GEORGE P. WOOLARD AWARD

presented to

NIKOLAS I. CHRISTENSEN

Citation by
WALTER D. MOONEY

The George P. Woollard Award of the Geophysical Division of the GSA recognizes outstanding geophysical contributions to the understanding of geology. For a geophysicist whose first love is geology, such a recognition is particularly gratifying. Nik Christensen is certainly such a person.

Nik began his career at the University of Wisconsin, where he completed both his under graduate and graduate degrees. His B.S. was in geophysics, and his Ph.D. was in metamorphic petrology, with his field area in Connecticut. George Woollard, who was at Wisconsin at the time, urged Nik to combine his knowledge of physics and geology by going to work at Harvard in the laboratory of Francis Birch, who had recently published several benchmark papers on the constitution of Earth's interior, and on the elastic properties of igneous rocks.

It is perhaps no surprise that Nik's first papers from his work at Harvard were on the elastic properties of metamorphic rocks. His field work had certainly convinced him that metamorphic rocks were abundant in Earth's crust—far more so than was implied by the simple model consisting of a granitic upper crust and basaltic lower crust.

For reasons known only to Nik, in the early 1960s he measured both the compression and shear-wave velocities of these metamorphic rocks, despite the fact that the shear-wave structure of the crust was essentially unknown from seismic refraction field measurements, and only poorly known from surface-wave studies. It would take crustal seismologists more than 20 years to catch up with Nik's laboratory measurements. (In fact, I'm not sure that we have even today completely caught up!)

While measuring shear-wave velocities, Nik discovered the phenomenon of shear-wave splitting, and published this observation In the Journal of Geophysical Research in 1966—over a quarter of a century ago. Once again he was well ahead of his time, and today shear-wave anisotropy in the crust and upper mantle is one of the primer research topics in geophysics because it provides a measure of structure, composition, and deformation of the lithosphere.

In the late 1960s, Nik joined the faculty of the University of Washington, by way of the University of Southern California. These were heady days for marine geophysics as the plate-tectonics revolution swept the globe. By measuring the elastic properties of ophiolites, Nik and graduate student Matt Salisbury were able to demonstrate that these bodies provided a match to oceanic crust and upper mantle.

This and other studies by Nik demonstrated that serpentinite is not abundant in the oceanic crust, and that mafic Igneous rocks and their metamorphic equivalents are the dominant rock types.

Despite his activity in marine geophysics, Nik remained loyal to his upbringing in the heartland of the continental interior and continued his studies of the continental crust and upper mantle. In 1975, together with graduate student David Fountain, Nik promoted the concept that the lower crust consists of mafic granules, a conclusion that has survived more than 20 years of scrutiny.

Nik moved to the Big Ten league when he joined the faculty at Purdue in 1983. In the years that followed, he pursued a variety of exciting topics in both field and lab studies. Among these are the origin of crustal reflections (with graduate student Dan Szymanski), the island-arc model of continental growth as exemplified by the Kohistan arc in Pakistan (with Jay Miller), and further studies of seismic anisotropy, attenuation, and pore pressure.

It was in the middle 1980s that I began to collaborate with Nik on the USGS Trans-Alaska Crustal Transect. During numerous field seasons in Alaska I benefited from numerous lectures on petrology at the outcrop, and had the privilege of carrying 20-kilogram rock samples down steep slopes with Alaskan haul-road 18-wheelers whizzing by at the base. It was exhilarating and I'm glad that I survived to tell the tale. By building on our cooperation in Alaska, I have had a marvelous time working with Nik on the more general problem of the structure and composition of continental crust. Doing laboratory work requires the ability to work with your hands as well as your mind.

Outside the lab Nik has applied this ability to the restoration of classic cars from the late 1950s. As he has explained to me, most people form a special bond with objects of desire from the high school and college years, and in his case this includes his wife of 35 years, Karen, and his 1957 Chevy Bel-Air convertible.

Well, you either know about classic cars, or you don't, so I won't try to explain this magnificent obsession.

This short citation presents the listener with a brief overview of Nik's contributions, and a rare opportunity. I refer to the fact that Nik has often been making measurements in his lab that are fully appreciated only 20 years later (shear-wave splitting, for example). The opportunity is obvious: talk to him after his acceptance speech and ask him what he's working on. There's your chance to get in on the ground floor on a topic that will be center stage in the year 2016.

Nik, on behalf of the Geophysics Division, and your numerous friends and colleagues from around the world, please accept the 1996 George P. Woollard Award for your outstanding scientific contributions.