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Comprehensive Research in Earthquake Forecasting and Seismic Hazard Assessment

Edited by
Alexey Dm. Zavyalov and Eleftheria E. Papadimitriou

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Comprehensive Research in Earthquake Forecasting and Seismic Hazard Assessment

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Editors

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About the Editors

Alexey Zavyalov

Alexey Zavyalov graduated with honours from the Moscow Mining Institute in 1972 as a mining engineer-physicist and was sent to the O.Yu. Schmidt Institute of Physics of the Earth of the USSR Academy of Sciences, where he has been involved in expeditions and research since 1967. He has been PhD of Physical and Mathematical Sciences since 1985 and defended his thesis for the degree of Doctor of Physical and Mathematical Sciences in 2003.

Since 1981, his main fields of scientific interest have been earthquake physics, physics of seismic process and earthquake precursors, and development of algorithms for earthquake forecast by complex physically based features. In 1998, together with his colleagues A. Ponomarev and V. Smirnov, he was awarded the E.F. Savarensky Prize for the series of papers on "Structural Properties of Seismicity: Field Observations and Laboratory Simulation". A. Zavyalov is one of the authors involved in the discovery of the Round-the-World seismic echo effect.

He is the author of more than 200 scientific publications, including monographs, articles, and reports.

A. Zavyalov is a member of the editorial boards of a number of Russian and foreign journals, a member of the Bureau of the National Geophysical Committee of the Russian Academy of Sciences. From 2006 to 2013, he was the Chair of the Commission "Earthquake Source: Modelling and Monitoring for Forecasting" of the International Association for Seismology and Physics of the Earth's Interior (IASPEI). From 2011 to 2015, he was a member of the Executive Committee of IASPEI. In 2010, he was elected Vice-President of the European Seismological Commission (ESC). From 2012 to 2014, he was President of the ESC. He is currently the Titular Member of Russia in the ESC.

A. Zavyalov has led and implemented a number of Russian and international projects supported by the Russian Foundation for Basic Research, the Russian Ministry of Education and Science, and the governments of Greece, China and India.

Eleftheria E. Papadimitriou

Eleftheria E. Papadimitriou is a geologist and seismologist with a deep commitment to advancing the field of geophysics. With a Bachelor's degree in Geology and a Ph.D. specializing in Seismology, her career has been dedicated to furthering our understanding of earthquakes and seismic activity. Fluent in Greek, English, French, and Russian, she has fostered international collaborations and established connections with approximately 55 foreign institutions.

She has actively engaged in teaching seismology to undergraduate and postgraduate students, nurturing their passion for geophysics, mentoring and guiding the theses of undergraduate, master's, and Ph.D. students.

She is also a member of eight scientific societies and has actively contributed to 14 special committees and councils. In recognition of her dedication to advancing scientific knowledge, she currently serves as the Editor-in-Chief of *Acta Geophysica*, a prestigious publication managed by the Polish Academy of Sciences and Springer. Additionally, she holds the position of Associate Editor in five scientific peer-reviewed journals.

She also actively participated in more than 97 scientific meetings and made significant contributions to over 65 research projects, assuming scientific responsibility for 18 of them. With over 240 publications and more than 2200 citations (excluding self and co-authors), her research has made a lasting impact on the field of geophysics.

She also holds leadership positions, including serving on boards of directors and as the Head

of the Department and Laboratory of Geophysics at the School of Geology, Aristotle University of Thessaloniki.

Her commitment to the awareness of seismic activity is evident in her continuous efforts to inform both the public and the state. She recognizes the importance of communicating information about earthquakes and works tirelessly to raise awareness.

Editorial

Special Issue on Comprehensive Research in Earthquake Forecasting and Seismic Hazard Assessment

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Dear Colleagues,

Despite some success, the issue of earthquake forecasting has yet to be resolved. There are occasional discussions within the scientific community about the principal feasibility of earthquake forecasting, particularly in the short-term aspect. However, the bulk of these discussions were set in the Resolution of the General Assembly of the International Association of Seismology and Physics of the Earth's Interior (IASPEI) in 2009 in Cape Town: "Resolution 4: Earthquake Forecasting and Predictability Studies—IASPEI RECOGNIZING the opportunities provided by recent developments in earthquake science and technology RECOMMENDS that research on forecasting and predictability of earthquakes, and the validation and comparative testing of prediction methods be supported".

However, it is not sufficient to precisely predict a future strong earthquake. It is necessary to make a correct, scientifically based assessment of the level of seismic hazard and the intensity of seismic shocks to be expected in a particular region, city and settlement. What should the administration of a megapolis do when it receives information about the likelihood of a strong earthquake? The problems of earthquake forecasting and seismic hazard assessment are, therefore, closely related to the problems of high-quality anti-seismic constructions.

More than 13 years have passed since the adoption of the IASPEI Resolution. New earthquakes have occurred. Their study increased our knowledge regarding the physics of the seismic process, the physics of earthquake preparation processes and the search for earthquake precursors. The new data obtained became the basis for the development of new models of the behaviour of the ground under the influence of seismic waves and provided initial information for the development and parameterization of earthquake occurrence zone models and ground motion prediction equations.

More than one and a half years have passed since the announcement of the Special Issue "Comprehensive Research in Earthquake Forecasting and Seismic Hazard Assessment" in the MDPI Journal of *Applied Sciences*. We invited representatives of the seismological community to present their results on these topics, to show the current view of the state of the problem, what has been achieved in the field of earthquake forecasting and seismic hazard assessment, what needs to be done next and in which direction to move forward. We expected to discuss the results and directions of further research on the physics of the seismic process—from experiments under laboratory conditions to rock bursts in mines and earthquakes in seismically active regions at the stage of preparation for strong earthquakes.

As a result, 14 articles were published in the Special Issue, with authors representing different thematic areas and working in different institutions and organisations in Russia, Greece, Italy, Colombia, New Zealand, China, Argentina and Japan. The total number of authors was around 50. Thus, we managed to attract a sufficiently wide range of representatives of the scientific geophysical community to participate in this Special Issue. In this sense, our hopes and assumptions were fulfilled. In addition, this Special Issue is

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