Vladimir Isaakovich (Volodya) Keilis-Borok (1921-2013)

Vladimir Keilis-Borok, IUGG President (1987-1991), was one of the most influential mathematical geophysicists of our time. He was engrossed by the idea of earthquake prediction and spent the last few decades of his life on understanding nonlinear processes in the Earth’s lithosphere leading to earthquakes. He developed a distinguished group of experts in mathematical geophysics, who contributed together with him to the theory of lithosphere dynamics, seismic hazards and risk, and earthquake prediction. Volodya Keilis-Borok (Vladimir Isaakovich - how Russians called him, Volodya - for his friends or KB - for many of his colleagues) passed away on 19 October 2013 in Los Angeles, California, at the age of 92.

Born in Moscow (Russia) in 1921, he graduated from the Moscow State Geological Prospecting University in 1943 and received his PhD and DSc (Habilitation) degrees in mathematics and geophysics from the Russian Academy of Sciences in Moscow in 1948 and 1953, respectively. He worked at the Schmitt Institute of Physics of the Earth from 1948 to 1989 and chaired the Institute’s Department of Computational Seismology. In 1989 he founded the Moscow Institute of Earthquake Prediction Theory and Mathematical Geophysics and became the Institute’s first Director. After his retirement from the leadership of the Institute in mid 1990s, he moved to USA and became a distinguished professor of the University of California at Los Angeles (UCLA).

Trained as a geologist and a mathematician, the scientific credo of Volodya became ‘mathematics for geophysics’. His early research was concentrated on seismic source modelling, surface wave propagation in elastic layered structures, and inverse problems in seismology. He collaborated with great mathematicians Israel Gelfand, Nobel Prize winner in economy Leonid Kantorovich, Andrei Kolmogorov, and Yakov Sinai as well as with great geophysicists Keith Aki, Leon Knopoff, Frank Press, Don Turcotte, Seiji Uyeda, and many others. In mid 1960s Keilis-Borok initiated two research programs: on seismic risk analysis (with Leonid Kantorovich and George Molchan) and recognition of the regions prone to potential large earthquakes (with Israel Gelfand and Leon Knopoff). As results, a general probabilistic approach to seismic risk assessment and pattern recognition methods to predict earthquakes and other extreme events were developed. Keilis-Borok with his colleagues applied pattern recognition methods to predict earthquakes as well as socio-economic events with notable success. For example, together with Vladimir Kossobokov (a statistical seismologist of his Moscow group) they predicted great earthquakes around the world with a success rate of over 70%, and together with Allan Lichtman (a political historian of the American University in Washington, D.C.) they predicted the popular vote winner of presidential elections in USA from 1984 to 2012 as well as 128 out of 150 U.S. mid-term Senatorial elections since 1986.

Responding to an invitation of Abdus Salam, a Nobel Prize winner in Physics, and the founding Director of the International Centre for Theoretical Physics (ICTP) at Trieste, Italy, Volodya Keilis-Borok established in the mid 1980s a research program on structure and nonlinear dynamics (SAND group) in ICTP to promote research and education in theoretical geophysics in
economically less-developed countries. Alternating biennial advanced schools on nonlinear dynamics and earthquake prediction and schools on inverse problems in seismology organized by Keilis-Borok for about two decades disseminated modern knowledge in theoretical seismology and geodynamics.

Keilis-Borok was the founding Chairman of the International Committee for Geophysical Theory and Computers (1964-1979, now the IUGG Union Commission on Mathematical Geophysics). He served IUGG as a Bureau Member (1983-1987) and the International Association of Seismology and Physics of the Earth’s Interior (IASPEI) as Vice President (1983-1987), and he was also Board Member and Chair of Mathematics and Natural Sciences Section of the International Council for Science (ICSU, 1988-1991). He was a member of many expert groups and scientific committees including the Committee for International Security and Disarmament of the Russian Academy of Sciences, the Scientific Committee for the U.N. Decade for Natural Disasters Reduction, and the International Working Group on the Geological Safety of Nuclear Waste Depositories.


Volodya loved his science, he could not live without it. Volodya loved people, he could not live without them. Volodya had an impressive knowledge of history, literature, music, and he knew several languages. He could recite Shakespearian sonnets in English and Russian (in the translation by B. Pasternak, Nobel Prize Winner in literature) and Goethe poems in German. Last time I met Vladimir Isaakovich was in his flat in Los Angeles in December 2012. He was already not well, but his eyes were shining when we spoke about advances in geophysics and especially in earthquake science.

“Why is it that some of us still decide to become scientists, despite the fact that businessmen, lawyers, and doctors enjoy a much higher income?” Volodya asked and answered. “A famous Russian writer Leo Tolstoy once wrote that a writer is not merely a person who writes; a writer is a person who cannot live without writing. The same, I believe, is true for a scientist. Science is an exciting adventure where major rewards come from the discovery itself. What you get instead of big money is freedom, camaraderie, and independence. The honors and promotions will depend on yourself more than in the other occupations. And you will have the overwhelming feeling of uncovering yet another one of nature’s mysteries.”

1 (Keilis-Borok, V.I., 2004. Scientific research is a token of humankind’s survival. In: One Hundred Reasons to be a Scientist, ed. K. Sreenivasan. Trieste, Italy: ICTP, pp. 124-126.)
There are not many scientists who consider that earthquakes can be predicted, but it was not the case with Volodya. He always said that earthquake prediction is the Holy Grail of earthquake science. “Earthquakes can and should be predicted, although earthquake prediction is a challenging task”. Volodya liked to quote British Prime Minister W. Churchill when he heard concerns regarding his earthquake predictions: “This is not the beginning of the end, it’s the end of the beginning”. Frank Press, the Science Adviser to President Jimmy Carter and former President of the U.S. National Academy of Sciences, wrote on the occasion of Volodya’s 90th birthday: “Volodya, your career in science has been both creative and controversial - the same characterization that can be said of Fred Hoyle, Linus Pauling, even Albert Einstein. Knowing you, I am sure that age will be no impediment and that you will continue to put forward new concepts that will stimulate much discussion, not only in geophysics but in the social sciences as well.”

Life is limited, and unfortunately, Vladimir Isaakovich Keilis-Borok cannot anymore “put forward new concepts”, but his students and colleagues infected by Keilis-Borok’s great enthusiasm will continue scientific research “uncovering yet another one of nature’s mysteries”.

Volodya will be remembered by his family, friends, and colleagues around the world as a great Man, Scientist, and Teacher.

Alik Ismail-Zadeh