Data Processing & Acquisition SIG

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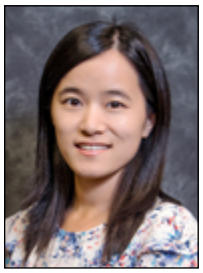
Recent Advances in Separating the Reference Wave and Preserving Reflection Data, and for Deghosting, for Towed Streamer, On-shore and Ocean Bottom Acquisition: Implications for Multiple Removal, Structural Determination and Amplitude Analysis



Jing Wu **Arthur B. Weglein**

Speaker(s): Jing Wu and Arthur B. Weglein,
M-OSRP/Physics Dept./University of Houston

Tuesday, February 7, 2017
4:30 p.m. Sign-in, Snacks, Social Time
5:00 p.m. Start of presentation

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Location: Schlumberger
Q Auditorium
10001 Richmond Ave.
Houston, TX 77042

Abstract: We begin with a brief overview of objectives, strategy, projects, plans and deliverables in M-OSRP consortium at University of Houston. We then focus on and describe several recent advances in the initial wave separation steps in the seismic processing chain. First, we extend the Green's theorem based marine towed streamer deghosting method to accommodate non-horizontal and undulating cables. The current industry standard deghosting method, the P-Vz method, assumes that the acquisition surface is horizontal. The P-Vz method can have problems and be less than effective with feathered towed streamer data, and with on-shore and ocean bottom acquisition in the presence of significant variable topography. Secondly, we advance the Green's theorem method to de-ghost both the ocean bottom pressure data and multi-component displacement data.

Thirdly, the marine towed streamer Green's theorem reference wave, reflection data separation method is extended to on-shore acquisition for ground roll removal without damaging the reflection data. That method provides an alternative to the traditional filtering methods for ground roll removal that can damage reflection data. Finally, we simplify the on-shore algorithm with a reduced data requirement, allowing effective application with current land acquisition.

These advances in preprocessing are important for broad band data interests. In addition, they are required prerequisites for all inverse scattering series (ISS) free surface and internal multiple methods to allow the latter capability to deliver their promise and potential. The ISS methods are direct and do not require subsurface information, but are high-graded and benefit from the preprocessing methods and advances described in this presentation.

Biography: Jing Wu received her B.S. (2009) in geophysics from China University of Geosciences, and an M.S. (2012) in geophysics from Peking University. She is currently a PhD student in seismic physics at the University of Houston, advised by Prof. Arthur B. Weglein. Her research topics include seismic signal processing for the removal of multiples, ground roll and ghosts, and seismic forward modeling. Among Jing Wu's contributions are a method to remove ground roll without damaging reflection data, and showing that the original inverse scattering series internal multiple attenuation algorithm's ability to not only be applied without subsurface information but without any slightest algorithmic change for any earth model type (acoustic, elastic, anisotropic, anelastic…) was explicitly demonstrated for an absorptive/dispersive subsurface.

Arthur B. Weglein received his PhD in physics from the City University of New York and then spent two years as a Robert Welsh Postdoctoral Fellow at the University of Texas at Dallas. He entered seismic petroleum research in 1978, first at Cities Service Oil Company Research Laboratory in Tulsa (1978-81) and Sohio Petroleum Company Research Laboratory in Dallas (1981-85). Weglein spent the next 15 years as a member of ARCO's research staff. He spent a sabbatical year (1989-90) as visiting professor at the Federal University of Bahia, in Brazil, and three years (1990-94) as scientific advisor at Schlumberger Cambridge Research in Cambridge, England. In 2000, Weglein joined the University of Houston. In 2002, Weglein was promoted to a university-wide chair, the Hugh Roy and Lillie Cranz Cullen Distinguished Professorship in Physics, with a joint professorship in the Department of Physics and the Department of Earth and Atmospheric Sciences. Weglein received the 2008 CCNY Townsend Harris Medal, and in 2010 the SEG Reginald Fessenden Medal for contributions to seismic exploration. In 2016, Weglein was awarded the SEG's highest honor, the Maurice Ewing Medal.