Bear, among others. Thus, the reader's choice is to maintain many of the classic books and papers, or simply own Batu's text. While it is a superb compendium of the classical theory of well hydraulics, this text ignores many advances of the past 2 decades, especially those of the petroleum industry. A more appropriate title therefore might be "Aquifer Hydraulics: A Comprehensive Guide to Classical Hydrogeologic Data Analysis."

In addition to the seminal content, this text is one of the most organized and systematic books that I have read and used. The first chapter provides scope and organization. The second covers material typically provided in introductory groundwater hydrology textbooks.

However, with fewer than 100 pages, it does so in a concise manner. The rest of the book details aquifer hydraulics theory and associated methods of analysis. These chapters start with the most simplified scenario: fully penetrating pumping wells in a homogeneous, isotropic, nonleaky confined aquifer, with steady pumping (in other words, the Theim equation). With each chapter, the text steps through increasingly complex well and aquifer configurations in a systematic manner. Subsequent chapters treat anisotropy, multiple aquifers, storage/no storage in the confining aquitard, and so forth.

Increases in complexity include partially penetrating wells, unconfined aquifers, and noninfinite or bounded aquifers. Also covered are well efficiency, well-specific capacity, step-drawdown tests, slug tests and associated methods, and theory, models, and methods associated with formations of low permeability. One could say that the book is rigorously systematic in its progression of topics. Whether this is a criticism or a compliment depends on the style of the reader.

Each individual chapter and section within mimics the structure of the book itself—logical and systematic. Each new well and aquifer configuration begins with an overview of theory drawn from the original works. In most cases, a list of steps, or a "recipe," for analysis is provided. For some readers, this will seem overly myopic with regards to the generic problem. For others, it will seem an appropriate approach to an actual field situation. Most topics include examples, drawing from the original cited work or from a problem that Batu has assembled specifically for demonstration of the given method.

Software is provided for analyses associated with material in the book. Included are 16 type curves, 2 type curve generation programs, and a program for modeling drawdown using step-drawdown data. These are not state-of-the-art or optimization programs such as the GUI-driven software packages that are becoming common. They are original Fortran executables developed by other scientists (Reed, Neuman, Labadie, Helweg), but modified by Batu for purposes of the textbook. This again illustrates the intended purpose of the book as a primer of fundamentals, not a source of the most modern methods.

Batu's text is meant to provide a working knowledge of fundamental, classic well hydraulics theory and methods. Its core readership may include graduate-level hydrology classes. A beginning practitioner may find it absolutely invaluable, while a seasoned hydrologist may find it redundant in his or her library.

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About AGU

Stixrude Receives James B. Macelwane Medal

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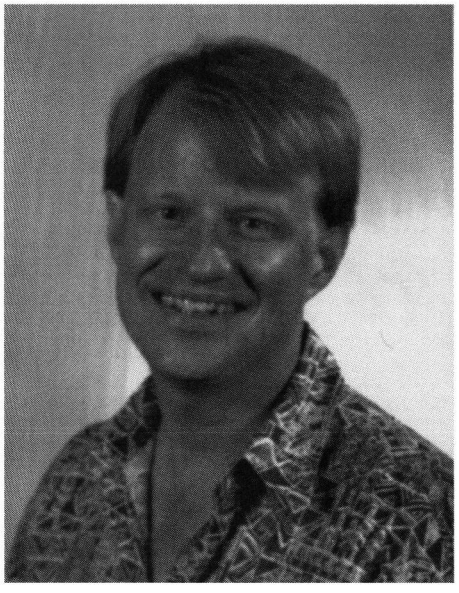
Lars P. Stixrude was awarded the James B. Macelwane Medal at the AGU Fall Meeting Honors Ceremony, which was held on December 8, 1998, in San Francisco, California. The medal recognizes significant contributions to the geophysical sciences by a young scientist of outstanding ability.

Citation

"As scientists, most of us are privileged to have many happy and fulfilling moments. Among the happiest is the shared enjoyment of recognition of an outstanding young colleague. In awarding the James B. Macelwane Medal to Lars Stixrude, we at once recognize Lars' exceptional achievements in geophysics and take pride in the knowledge that owing to his clever and persistent prodding, Mother Earth will surely yield some of the secrets we sought to unveil but failed.

"Lars' unique contributions to geophysics come from a masterful use of theoretical and computational methods in physics and chemistry combined with a deep and broad understanding of unresolved questions concerning the composition, structure, and evolution of the Earth. Most know that Lars is one of a handful of theoretical mineral physicists. He is indeed an excellent practitioner of this difficult field, but there is more to Lars. Those of us who know him well have to agree with Mark Richards when he said that Lars "is virtually a one-man geophysics department."

"Having his interest in the Earth sparked early by a gifted high school teacher named Bill Harrison, Lars proceeded to build a fertile intellectual foundation by completing a double major in geology and physics. He then joined the University of California, Berkeley graduate program, intending to pursue research in geological tectonics. However, his analytical mind was soon drawn to the mysteries of the deep Earth. Not one to venture onto well-worn paths, he chose theoretical mineral physics, which he saw as a potentially powerful probe of mineral properties under pressure and of temperature conditions outside existing experimental capabilities. A very happy and productive collaboration ensued, in which Lars picked up new ideas at least as quickly as I could supply them. With a prodigious capacity for work, he returned with new ideas that he fully developed in a series of papers on the structure of liquid and glassy silica, the topology of tectosilicates, and the high-pressure thermodynamics of silicate liquids and solids. He went



on to assimilate and carefully analyze the available petrologic, mineral physics, and seismic data pertaining to the transition zone and deep lithospheric slabs. The combination of an exhaustive data analysis with theoretical models that are just rigorous enough for the job at hand became a hallmark of Lars' work that would serve him well in the future.

