

REVIEW

By: Prof. Dr. Boris Valchev, Department of Geology and Geoinformatics, Faculty of Geological Exploration, St. Ivan Rilski University of Mining and Geology

To: The documentation submitted for the competition to fill the academic position of “professor” in professional field 4.4. “Earth Sciences,” scientific specialty “Methods and Techniques of Geological Research,” for the needs of the Department of Geology and Geoinformatics at the St. Ivan Rilski University of Mining and Geology

This review was written in accordance with the Law on the Development of Academic Staff in the Republic of Bulgaria (Chapter Three, Section IV), the Regulations for its Implementation (Chapter Three, Section IV), the Rules and Procedures for Filling Academic Positions at the “St. Ivan Rilski” University of Mining and Geology (Chapter Six), Order No. RD-13-26/June 1, 2026, of the Rector of the “St. Ivan Rilski” University of Mining and Geology, and the decision of the scientific jury for the competition at its first meeting, held on July 9, 2026.

The competition was announced in the State Gazette, Issue No. 41, May 5, 2026.

Procedure

Within the legally established deadline for participation in the competition, documents were submitted by one candidate: Dr. Ivan Dimitrov Ivanov, associate professor in the Department of Geology and Geoinformatics. These documents comply with the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation, and the Rules and Procedures for Filling Academic Positions at the “St. Ivan Rilski” University of Mining and Geology, as confirmed by the Candidate Eligibility Committee (minutes dated July 7, 2026).

I declare that I have 5 (five) joint publications with the candidate, which will not be taken into account when determining the final evaluation.

1. General description of the materials submitted for review

1.1. Works

Assoc. Prof. Ivanov has submitted three lists. The first list includes a total of 93 scientific publications from 1998 to 2026. In the second list, the publications are grouped and numbered by the candidate as follows: (i) articles for obtaining the academic degree of “Doctor” – 3; (ii) a monograph and scientific publications for the academic position of “Associate Professor” – 22; (iii) scientific publications submitted for participation in the competition for the academic position of “professor,” divided into those corresponding to a habilitation thesis—9—and those published in refereed and peer-reviewed journals—37. Separate lists are attached for (i) reviews in international journals—2, and (ii) online publications—2.

A review of the 46 works submitted since assuming the academic position of “associate professor” shows that 37 publications are scientific articles, while 9 are extended abstracts and scientific communications.

For the purposes of this competition, I am accepting 41 works for review (excluding the five co-authored ones), as follows: 34 articles and 7 extended abstracts and scientific communications. Of these, 9 are authored solely by the candidate and 32 are co-authored; in 11 works, the candidate is the first author, in 10 – the second, and in 11—the third or subsequent author. Seventeen works are in Bulgarian, and 24 are in English. Eight works were published in foreign journals. Fifteen publications appeared in journals with an impact factor or impact rank.

All submitted publications fully correspond to the competition's subject matter.

1.2. *Research Projects*

Since receiving his tenure, Associate Professor Ivanov has participated in a total of 15 national research projects, serving as principal investigator on 4 of them.

1.3. *Teaching Activities*

Dr. Ivan D. Ivanov teaches seven courses at the bachelor's level and two at the master's level at the St. Ivan Rilski University of Mining and Geology, and is the author of four of them. In addition, he is the author and instructor of three master's-level courses in joint programs with the University of Forestry. The candidate has supervised three doctoral students who have successfully defended their dissertations and more than 10 master's students who have successfully defended their theses. He is currently supervising one doctoral student and three master's students. He is the author of two textbooks: "Guide to Structural Geology" (2010) and the monographic textbook "Structural-Geological Analysis and Mapping for the Purposes of Applied Geology" (2018).

1.4. *Participation in Scientific Forums*

Dr. Ivanov has presented 15 papers at international scientific conferences and 13 papers at national scientific conferences.

1.5. *Consulting Services*

Associate Professor Ivan D. Ivanov, Ph.D., is the author of a large number of official (defended before the Scientific Examination Commission of the Bulgarian Geological Society) and unofficial (corporate) geological reports, due diligence audits, and expert opinions in the field of exploration and engineering geology. The candidate has authored reviews of articles and scientific papers in the Journal of the Bulgarian Geological Society and the Yearbook of the "St. Ivan Rilski" University of Mining and Geology.

