



Mission-Oriented Seismic Research Program

2015 Annual Technical Review and Meeting

UH Hilton

4800 Calhoun Road, Houston, Texas, 77004

(On the UH Main Campus, entrance 4 (four), University Drive off Calhoun Road,
below ground parking, at the hotel)

The meeting and breakfast will be in the Plaza Room and lunch in Shamrock A.

The dinner on Friday, June 5th at 6:00PM is in Shamrock A.

AGENDA

Thursday, June 4, 2015

- 7:30 AM** Welcome, breakfast/reception
- 8:00 AM** Technical Program begins: Meeting Overview
- Green's theorem tutorial Part I: for wave field separation (separation of reference and scattered wave-fields, and for de-ghosting)
*Arthur B. Weglein**
- 9:00 AM** Preprocessing in the PS space for on-shore seismic processing: removing ground roll and ghosts without damaging the reflection data
*Jing Wu**
- 9:30 AM** Preprocessing in displacement space for on-shore seismic processing: removing ground roll and ghosts without damaging the reflection data
*Jing Wu**
- 9:50 AM** Morning break
- 10:15 AM** Green's theorem tutorial Part II: for wave field prediction: imaging conditions, one-way and two-way wave equation migration for a more effective and capable RTM (Claerbout III imaging for migrating in a volume with two way propagating waves)
(Glossary of imaging conditions: in our usage, Claerbout imaging I is the exploding reflector model, Claerbout II imaging, is the space and time coincidence of up and downgoing waves, and Claerbout III refers to predicting a coincident source and receiver experiment at depth at time equals zero.)
These migration methods require a velocity model.
*Arthur B. Weglein**

The Claerbout II imaging principle resides behind all current leading edge RTM methods used in industry. Benefits of the new Claerbout III imaging for two way propagating waves (RTM): (1) provides added-value and advantages for both structural determination and amplitude analysis in migration and (2) provides clarity on the role of primaries and multiples in imaging and migration

11:00 AM Analysis and advances in amplitude interpretation of two way migration Claerbout II imaging (current leading edge RTM), backscatter artifacts and its removal (for example, Faqi Liu et.al.)
*Qiang Fu**

12:00 PM Lunch

Claerbout III imaging for one way and two way wave migration: a new and more capable migration method for RTM:

12:45 PM Analysis and comparison of Claerbout III imaging for one way waves(pre-stack Stolt FK migration) and its asymptotic approximation, that is, Kirchhoff migration
Yanglei Zou, Qiang Fu, Chao Ma, Jing Wu and Arthur B. Weglein*

1:20 PM Analysis and comparison of Claerbout II for one way propagating waves (current leading edge RTM) and Claerbout III migration for one way propagating waves
*Yanglei Zou**

1:50 PM Afternoon break

2:15 PM Claerbout III imaging for structure and amplitude analysis beneath a reflector, and comparison with Claerbout II RTM
*Qiang Fu**

2:40 PM Analysis and the first Claerbout III two way wave propagating migration results beneath a laterally varying layer
*Fang Liu**

3:10 PM Claerbout III imaging for two way propagating waves provides a clear and definitive response to the role of primaries and multiples in imaging and inversion: Multiples: signal or noise?
*Arthur B. Weglein**

Only primaries are required for imaging and inversion, but when there is inadequate acquisition of primaries, multiples can be used to provide an approximate image of an unrecorded primary

3:40 PM A clear example of using multiples to enhance seismic imaging -- providing an approximate image of an unrecorded primary

*Chao Ma**

- 4:10 PM** Multiples can be useful (at times) to enhance imaging, by providing an approximate image of an unrecorded primary, but it's always primaries that are migrated or imaged
What's the big picture, bottom line and our seismic imaging and inversion strategy with respect to primaries and multiples----the updated seismic processing chain
*Arthur B. Weglein**

Friday, June 5, 2015

- 7:30 AM** Breakfast/reception/welcome

- 8:30 AM** A tutorial on the inverse scattering series: distinct isolated task subseries for removing free surface and internal multiples
*Arthur B. Weglein**

Multiples: part I: Background/Introduction/Update

- 9:15 AM** Multiple attenuation: recent progress, and a plan to address open, prioritized and pressing issues and challenges
*Arthur B. Weglein**

- 10:00 AM** Morning Break

- 10:15 AM** Reviewing the historic Saudi Aramco onshore ISS internal multiple attenuation examples
*Qiang Fu**

- 10:40 AM** Inverse scattering series internal multiple attenuation in an absorptive dispersive earth, without knowing, needing or estimating elastic or inelastic subsurface properties: update with pre-stack data examples
*Jing Wu**

Multiples: part II: Advances to enhance the effectiveness of free surface multiple elimination and internal multiple attenuation algorithms

- 11:00 AM** The impact of accommodating the source radiation pattern on the inverse scattering series free-surface multiple elimination algorithm on data with interfering or proximal primaries and multiples
*Jinlong Yang**

- 11:30 AM** Lunch

- 12:30 PM** The significance of incorporating a 3-D point source in the inverse scattering series free-surface multiple elimination algorithm for a 1-D subsurface
*Xinglu Lin**

- 1:00 PM** Incorporating a 3-D point source in the inverse scattering series internal multiple attenuation algorithm for a 2-D subsurface
*Xinglu Lin**
- 1:20 PM** Afternoon Break
- Multiples: part III: Beyond internal multiple attenuation: algorithms for eliminating internal multiples and spurious events, providing essential and necessary added value when there are numerous generators and interfering and proximal primaries and multiples**
- 1:35 PM** A new Inverse Scattering Series (ISS) internal-multiple-attenuation algorithm that predicts the accurate time and approximate amplitude of the first-order internal multiples and *addresses spurious events: Analysis and Tests in 2D*
*Chao Ma**
- 2:10 PM** An internal-multiple *elimination* algorithm for all first-order internal multiples for a 1D earth
*Yanglei Zou**
- 2:45 PM** Inverse scattering series depth imaging: direct depth imaging without a velocity model, the Marmousi model tests, and *a plan for a documented code delivery this year*
Fang Liu and Arthur B. Weglein*
- Amplitude analysis: Direct inverse solutions and a comparison with iterative linear inverse (the latter resides behind current AVO/FWI)**
- 3:20 PM** A direct inverse solution for AVO/FWI parameter estimation objectives
*Arthur B. Weglein**
- 3:50 PM** A first comparison of the inverse scattering series non-linear inversion and the iterative linear inversion for parameter estimation
Jinlong Yang and Arthur B. Weglein*
- SUMMARY**
- 4:15 PM** Summary of M-OSRP proprietary code delivery to-date and schedule of on-going code development and delivery
*Jim Mayhan**
- Primaries and multiples: the effective removal of all multiples remains an open issue and challenge- a strategy, plan, recent progress and steps towards delivering the next and necessary level of effectiveness and capability
*Arthur B. Weglein**
- 5:15 PM** Meeting adjournment

6:00 PM Reception and dinner