"Having completed his Ph.D. at the University of California, Berkeley, Lars went on to further develop his already impressive repertoire in the Earth sciences as a postdoctoral fellow at the Geophysical Laboratory of the Carnegie Institution of Washington. Here he embarked on collaborative efforts with Dave Mao, Rus Hemley, and Ron Cohen. A paper with Dave and Rus on lower mantle mineralogy established a new standard for future work. Lars quickly learned computational methods in band structure theory when he became interested in the stability of $MgSiO_3$ perovskite. Some data and model predictions suggested possible temperature-induced phase transformations in this dominant lower mantle mineral. With Ron, Lars showed that the energy needed to change the symmetry of the orthorhombic unit cell is large enough to essentially insure that the distorted perovskite structure is stable throughout the mantle. More recent experiments validated this result. There followed a series of landmark papers that strengthened the status of hexagonal close-packed iron as the stable phase at core conditions and made the daring proposal, based on detailed quantum computations of the elasticity tensor of iron, that a virtually complete alignment of the anisotropic hexagonal grains of iron accounts for the observed cylindrical anisotropy of the inner core. Since then, he has applied this technique to compute the pressure dependence of the elastic anisotropy of forsterite, a mineral that boasts 28 atoms per cell and 14 degrees of freedom. Lars has brought us a long way from the quantum mechanics of simple cubic salts.

"In the few short years since his graduation, Lars has helped to realize the promise that careful theoretical investigations can sharply illuminate the behavior of materials under extreme conditions and can help to predict consequences of specific planetary models, while pointing out fruitful avenues of experimentation and field observations. His contributions to the structure of the transition zone, the chemistry of the lower mantle and the physics of the inner core, and the addition of seismic anisotropy as a realistic diagnostic of mineral composition and mantle are truly impressive. There are others who are able to make very competent first principles calculations, but none do so as creatively for the benefit of geophysics. He is one of the very rare individuals endowed with a combined grasp of geology, geophysics, and fundamental computational physics, and the necessary motivation and energy to capitalize on them fully. He is the exemplary multidisciplinary Earth scientist."—*Mark Bukowinski, University of California, Berkeley, USA*

Response

"Francis Bacon said that 'No pleasure is comparable to the standing upon the vantage ground of truth," but at this moment, I must disagree. For the joys of science are both private, as when on the threshold of discovery a new picture emerges from the cloak of obscurity, and public, when the discovery is shared with friends and colleagues. I am bound to say that for this moment, there is no greater pleasure than when one's contributions, however small, are recognized by one's peers.

"I am deeply grateful to the American Geophysical Union for this award and honored that I have been recognized in this way. Be assured that I have been humbled by the experience. In looking over the history of past recipients, I feel there are none to whom I would dare compare myself. May I see this recognition as a spur to new discoveries; not a destination, but a signpost along the way and a hint that the direction might be true.

"My greatest thanks to Mark Bukowinski, for his words that were too kind and for his profound influence on my thinking as my research advisor in graduate school. Far more important than the skills of geophysics and solid-state physics that I learned from him, though these have been invaluable, has been his uncompromising insistence on careful thought and rejection of easy certainty.

"I feel privileged to have been at the University of California, Berkeley, at a special time. There I felt the excitement of a new adventure in which the richness of the Earth's interior was being revealed for the first time. I am grateful that throughout my career I have continued to learn from some of the leaders of this endeavor, including Mark Bukowinski, Raymond Jeanloz, and Mark Richards. My appreciation of the Earth's interior and of the still young field of mineral physics was deepened by my visit to the Geophysical Laboratory, where I had the pleasure of working with Rus Hemley, Dave Mao, and Ronald Cohen. To Ronald Cohen I owe a special debt of gratitude for showing me the power of modern first principles theory and starting me in a direction that I have continued to pursue since. I am grateful also to my former colleagues at the Georgia Institute of Technology for giving me a chance, and to my present colleagues at the University of Michigan for continuing to inspire me and to support my new experimental ventures.

"It was a high school teacher, Bill Harrison, who first awakened my interest in geology and science while I was growing up in Delaware. I remember his boundless enthusiasm for the subject, his dedication to his students, and his message that the power of authority was nothing compared with that of observation. The seeds were planted in fertile ground, for my parents had already instilled in me a lifelong love of learning for its own sake. Without their constant support and encouragement, I would not be here today.

"Finally, my deepest gratitude to my fellow traveler and companion in intellectual pursuit, Carolina Lithgow-Bertelloni. Up the sometimes slippery slopes of career and discovery, she has been far more than muse. Leader as much as inspiration, she has pointed the way and kept our gaze focused on the distant summit. For me, it is our shared journey that invests this honor with meaning."—*Lars P. Stixrude, University of Michigan, Ann Arbor, USA*