

## Mitiyasu Ohnaka (1940 – 2021)



On 5 May 2021, the geophysicist and seismologist Dr. Mitiyasu Ohnaka died in Yokohama, Kanagawa Prefecture, Japan at the age of 80. Dr. Mitiyasu Ohnaka was born on 11 September 1940 in Yokohama, Kanagawa Prefecture. He graduated from the University of Tokyo in 1966, and earned a Master's degree in 1968 and a PhD degree from the same university in 1975. From 1970, he worked at the Earthquake Research Institute, the University of Tokyo as Research associate, in the fields of rock physics, experimental seismology, and the physics of earthquakes. He was promoted to associate professor in 1980 and then to full professor in 1990. He was the director of the Earthquake Prediction Research Center during 1997 – 2001. He held various positions such as Honorary Professor at University College London and invited lecturer or visiting scholar at many worldwide institutions, including the Kavli Institute for Theoretical Physics at the University of California, Santa Barbara. After his retirement in 2001, he continued to work for understanding of earthquake physics as professor emeritus, publishing papers in leading geophysical journals. He also worked widely in Japan, supervising researchers and students, and delivering undergraduate and postgraduate lectures, at institutions from the University of Tokyo to Yamagata University and more. To advance international activities of the earthquake physics community, he served as a member of Executive

Committee of the International Association Seismology and Physics of the Earth's Interior (IASPEI) during 1991 to 1995, and he chaired the Sub-Commission on Modeling the Earthquake Source from 1991 to 2001 in IASPEI.

He wrote the book "The Physics of Rock Failure and Earthquakes" published by Cambridge University Press in 2013. This book covers the fundamentals of rock failure physics, earthquake generation processes, physical scale-dependence, and large-earthquake generation cycles and their seismic activity and is designed for researchers and professional practitioners in earthquake seismology and rock failure physics, and also in adjacent fields such as geology and earthquake engineering. It is also a valuable reference for graduate students in earthquake physics, rock physics, and earthquake seismology.

He conducted a series of laboratory experiments with high-resolution measurements to understand earthquake generation processes from slow nucleation to the dynamic rupture propagation. He greatly contributed to the understanding of how a rupture develops spontaneously at accelerating speeds, finally reaching a steady high-speed close to elastic-wave velocities. He proposed a model in which local dynamic unstable ruptures that occur during the source nucleation process correspond to foreshock sequences immediately before the occurrence of the mainshock rupture. He focused on the formulation of laboratory-derived physical constitutive laws, which governs the behavior of earthquake ruptures and provides the basis of earthquake physics. He also investigated how the constitutive law for rock failure at local strong areas on faults is affected by seismogenic crustal conditions of effective normal stress, pore fluid pressure, and temperature. He continued to put a lot of efforts to reveal scale-dependent physical quantities inherent in the rupture over a broad scale range, focusing on a dominant wavelength representing the non-uniformity of the geometric shape of the fault. To explore the earthquake physics in nature, he performed comparative study of the experimental results and observed seismic phenomenon. We miss his relentless positive energy and enthusiasm to make progress of studies on earthquake physics.

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