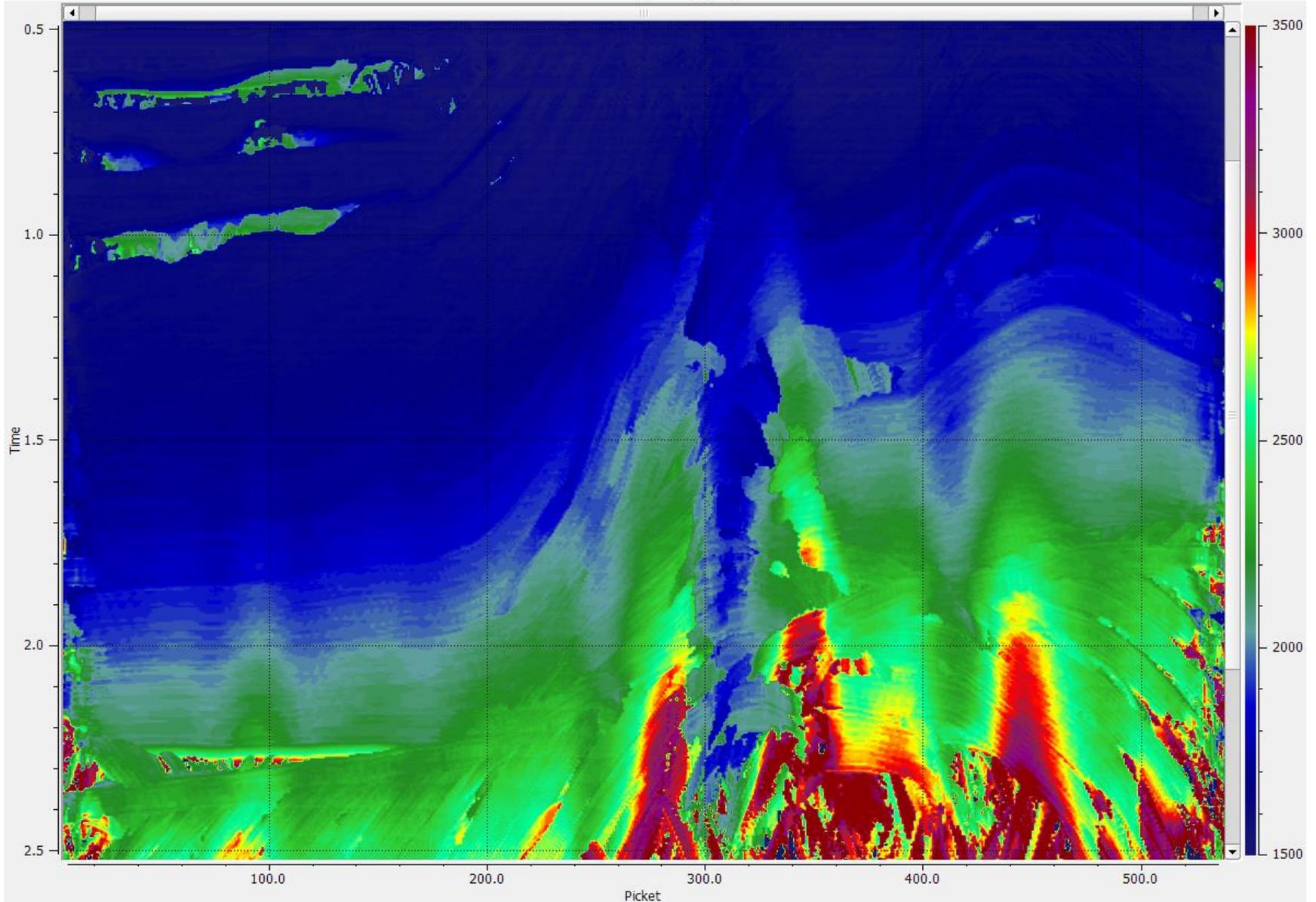


# Velocity analysis



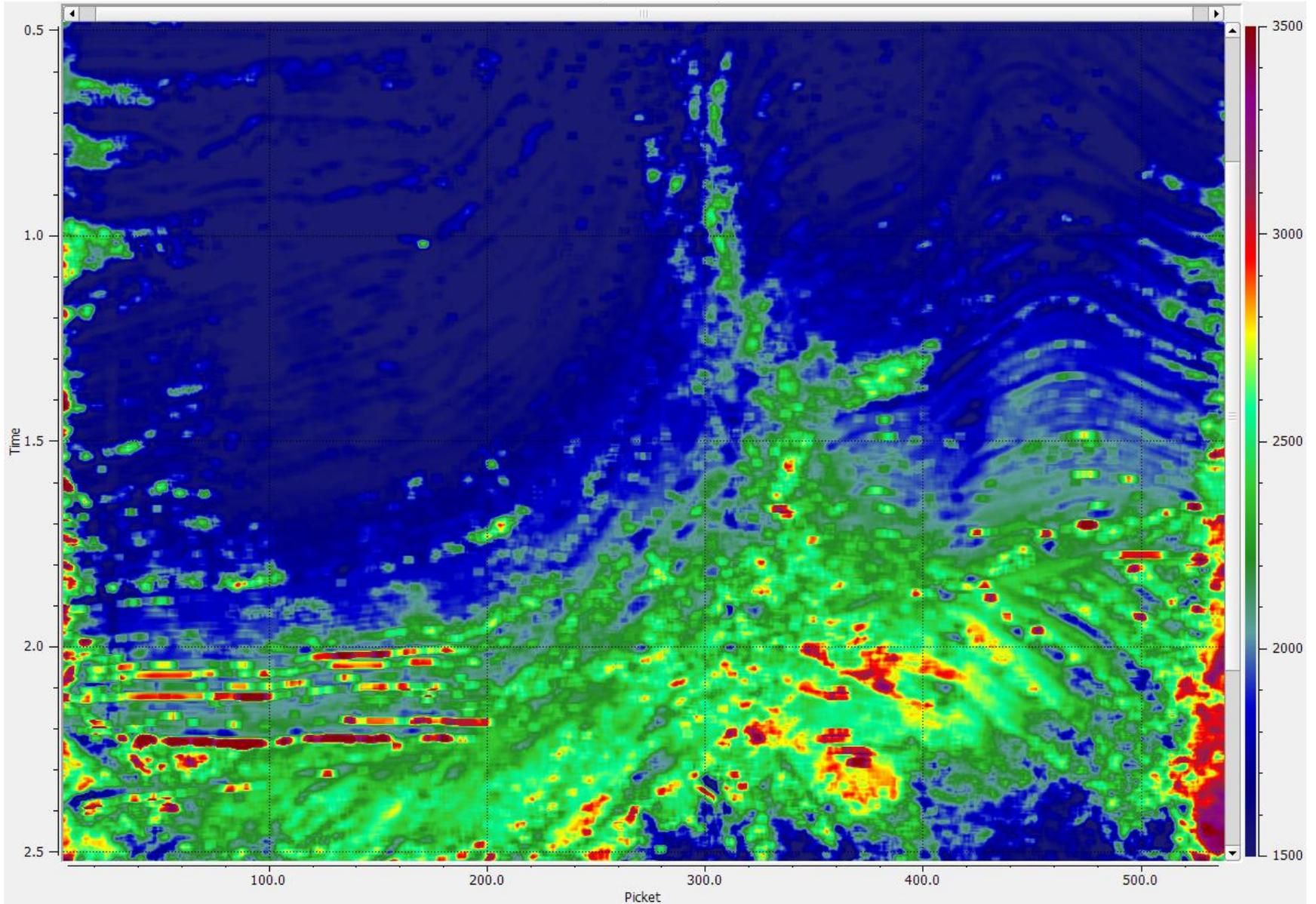
# MF stacking velocities

MF Stacking Velocity (Rcre)

