Opinion

Prepared by Prof. DSc. Ivan Georgiev

Concerning: Competition for the academic position of "Associate Professor" in the professional field 4.4. Earth Sciences, Department of Seismology and Earthquake Engineering, published in the State Gazette no. 86 of 15.10.2021.

Candidate for the academic position "Associate Professor": Plamena Raykova-Tsankova, PhD, Assistant Professor in the Department of Seismology and Earthquake Engineering at National Institute of Geophysics, Geodesy and Geography (NIGGG) BAS.

The opinion is prepared, based on Order № 01-263 of 12. 11. 2021 of the NIGGG's Director and in accordance with the requirements of Section 4 of the Regulations for implementation in NIGGG-BAS of the Development of Academic Staff in the Republic of Bulgaria Act.

1. Education and professional qualification

The candidate Plamena Raykova-Tsankova obtained master's degree in geophysics in 2013 at Sofia University "St. Kliment Ohridski", Faculty of Physics. Since 2009 she has been working at the National Institute of Geophysics, Geodesy and Geography as a technician-geophysicist, and in 2011 she was appointed as a seismologist. In August 2013, Plamena Raykova-Tsankova began her PhD in the specialty: "Seismology and Internal Structure of the Earth" and in May 2017 she acquired the PhD degree after defending her thesis. The same year she won the award of the Bulgarian Academy of Sciences "Academician Ivan Evstratiev Geshov", which is given to young scientists up to 30 years, for achievements in the field of "Climate change, risks and natural resources".

2. Implementation of the requirements for holding the academic position of "Associate Professor"

In the competition, the candidate participated with 41 publications, 15 citations, participation in national and international projects. According to the reference for fulfillment of the minimum requirements for holding the academic position "Associate Professor", defined in the Regulations on the terms and conditions for obtaining degrees and for holding academic positions in BAS, respectively the requirements of Article 1 A, subparagraph 2, the total number of points is 476 points. The criteria for the various indicators are completed as follows:

- **Indicator A:** the candidate has 50 points from the defense of the dissertation for the award of educational and scientific degree "Doctor" (PhD) in specialty - 01.04.06 "Seismology and internal structure of the earth" on the topic "Characteristics of for-aftershock and swarm type seismicity on the territory of Bulgaria and the surrounding area";
- **Indicators B:** the candidate has 115 points, from 10 publications referenced and indexed in world's famous databases with scientific information Scopus, Web of Science, ERIH +;
- **Indicators G:** the candidate has 221 points, from 31 publications referenced and indexed in world's famous databases with scientific information, scientific monographs, as well as from non-refereed journals with scientific review or in edited collective volumes;
- **Indicators D:** the candidate has 60 points, from 15 citations: 9 citations in scientific journals, referenced and indexed in world's famous databases, 3 citations in monographs and collective volumes with scientific review and 3 citations from non-refereed journals with scientific review;
- **Indicators E:** the candidate has 30 points from participation in international and national scientific and educational projects.

3. Assessment of the main scientific and scientific - applied contributions of the candidate

Scientific activity

The contributions reflected in the scientific publications presented in the candidate's documents can be outlined in the following main thematic areas:

- Research and analysis of seismicity and seismogenic processes in seismic active zones on the territory of Bulgaria and the surrounding area;
- Assessment and analysis of the space-temporal distribution of clusters (foreshocks, aftershocks, swarms) on the territory of Bulgaria and the surrounding area;
- Spectral characteristics of different types of seismic clusters for the territory of Bulgaria;
- Seismic hazard assessment.

Assistant Professor Plamena Raykova-Tsankova participated in one of the main tasks of NOTSSI for creating a catalog of the earthquakes in Bulgaria for the period 1981-2019 (publications 28 and 31). The candidate participates in the monitoring activities of the center, as well as in research related to space-temporal variations of regional seismicity and seismic regime, as can be seen from most of the publications in the publications (1, 2, 9, 10, 21, 22).

The candidate analyzes and evaluates the space-temporal distribution of the different types of clusters on the territory of Bulgaria and its surroundings (publications 3, 6, 8, 17, 24, 38, 39). Clusters are an essential aspect of seismicity that provides key information on earthquake dynamics. Some of them - the foreshocks show stress accumulation in the surroundings before the strong earthquake. Therefore, understanding their nature is very important for earthquake prediction. Aftershock series are those groups of earthquakes that occur immediately after the main event and gradually decrease in strength over time.
Spectral analysis of seismic waves is one of the most important origin of information for the earthquake sources. The spectrum of seismic waves can be used to estimate the parameters of the seismic source. The results obtained by the candidate related to the estimation of seismic moment M_0, stress drop $\Delta\sigma$, source radius and seismic moment magnitude are presented in publications 19, 23, 33, 34, 35.

Plamena Raykova-Tsankova participates in the seismic hazard assessment for the territory of Bulgaria (publication 27), also in generating prognostic scenarios for the cities of Ruse, Blagoevgrad, Plovdiv and Veliko Tarnovo (publications 30, 32, 40, 41), which are compared with observed seismic impacts for the respective cities. The results show that the generated scenarios are reliable and can be used in risk scenario development, engineering solutions and infrastructure planning. In combination with the modern methods of seismic engineering they can greatly reduce the damage and casualties from future earthquakes.

Scientific - applied activity

Over the years, Plamena Raykova-Tsankova has been a participant in 17 national and international projects. Most of the projects are related to seismic hazard, both throughout the country and in local regions, related to the design and seismic safety of high-risk facilities (eg Kozloduy NPP, Aurubis Bulgaria "Ada Tepe", "Ada Tepe", "Lyulyakovitsa" tailings). She also participated in the preparation of a methodology for analysis, assessment, and mapping of the seismic risk of the Republic of Bulgaria. The applicant also participates in projects related to environmental protection and risk reduction of adverse events and natural disasters.

4. Conclusion

Based on all the above facts and in accordance with the requirements of the law and regulations, I give positive assessment of the materials presented by Assistant Professor Plamena Raykova-Tsankova, PhD. As the candidate has submitted all documents and they fully meet all requirements of the Development of Academic Staff in the Republic of Bulgaria Act (DASRBA), the Regulations for implementation of DASRBA in NIGGG BAS and other regulations, as well as due to the quality of the attached publications and their full compliance with the theme of this competition, I recommend confidently the esteemed jury to choose Assistant Professor Plamena Raykova-Tsankova, PhD, for the position of "Associate Professor" in a professional field 4.4. Earth Sciences, Department of Seismology and Earthquake Engineering.

Sofia

07. 02. 2022

/Prof. DSc. Ivan Georgiev/