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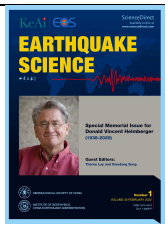

In Memoriam

Preface to the special memorial issue for Professor Donald V. Helmberger

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Citation: Lay T and Song XD (2022). Preface to the special memorial issue for Professor Donald V. Helmberger. Earthq Sci **35**(1): Q20220015, doi: 10.1016/j.eqs.2022.01.020

Donald Vincent Helmberger, Ph.D. and Smits Family Professor of Geophysics Emeritus at Caltech (Figure 1), one of the primary founders of seismic waveform modeling, was born on 23 January 1938 and died on 13 August 2020. Don obtained his Ph.D. in 1967 at the University of California San Diego, USA. In 1970, after a two-year appointment as a research associate at MIT and one year on the faculty at Princeton University, Don moved to the Seismological Laboratory at Caltech where he was to spend the rest of his career. From 1998 to 2003 he served as the Director of the Seismo Lab, and he became emeritus in 2017. Key milestones and accomplishments during his life and career are summarized in an oral history (Cohen, 1999), a profile (Zagorski, 2006), and memorials (Caltech, 2020; Lay, 2021). This special issue is intended to provide a more personal insight into his inspirational mentorship and guidance during myriad discoveries about earthquake faulting and earth structures from crust to core from the eyes of many of the ~45 Ph.D. students and postdocs whom he advised or co-advised at the Seismo Lab over the five decades of his career.

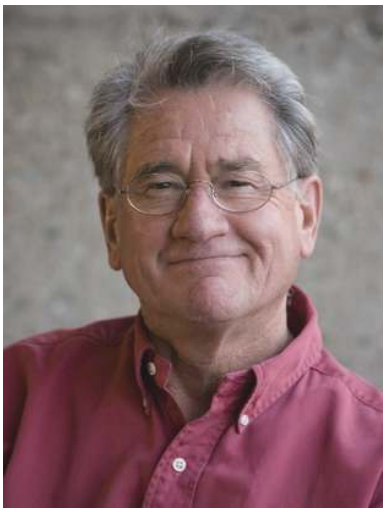

Figure 1. Professor Donald V. Helmberger (1938–2020). Photo courtesy of Caltech Archives.

Contributors in this special issue span the interval from his first graduate student (Charles Langston, Ph.D. 1976) to his last graduate student (Voon Hui Lai, Ph.D. 2020). The 19 articles are permeated by recurrent themes; Don's passion for looking at seismic data, his innovative development and extensions of Generalized Ray Theory,

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Article history:
Received 6 January 2022
Accepted 6 January 2022
Available online 8 February 2022

https://doi.org/10.1016/j.eqs.2022.01.020

his enthusiasm for 1D to 3D waveform modeling of seismograms at all distance ranges, his openness to exploring wide model spaces that enabled breakthrough discoveries, his pleasure in working closely, yet loosely, with students, his care for students, and his athletic skills on the football field. The contributions sample the many topics that could be addressed as waveform modeling transformed the discipline of seismology, from upper mantle structure, to lower mantle structure to core structure to finite-source processes of earthquakes large and small. In recounting vivid experiences, the contributors also paint a picture of a master mentor whose great personal attributes inspired a stream of students and postdocs of different personalities and background and turned novices into successful researchers.

When one pauses to think how many of the thousands of papers produced in seismology on these topics directly track back to seminal theoretical advances and modeling approaches introduced by Don Helmberger, one cannot help but be stunned by his impact on the field. But one also sees the steadfast joy, kind-heartedness, and pleasure with which he made this impact with his students and postdocs. He pursued science with integrity and positivity, engendering comradery rather than competition in the effort to extract information from seismic recordings. Always smiling, always keen to chat, always encouraging; his attributes come through clearly in the articles assembled here. We hope the inspirations that many of us had the fortune to receive from him can be inspirational to new generations of students and mentors alike. We also hope the insights into this great seismologist and great man prompt all readers to embrace his philosophy of life and science.

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