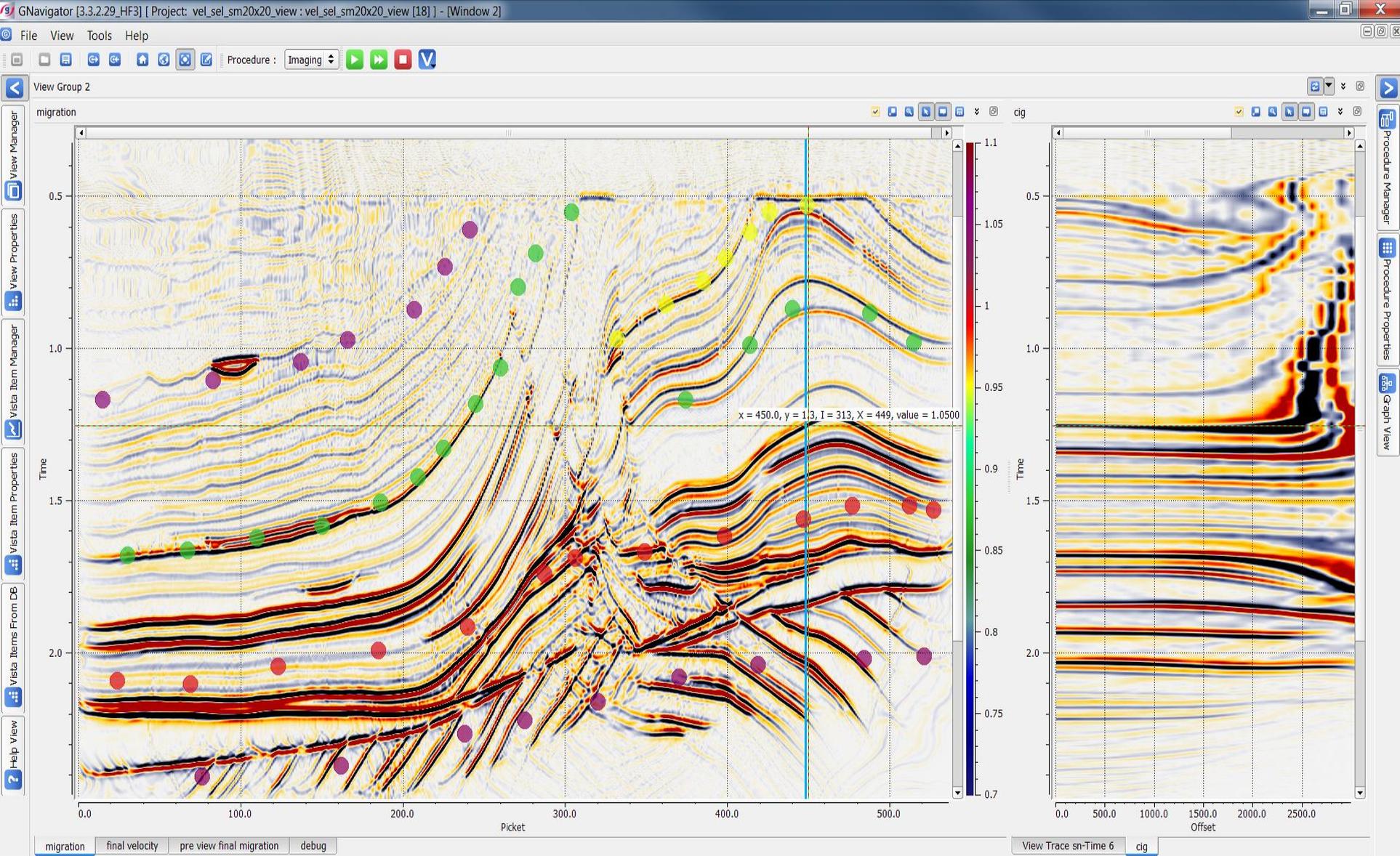


# MF dip corrected vels

Dip Corrected Velocity

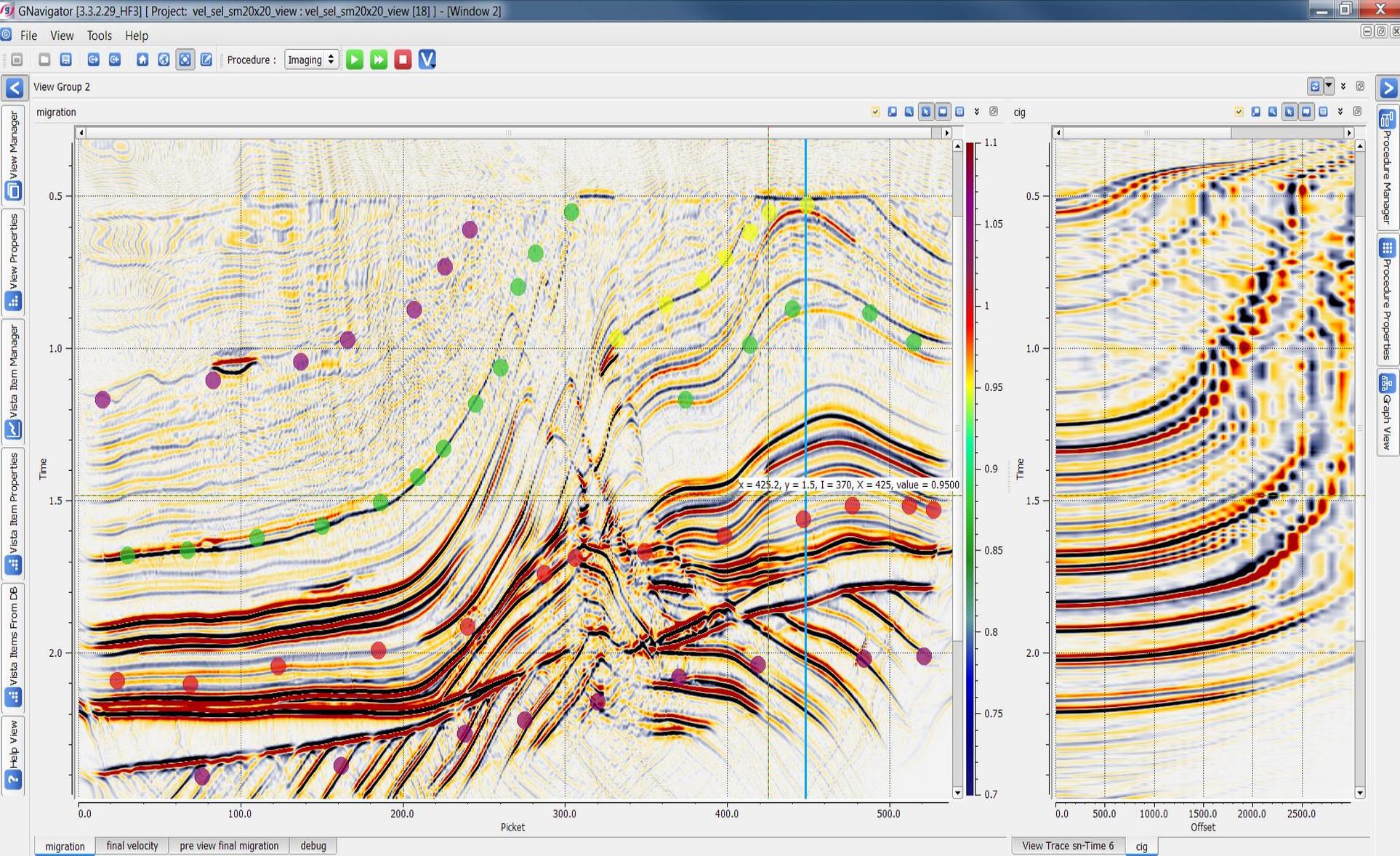


# Velocity selector



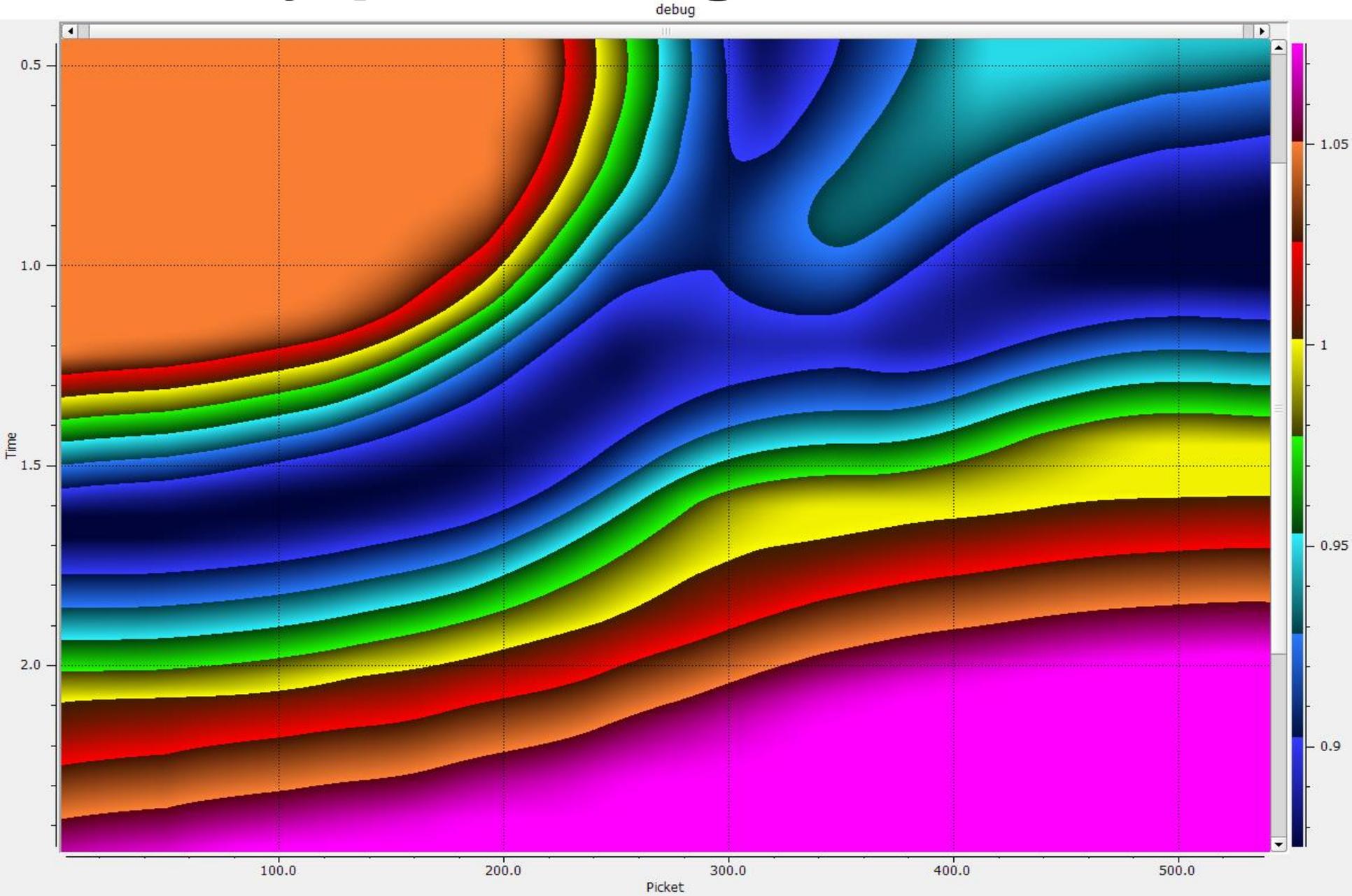
migration: x = 450.0, y = 1.3, I = 313, X = 449, value = 1.0500

