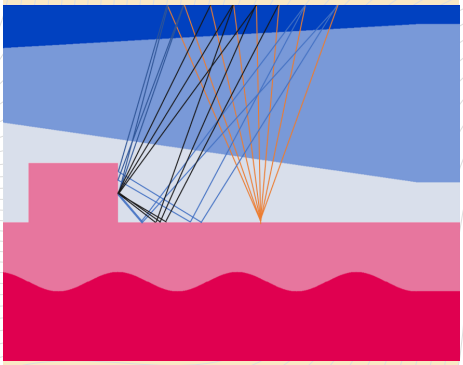
SeisRTM A HPC Software suite for seismic imaging

Seismic Imaging

Seismic Data is acquired on land and in Marine environment to find out the location of oil & gas reservoir in the subsurface. The processing of seismic data involves several steps before it gets converted into a meaningful and interpretable image of earth volume. Seismic Imaging is an advance processing step which converts the seismic data to an earth structure. The aim of seismic imaging is to create high resolution 2D & 3D structural image of subsurface geology.

"Complex ray paths of recorded seismic energy are required to be mapped to their true geological locations for computation of accurate seismic image"



1. Higher resolution and accuracy of seismic image helps in better estimate of oil locations in the subsurface
2. High performance computing is the key requirement for seismic imaging

Reverse Time Migration (RTM)

Reverse Time Migration (RTM) is one of the most reliable and preferred solution for seismic imaging of geological subsurface with complex structures. It can handle large velocity variation without any dip limitations for producing the earth subsurface structure with high resolution. It is capable of delivering subsurface images with high accuracy in different mediums. RTM is highly computation, I/O and storage intensive, which requires High Performance Computing (HPC) ecosystem for execution.

SeisRTM

Under National Supercomputing Mission (NSM), "SeisRTM" is a "Make in India" initiative to develop a customizable and efficient RTM software. "SeisRTM" can provide high resolution 2D & 3D seismic images of complex geological subsurface using acquired large seismic data. Indigenously developed "SeisRTM" on NSM infrastructure, will be first of its kind seismic imaging facility with 3D RTM capabilities for Indian upstream oil & gas exploration companies.

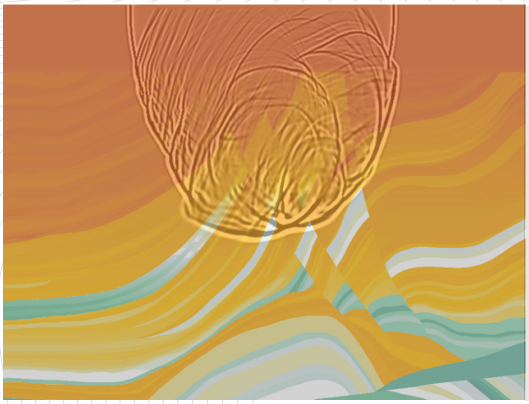
SeisRTM Capabilities

- 2D isotropic, VTI, TTI seismic modeling
- 2D isotropic, VTI, TTI RTM
- 3D isotropic seismic modeling and RTM
- Pre & Post migration processing tools

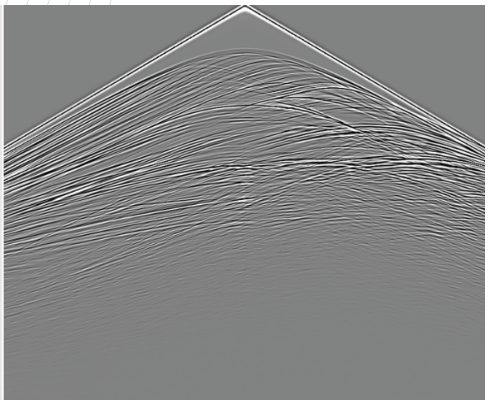
SeisRTM Features

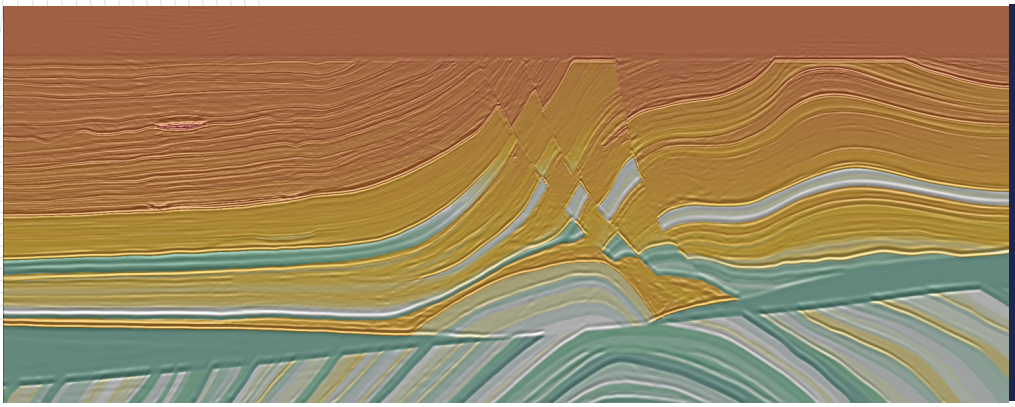
- Frequency up to 70 Hz
- Higher order Finite Difference implementation
- CPML Boundaries
- Conventional and Boundary saving RTM
- Choice on imaging conditions
- Shot Image gathers as RTM outcome
- Parallel on Shots using CPU Cluster
- CLI with self-documentation

2D AGCL Marmausi2 subsurface velocity model



2D seismic snapshot and shot gather of the Marmausi2 model using SeisRTM isotropic modeling





2D seismic imaging of the Marmausi2 model using SeisRTM Reverse Time Migration