Paul Stoffa, a long-time University of Texas faculty member, has contributed in the fields of geophysical signal processing and seismic imaging with SEG publications addressing the following topics: homomorphic deconvolution for shallow marine data, cepstrum aliasing and the Hilbert transform, seismic source decomposition, inversion of plane-wave seismograms with genetic algorithms, full wave-equation migration, split-step Fourier migration, and plane-wave depth migration.

Honorary Membership for Paul L. Stoffa

by Anton Ziolkowski

Paul Stoffa is awarded Honorary Membership in recognition of his outstanding scientific contributions to exploration geophysics. As a leader of geophysical research for 40 years, Paul has inspired colleagues, fellow geophysicists, and a long succession of graduate students, including over 50 PhDs. He has published over 100 research articles in peer-reviewed journals; those co-authored by a student often have the student’s name first.

Paul’s geophysical research began at Lamont-Doherty Geological Observatory, and continued at Gulf Research and Development, before his appointment in 1983 to his present position as Professor and Shell Distinguished Chair in Geophysics, in the Department of Geological Sciences and Institute for Geophysics (UTIG), The University of Texas at Austin. He was Director of UTIG from 1994 to 2008 and a member of the Steering Committee charged with forming the Jackson School of Geosciences. During this time, he was actively involved in the Ocean Drilling Program and served as Chairman of its Board of Governors.

Paul has a wonderful imagination and is able to create new methods to acquire and process geophysical data. He has developed major acquisition and processing techniques in exploration geophysics that have made a huge contribution to our understanding of how to investigate the Earth’s interior. Only a few of these can be mentioned here.

In the 1970s the Lamont-Doherty team of Talwani, Windisch, Buhl, and Stoffa acquired and processed in-house academic multichannel seismic reflection data, doing everything from scratch. A key step, developed by Paul from known work in sonar, based on the acoustic wave equation, was split-step Fourier migration, first used by Lamont in 1976. Paul presented the method at the 1977 Calgary SEG meeting, but the full theory was not published until 1990, when it began to be adopted by industry. Paul has since extended the application to prestack data.

The Lamont team used marine seismic acquisition equipment in new ways, including acquiring over 100 two-ship expanding-spread common-midpoint profiles all over the world, with offsets over 100 km to determine deep crustal structure. They also used two ships, one behind the other, firing alternately, to obtain continuous large-offset coverage. In 1981 the Large Aperture Seismic Experiment (LASE) used three ships with an aperture of 16 km for imaging the deep continental margin.

These were huge data sets for the time and, with very large offsets, had the potential for detailed velocity analysis to great depths. As a solution, Paul developed a coherency-weighted tau-p transform for these wide-angle seismic data, revealing not only the near-vertical reflection ellipses but also the postcritical, turning and refracted waves: the full velocity spectrum. Paul has since extended his plane-wave analysis to imaging 2D and 3D prestack data. In 1989, Paul edited the book *Tau-p: A Plane Wave Approach to the Analysis of Seismic Data*.

With Mrinal Sen, Paul introduced genetic algorithms and very fast simulated annealing to geophysics and in 1995 published *Global Optimization Methods in Geophysical Inversion* by Sen and Stoffa. The second edition was published in 2013. Perhaps surprisingly, the book is read and used more by engineers than by geophysicists, who have yet to become passionate about stochastic approaches to inversion. Building on this experience, as director of UTIG, Paul started a climate research program which used a Bayesian approach to estimate the uncertainties of climate models.

Recently Paul has combined pseudo-spectral methods (for space) with the rapid expansion method (for time) for acoustic, elastic and anisotropic seismic modeling and reverse time migration (RTM). Importantly, this approach is the most accurate numerical method in each of these domains.

His achievements make him truly worthy of Honorary Membership.