# Velocity selector



migration:  $x = 425.2, y = 1.5, I = 370, X = 425, \text{value} = 0.9500$

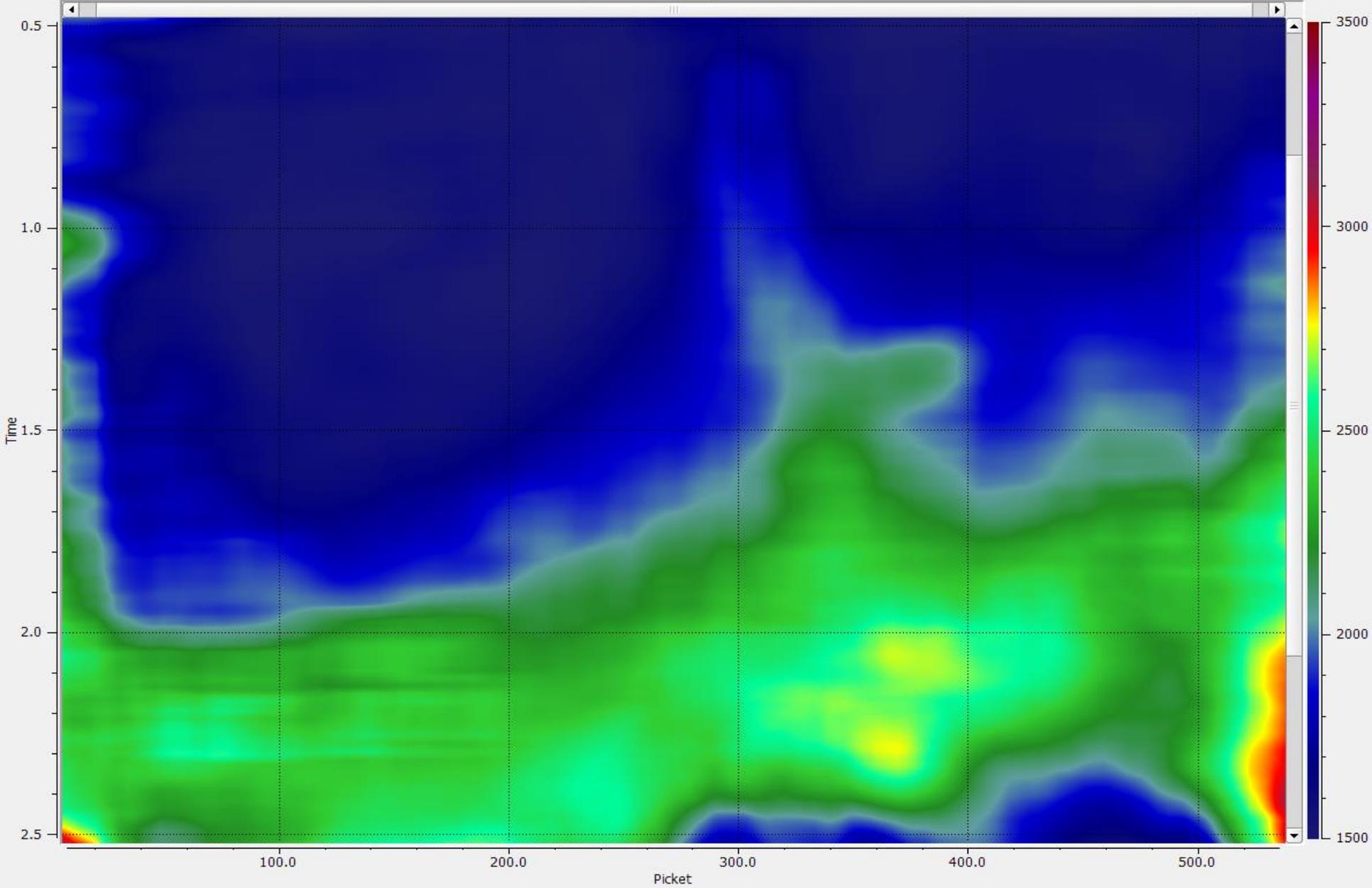
# Velocity percentage



# Original migration vels

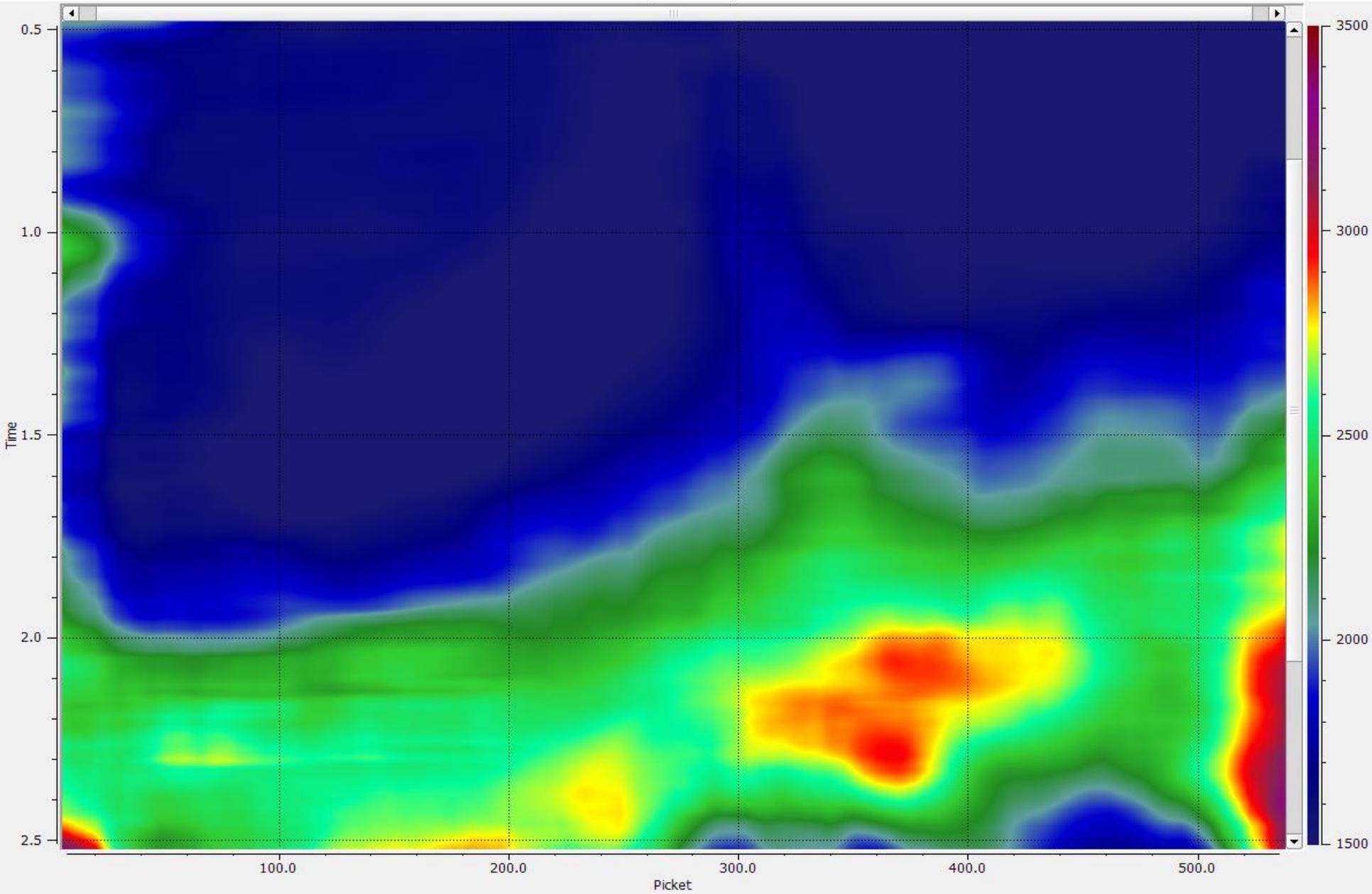


