



*Art Weglein is receiving the Reginald Fessenden Award for his influence on the seismic industry through his work in inverse scattering. He and his colleagues and students have published widely on this topic and the result is seen in the thinking and practice in the industry today, particularly in the area of treatment of multiple reflections.*

## *Reginald Fessenden Award to Arthur Benjamin Weglein*

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BY ROBERT H. STOLT

During the 1970s, a few theoretical physicists arrived on the seismic scene, young and naive enough to believe that the apparatus of quantum scattering theory could be applied to the inverse seismic problem. Among them was Art Weglein, who started at Cities Service in 1978 with a Ph.D. in physics from CUNY.

Art and I, among others, were fascinated with the inverse scattering series, and hopeful that it contained the key to the information hidden in seismic data. Apart from some success with the first term in the series (the so-called Born approximation), early results were discouraging. Inadequate computer power was certainly a problem, but so was faintheartedness. Art, more than anyone else, remained true to the original vision, mining the inverse scattering series for remedies to perplexing problems, including surface multiple removal, internal multiple removal, and imaging through complexity. Along the way, he has taught and mentored a number of young geophysicists, who have now taken their place as leaders in the seismic community.

In addition to working at Cities, Sohio, and ARCO, Art spent 1989–90 as a visiting professor at the Federal University of Bahia in Brazil, and 1990–94 as a scientific advisor at Schlumberger Cambridge Research in Cambridge, England. In 2000, Art joined the faculty at the University of Houston, where he now occupies the Hugh Roy and Lillie Cranz Cullen Distinguished University Professorship in Physics. In 2003, Art visited 25 SEG Sections in six countries as SEG Distinguished Lecturer.

Art is very much a theorist, though he always manages to keep a toe dipped in reality. At a time when most "research" is short term, Art's horizon is far away, though he is never without clear objectives. His gentle humor and unwavering commitment to good science make him a joy to work with. His scientific curiosity rarely turns off, even on evenings and weekends. He and his wife Chris have nevertheless raised a fine fam-

ily, and remain active and involved with contemporary affairs.

Art has generated some controversy with his velocity-independent approach to processing. Although the inverse scattering series requires an initial or "background" velocity model, the final solution is, on paper, independent of the initial model. Velocity-independent processing is not unknown within the industry, helping most people now accept velocity-independent surface-multiple removal, many to accept velocity-independent internal multiple attenuation, and some to accept velocity-independent imaging.

Arguments against velocity-independence have been made from the inverse series itself. Convergence of the series depends on the initial model being "close", in some sense, to the final solution. Analysis of individual terms in the series requires a Feynman-like interpretation, with waves propagating in definable directions between multiple scattering points. If the background velocity differs too much from the actual velocity, this interpretation becomes questionable.

Fortunately, for a quantum field theorist, indeterminacy is not an obstacle. With the outcome far from sure, Art approached the inverse series as performing a number of discrete tasks, some of which may be isolated by confining attention to certain terms (i.e., a subseries) of the full inverse scattering series. Some of these subseries may be sensitive to the initial velocity model, but others may not. By dissecting the series, Art and his coworkers have produced a suite of useful processes while advancing substantially their understanding of the inverse seismic problem.

Where success is certain, anyone may go. Art has shown a consistent willingness to swim in deep water, and has demonstrated his ability to do so. It is an honor and a privilege to present Arthur B. Weglein for the Reginald Fessenden Award.