

Multiscale Phase Inversion of Seismic Marine Data

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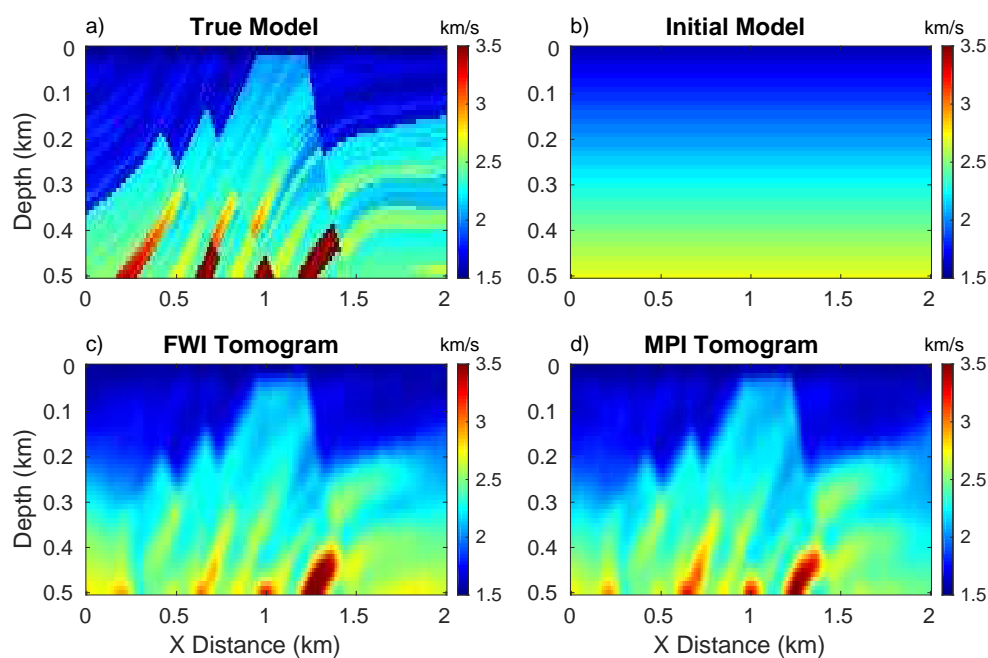


Figure 1: a) The true velocity model, b) the initial velocity model, c) multi-scale full wave inversion (FWI) tomogram, and d) multiscale phase inversion (MPI) tomogram.

Objective:

Learn how to do multiscale phase inversion (MPI) on local workstation.

Required Software:

1. Compilers: ifort/11.1.075, icc/11.1.075, mpi-openmpi/1.6.4-icc-11.1.
2. Visualization: Matlab.

Procedure:

- Load PhaInv_SeisF90_Demo.zip, from which extract all the files to your working directory. It includes following directories: **src** for the source codes (Fortran), **bin** for executable files, **model** for the velocity models and acquisition coordinates, **results** for the observed data and inversion results, **working** for parameter files for the inversion, **visual** for visualization matlab scripts.
- *cd* to the **src** directory, create executable files.
 1. modify the directories (eg. **DIR_CORE**) in Makefile.config, make sure these directories are consistent with the working directory;
 2. *cd* to folder **core**, *Make clean*, then *Make*;
 3. *cd* to folder **apps**, *Make clean*, then *Make*; which will make executable files.
- *cd* to the **model** directory, create true (synthetic case) and initial velocity models, acquisition coordinates.
 1. *cd* to folder **model** → **2D_models** → **Marmous_51x201x10**;
 2. modify parameters in mkcoord.m, and then *run* it in matlab, the velocity (vel.bin, vsmooth.bin) and coordinate (coord.csg.dat) files are created.
- *cd* to the **working** → **2D_models** directory, obtain observed data, run inversions.
 1. modify the directories (**DIR_CURRENT**) in Makefile.config,

2. *cd* to **Marmous_51x201x10**, and modify parameters in `parfile_a2dmod.sh`, `parfile_fwi_ms.sh`, `parfile_phainv.sh`,
 3. *cd* `..`, *make* `a2dmod` to obtain the observed data,
 4. *make* `a2dfwi_ms` to run the multiscale fwi,
 5. *make* `a2dPhaInv_Field` to run the multiscale phase inversion.
- Visualization: *cd* to the **visual** directory, then *run* `result_plot.m` in matlab, we can see the results in Figure 1.