Dip Corrected Velocity - Smoothed

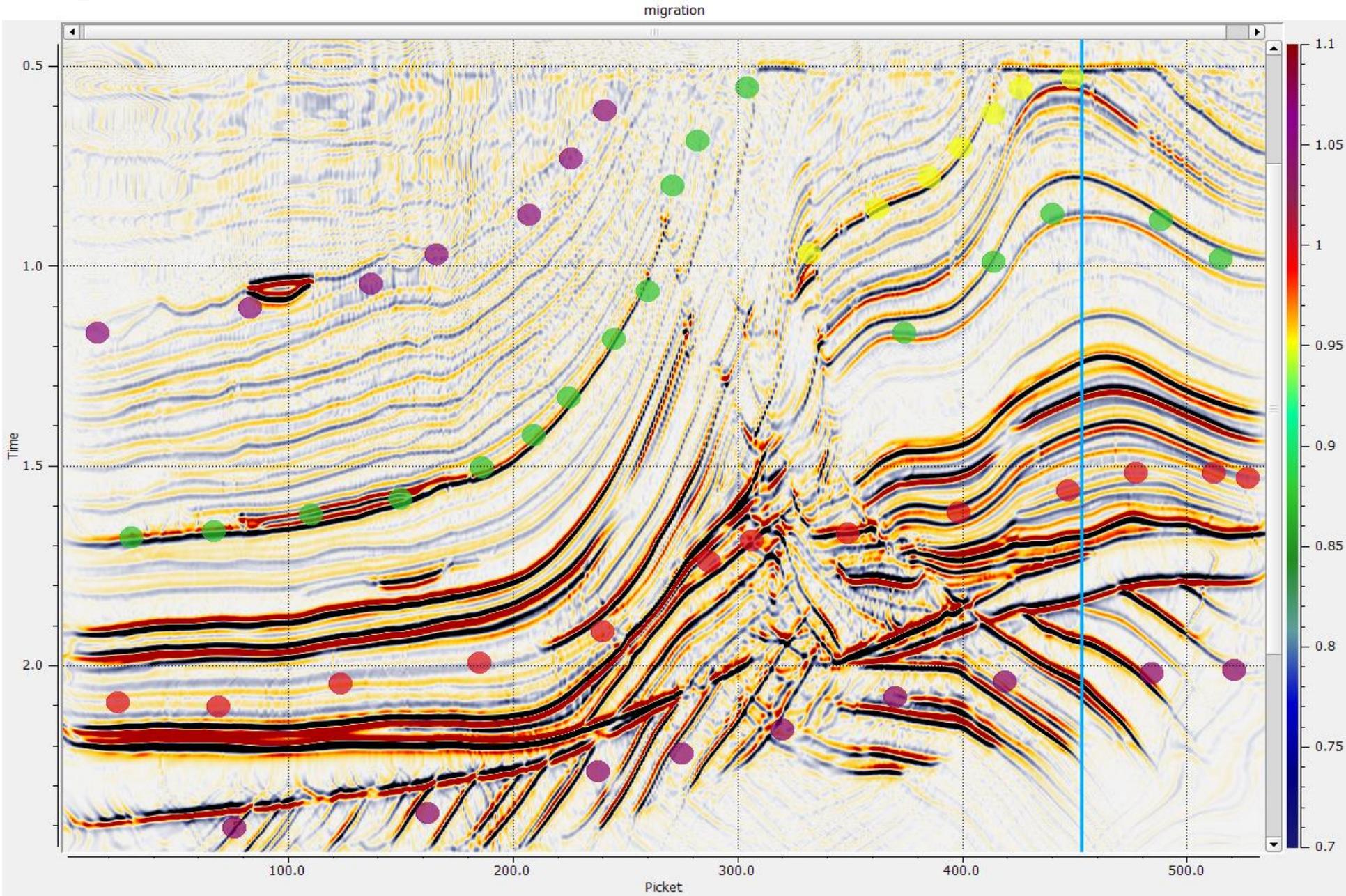


# Modified migration vels

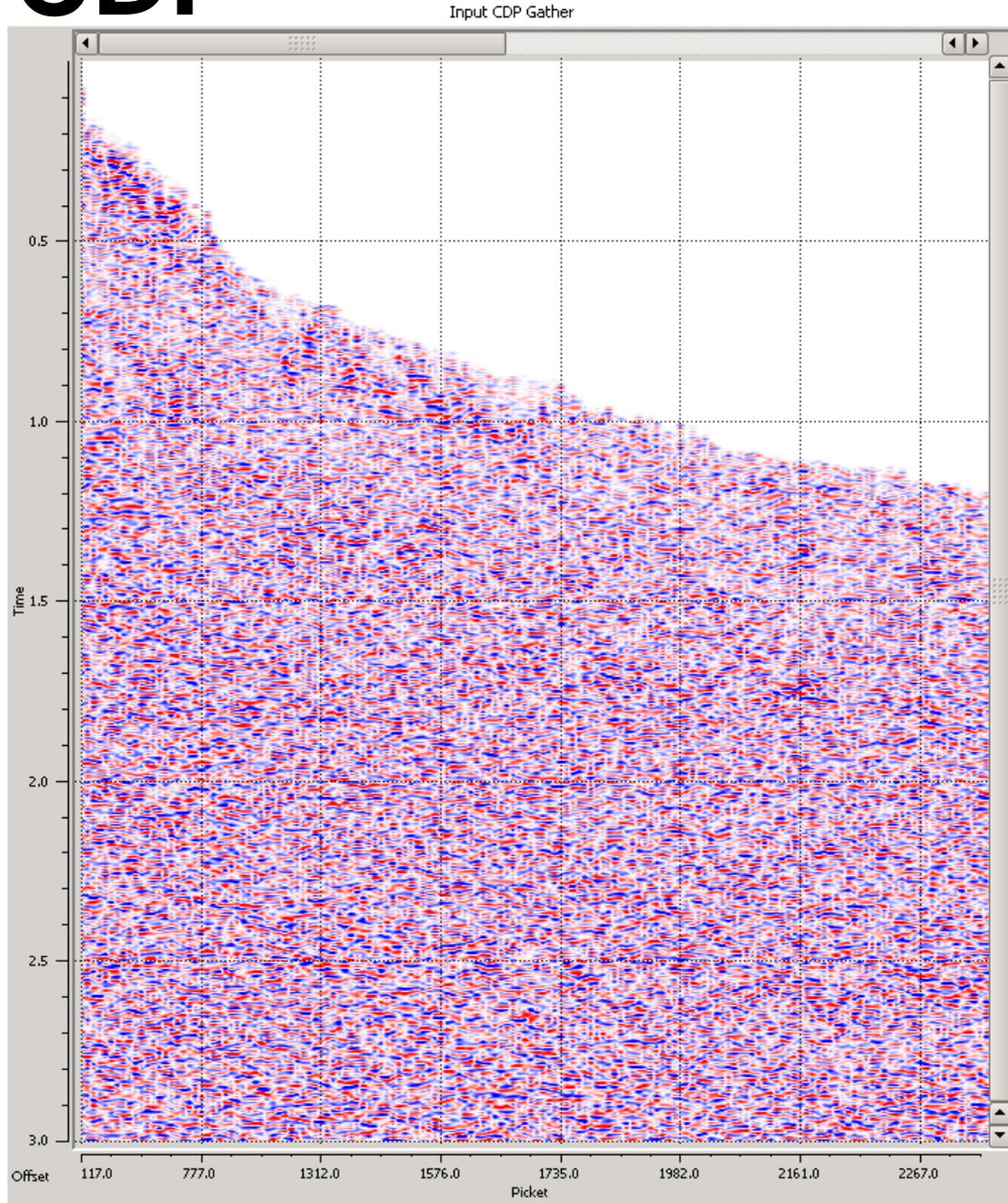
Update Velocity



