



Title Variations and healing of the seismic velocity

Speaker Prof. Roel Snieder
W.M. Keck Distinguished Chair of
Exploration Science, and the Interim Head of
the Department of Geophysics at
the Colorado School of Mines.



Date & Time Tuesday, March 27, 2019 9:30 a.m.- 12:00 p.m.

Place 543, West Zone 2, Ito Campus, Kyushu University

Abstract

Interferometric methods in seismology have made it possible to detect time-lapse changes in the seismic velocity with an accuracy of about 0.1%. I will show examples of detecting velocity changes in the laboratory, the earth's near surface, and in engineered structures. Perhaps surprisingly, the seismic velocity is not constant at all, and varies with the seasons, temperature, precipitation, as the weather does. In addition, the seismic velocity usually drops as a result of deformation. Most of these changes likely occur in the near surface or the region of deformation, and a drawback of using strongly scattered waves is that it is difficult to localize the spatial area of the velocity change. I will present laboratory measurements that show that a certain spatial localization of the velocity change can be achieved. One of the intriguing observations is that after deformation the seismic velocity recovers logarithmically with time. The reason for this particular time-dependence is the presence of healing mechanisms that operate at different time scales. Since this is feature of many physical systems, the logarithmic healing is a widespread behavior and is akin in its generality to the Gutenberg-Richter law.

About the Speaker

Roel Snieder holds the W.M. Keck Distinguished Chair of Professional Development Education at the Colorado School of Mines. He received in 1984 a Masters degree in Geophysical Fluid Dynamics from Princeton University, and in 1987 a Ph.D. in seismology from Utrecht University. In 1993 he was appointed as professor of seismology at Utrecht University, where from 1997-2000 he was appointed as Dean of the Faculty of Earth Sciences. Roel served on the editorial boards of Geophysical Journal International, Inverse Problems, Reviews of Geophysics, the Journal of the Acoustical Society of America, and the European Journal of Physics. In 2000 he was elected as Fellow of the American Geophysical Union. He is author of the textbooks "A Guided Tour of Mathematical Methods for the Physical Sciences", "The Art of Being a Scientist", and "The Joy of Science" that are published by Cambridge University Press. In 2011 he was elected as Honorary Member of the Society of Exploration Geophysicists, and in 2014 he received a research award from the Alexander von Humboldt Foundation. In 2016 Roel received the Beno Gutenberg Medal from the European Geophysical Union and the Outstanding Educator Award from the Society of Exploration Geophysicists. From 2000-2014 he was a firefighter in Genesee Fire Rescue where he served for two years as Fire Chief.

Host : Prof. Takeshi Tsuji

Contact : Exploration Geophysics Lab (Tel : 092-802-3316)

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