# Updated PSTM



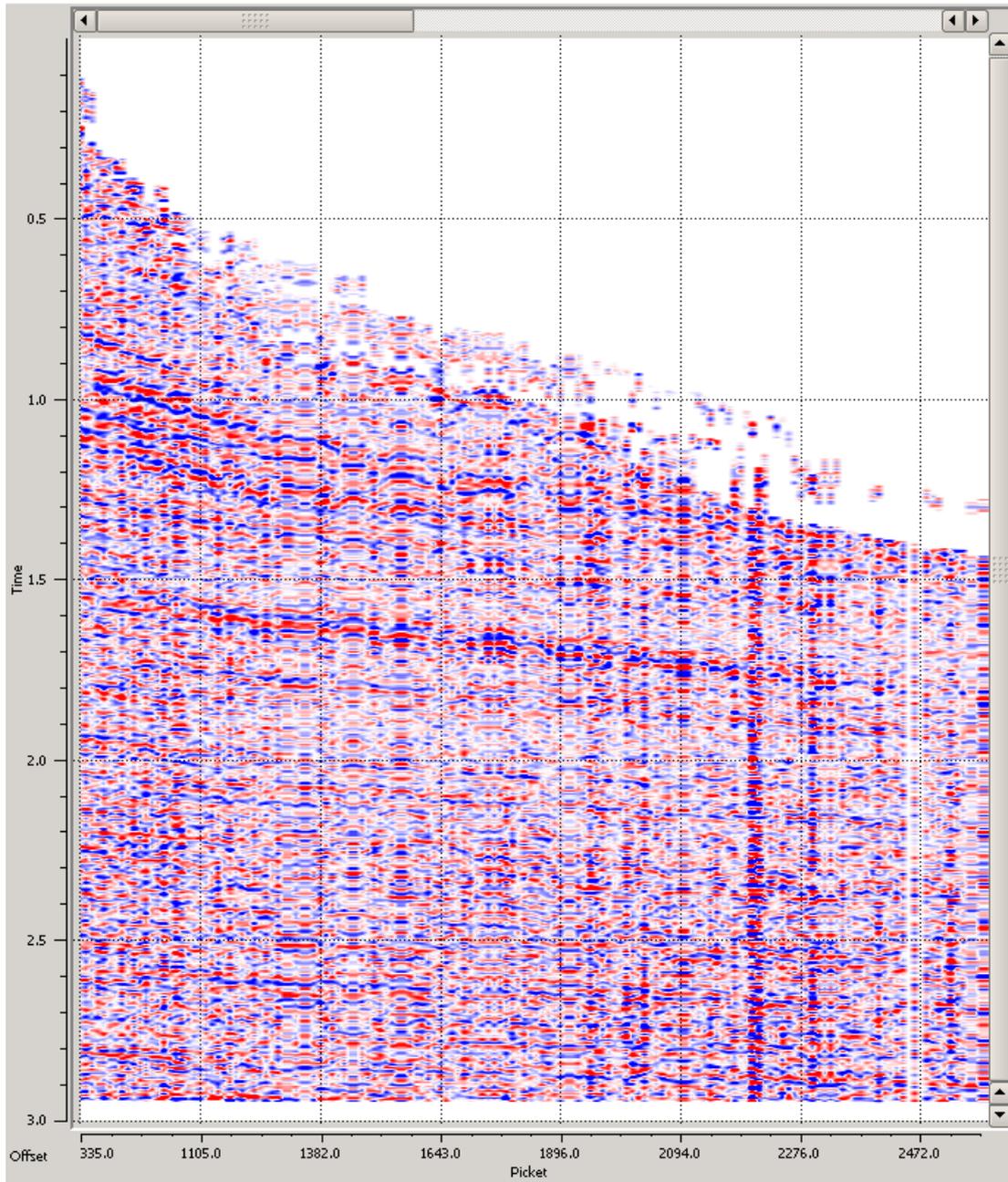
# Input CDP



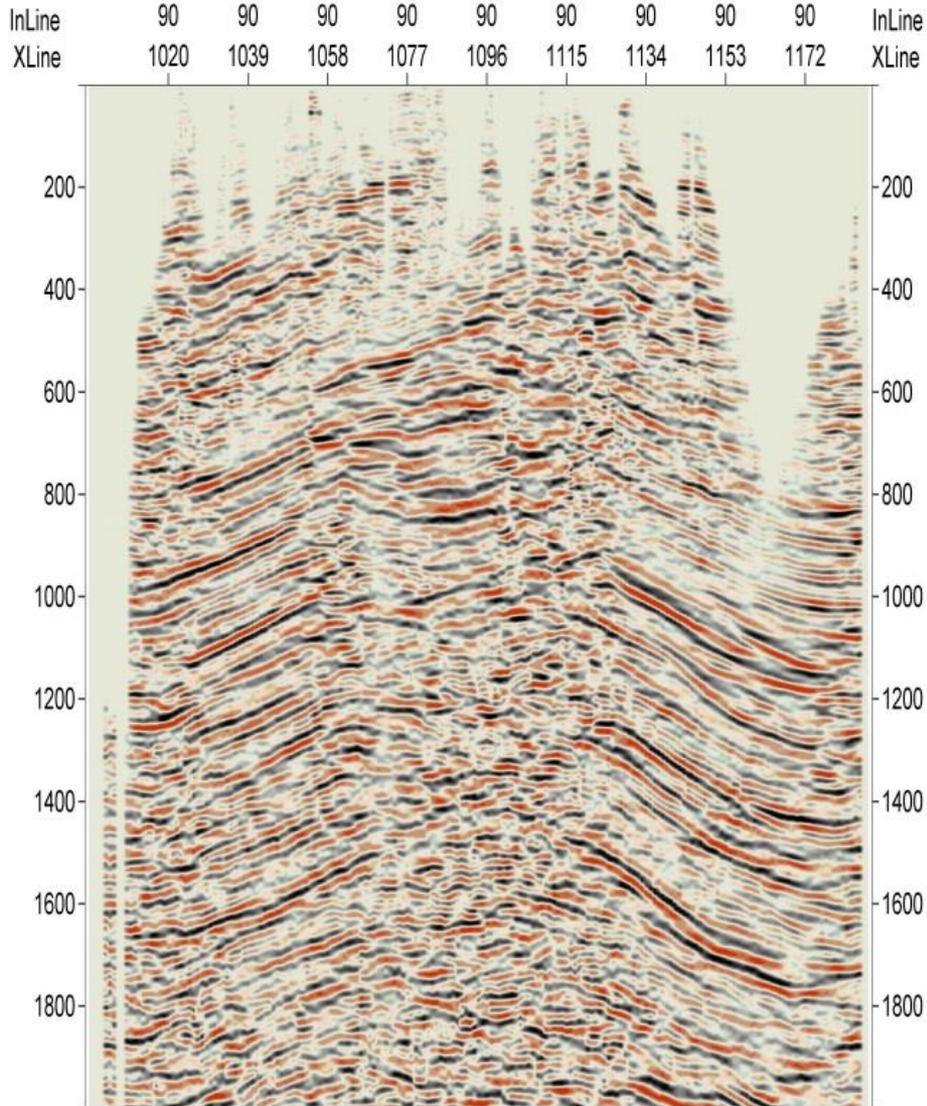
# MF CDP



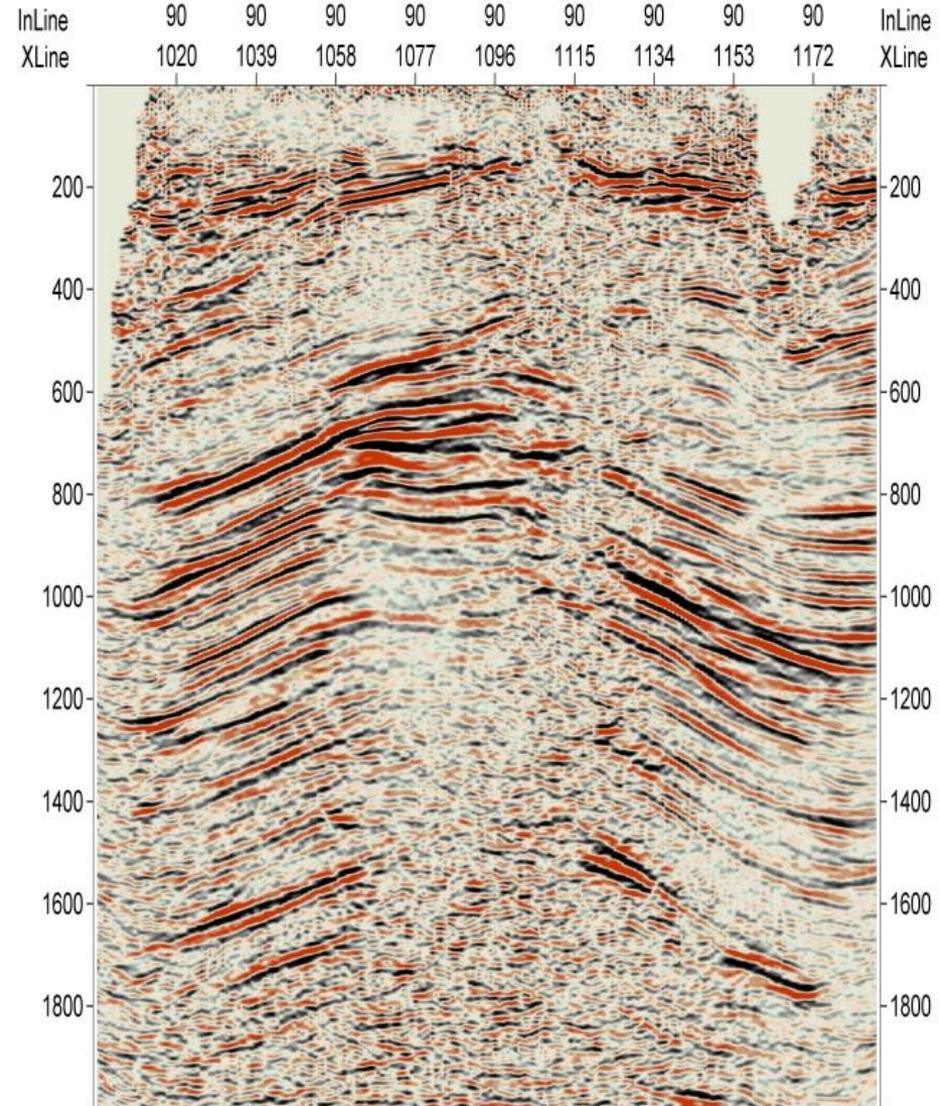
MF Enhanced CDP Gather



# Stack results

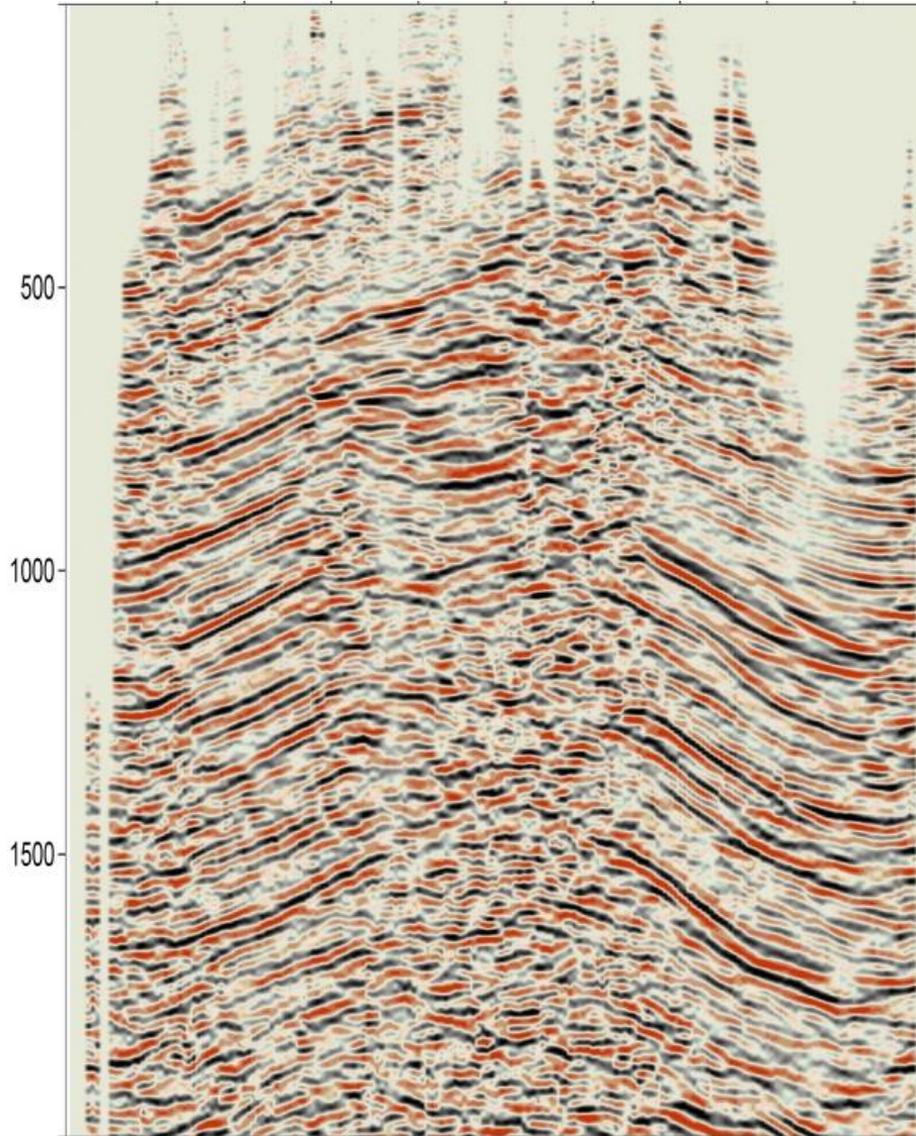


**conventional**

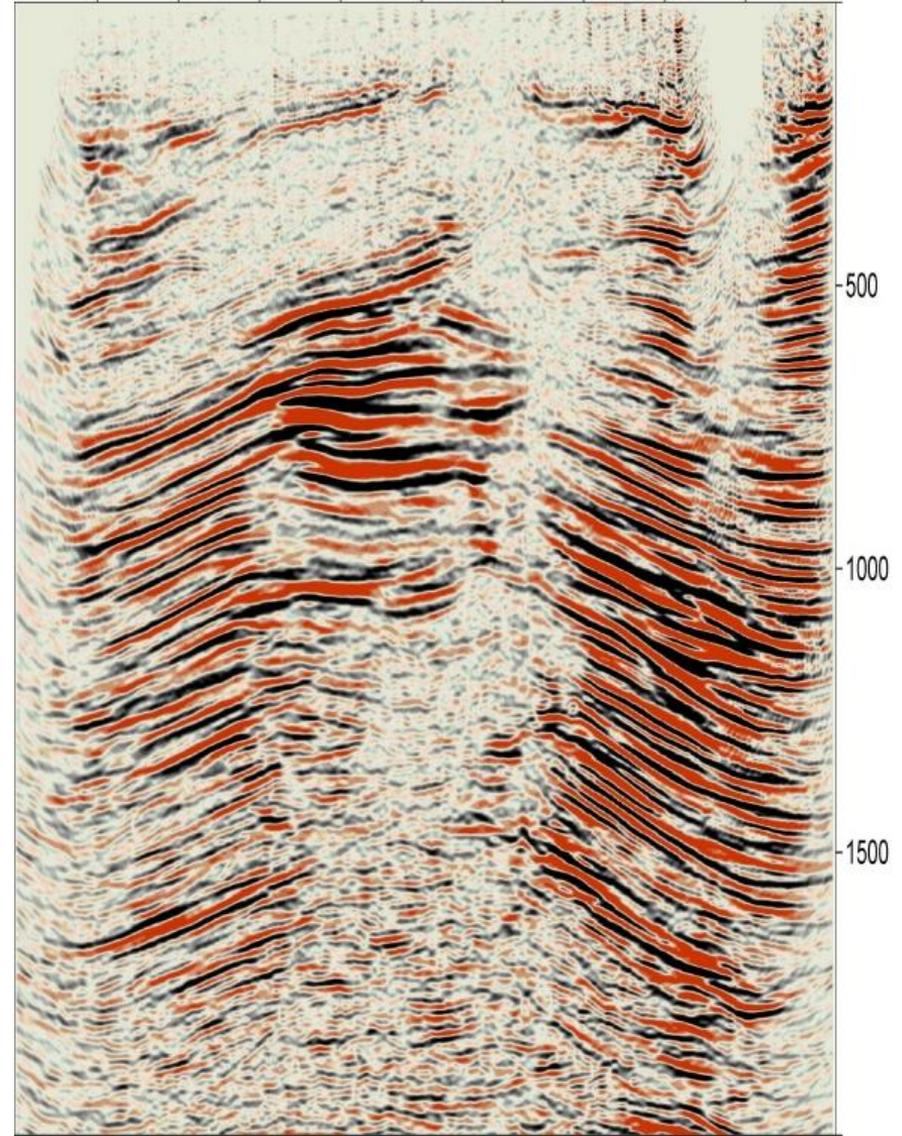


**MultiFocusing**

# PSTM results



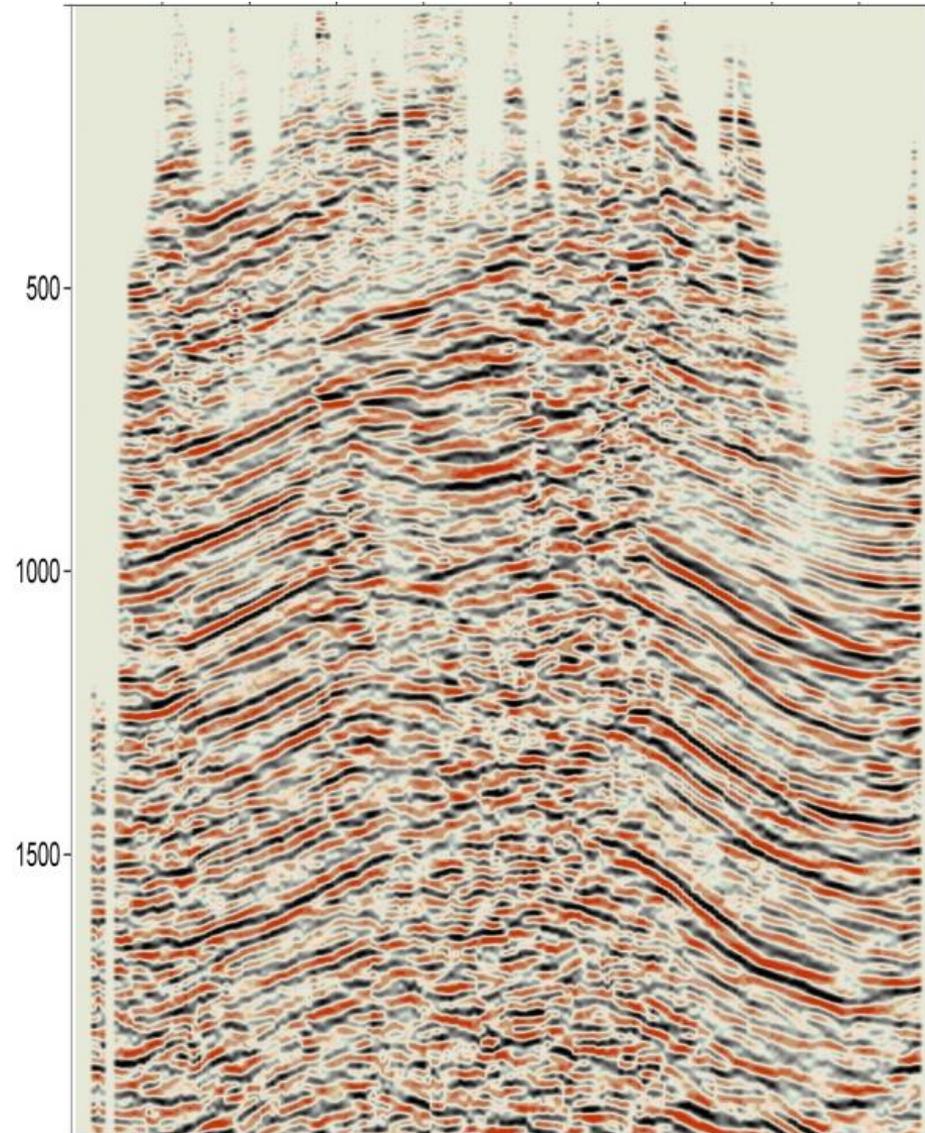
conventional



MultiFocusing

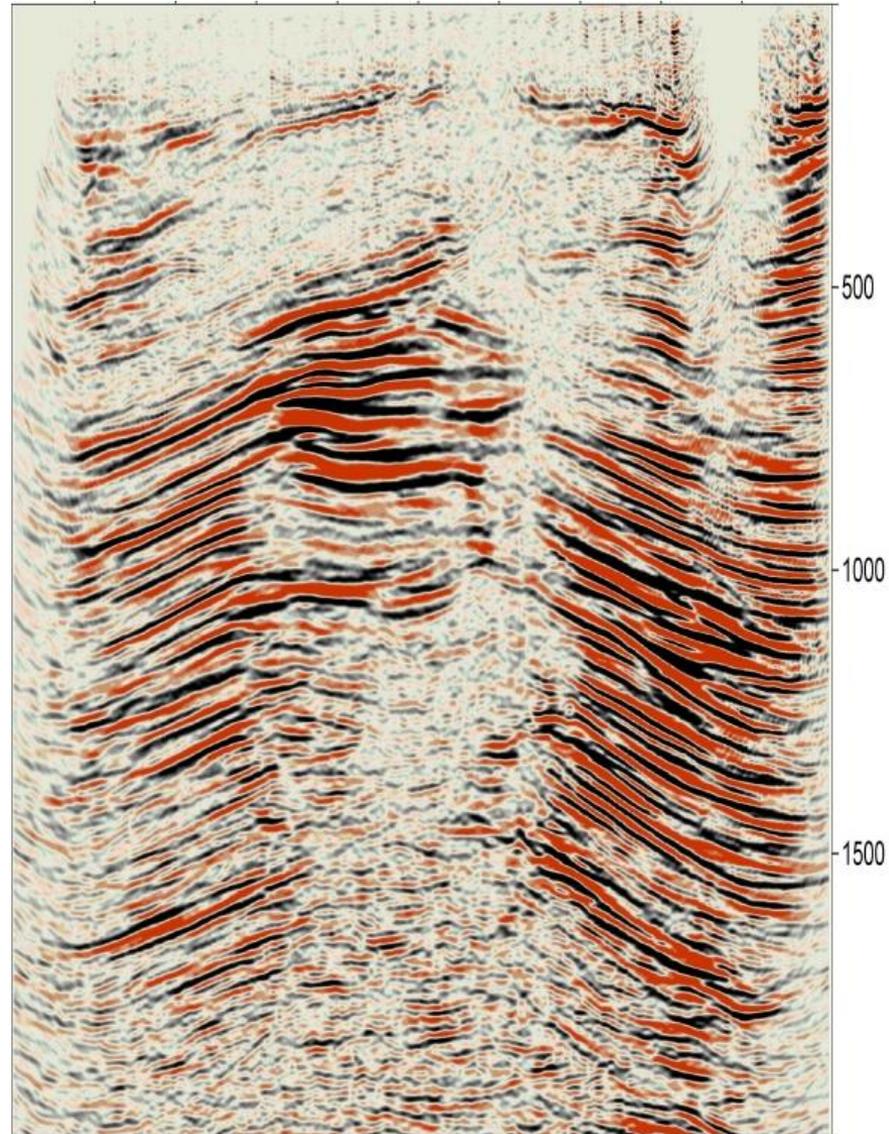
# Original PSTM

- 110' x 110' bins
- PSTM
- Data interpretability and continuity is poor

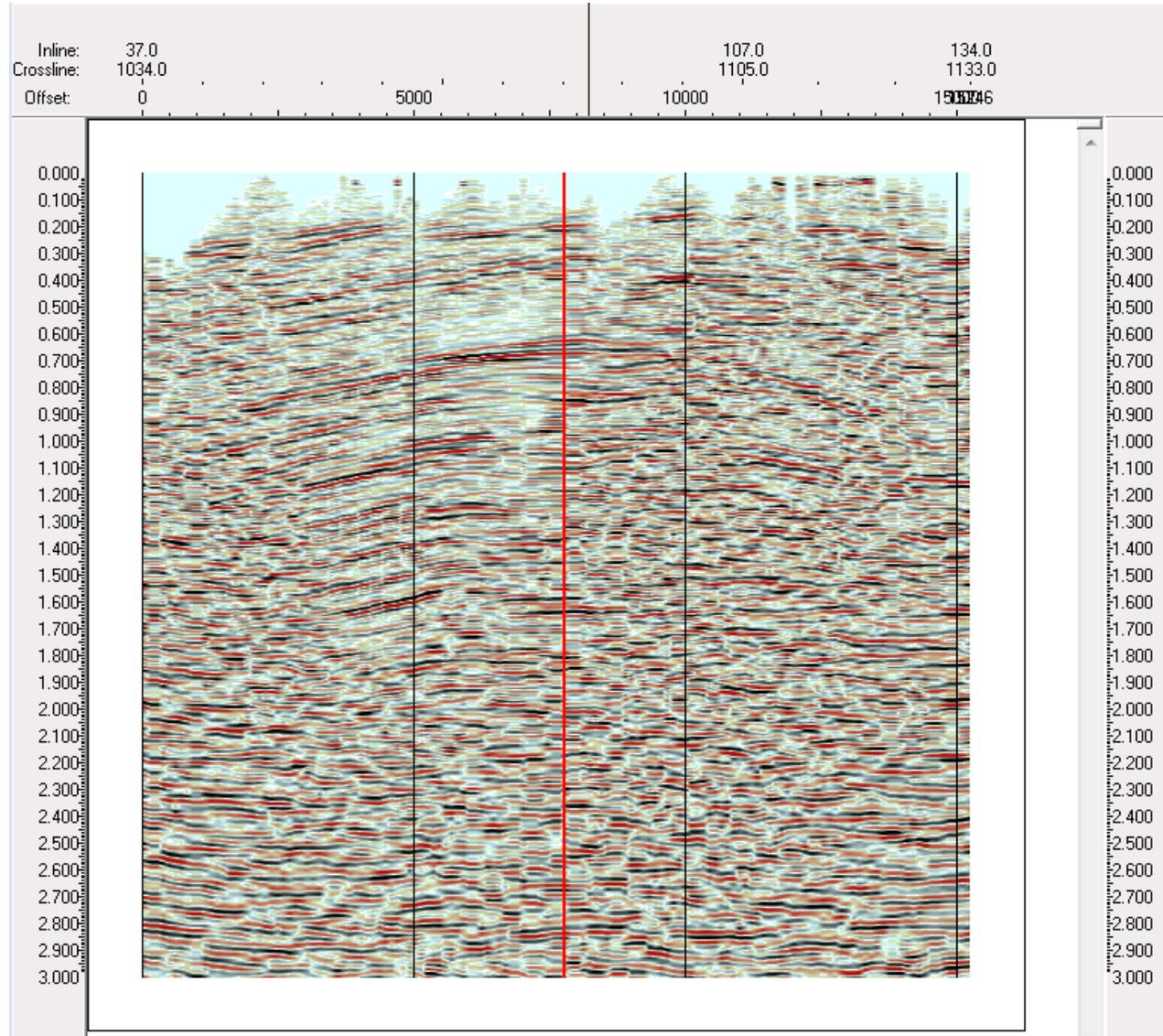


# MultiFocusing PSTM

- Resampled to 55' x 55' bins in PSTM
- Much better fault definition
- Data interpretability and continuity greatly enhanced



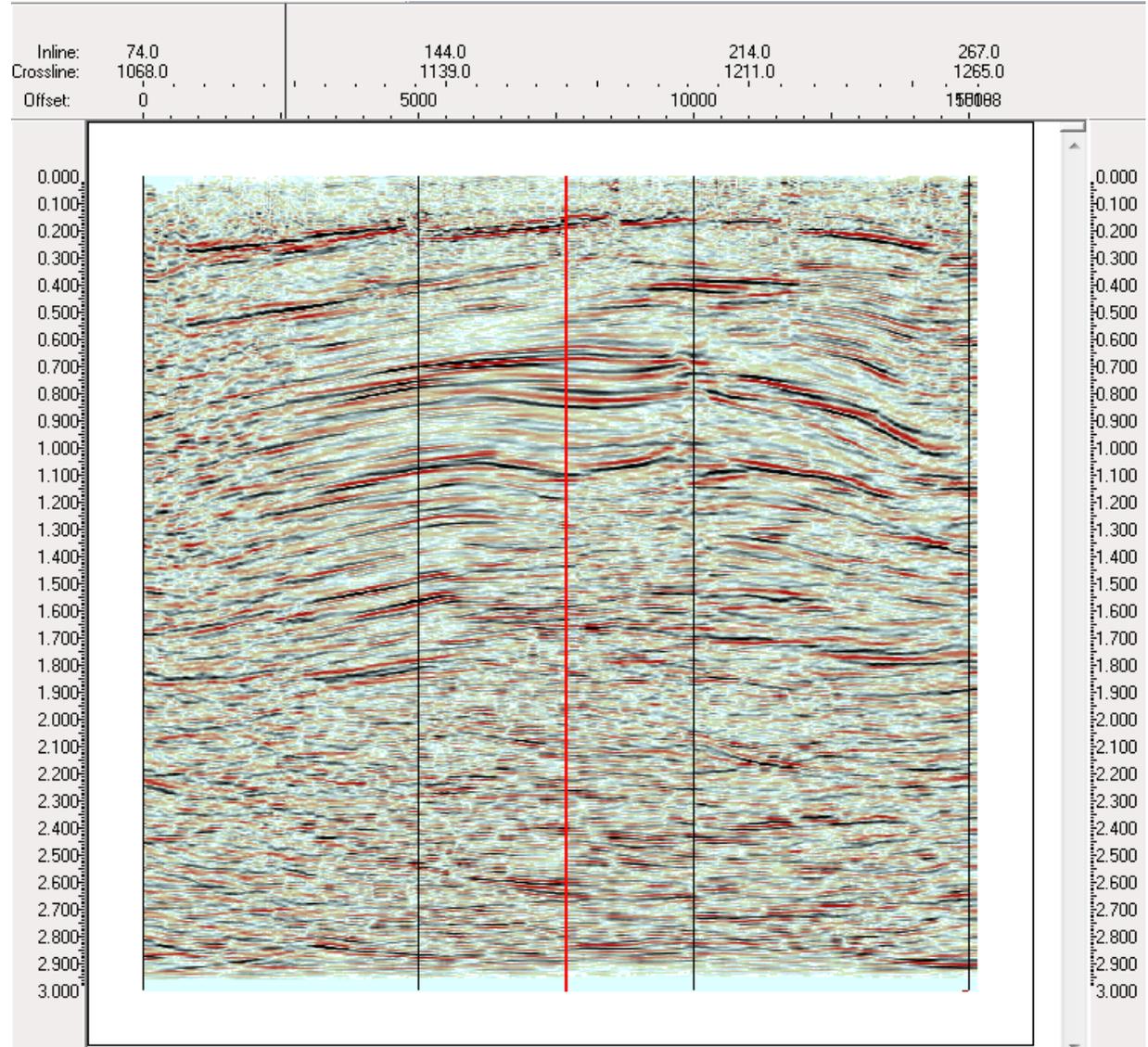
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