1.6. *Membership in professional organizations*

Dr. Ivan D. Ivanov is currently a member of the Bulgarian Geological Society (BGS).

Characteristics of Research and Teaching Activities and Which One Predominates

An analysis of Assoc. Prof. Ivanov's scientific publications shows that he is a nationally and internationally recognized expert in the field of structural and engineering geological mapping and modeling, as well as in the exploration and modeling of mineral deposits. A review of the submitted documentation indicates that teaching, research, and expert work have been represented in a balanced manner throughout his career to date.

2. Scientific contributions.

The candidate's scientific contributions can be grouped as follows:

- Morphotectonic and geomorphological studies;
- Studies related to the exploration, investigation, and evaluation of mineral resources;
- Geochemical and ecological-hydrochemical studies;
- Stratigraphic and tectono-stratigraphic studies;
- Structural-geological studies;
- Geotechnical studies of rock masses;

2.1. Morphotectonic and geomorphological studies

In multidisciplinary studies that combine knowledge of tectonics, geomorphology, and modern analyses conducted using geographic information systems (GIS). Significant scientific conclusions have been reached regarding the geological risk associated with river hydrology in areas threatened by flooding (B.4.1, B.4.4).

A series of studies (G. 7.1, G. 7.10, G. 7.11, G. 7.17) focus on interpreting tectonic control over the relief and identifying patterns that recur and lead to the systematic occurrence of the same landforms. These studies were conducted in the context of research on engineering-geological problems and on the geomorphological control of soil formation in Bulgaria, areas in which the candidate has long-standing interests.

2.2. Studies related to the exploration, investigation, and evaluation of mineral resources

One group of publications is related to the EU's National Program on Critical Raw Materials and consists of assessments at the detailed exploration (B.4.2) and prospecting (B.4.3) stages of the project. Publication (B.4.2) marks the culmination of the author's career in geological exploration, as it integrates his geological exploration work with geochemical and eco-geochemical studies of Central Thrace, where he has published extensively on the genesis and properties of the soil substrate (soil horizons B and C) and natural waters. This publication demonstrates that the extraction of magnetic titanium and vanadium concentrate in Bulgaria (and in the EU) can be economically viable, and furthermore, it can provide (otherwise unavailable) raw materials for soil improvement—which the region needs—while also reducing the carbon footprint of the Bulgarian economy.

Publication G.7.4 presents an interpretation of the geological map of the "Milin Kamak" gold deposit near Breznik, explaining the tectonic control over the formation of the ore pillars.

Publication G.7.14 addresses the serious economic problem associated with estimating reserves losses in carbonate rock quarries. A possible solution proposed is to model the tectonic zones when assessing losses and to exclude them from the reserves. This is illustrated with an example from a real deposit.

G.7.20 and G.7.21 are studies related to the three-dimensional modeling of ore bodies.

G.7.22 is devoted to structural geological studies related to the assessment of the block structure of a rock facing materials deposit.

G.7.35 is devoted to the distribution of Silurian bioherms/reefs in the New Brunswick Province. The publication is formatted as a mineral resources paper (because the studies were funded by an industrial consortium), but it is based on rigorous stratigraphic and sedimentological work, as these bioherms are not visible. They are buried under tens of meters of glacial till, which is why their localization requires in-depth facies modeling.

Publication G.7.36 presents geological survey practices in the Northern Appalachians and illustrates the operating principles of the Canadian Geological Survey.

2.3. Geochemical and ecological-hydrochemical studies

The publication with quartile Q1 (V.4.5) dates from a period of intensive multidisciplinary geomorphological and soil geochemical research by the author, during which, as part of a major project funded by the Scientific Research Fund, the geochemically homogeneous crust in southeastern Bulgaria was mapped and studied. Comprehensive soil-stratigraphic, geochemical, microbiological, and genetic studies were conducted to substantiate the feasibility of biological soil improvement. In this publication, the candidate is the author of the concept as well as the general justification of the problem.

Publication B.4.6. is devoted to the environmental problems of decommissioned mining enterprises. In this publication, a series of hydrogeochemical observations demonstrates that the nature of the mineral resource is of great importance in defining an environmental problem, and that different mineral deposits create different environmental footprints.

Publication G.7.15. is one of Assoc. Prof. Ivanov's most significant works. The publication is illustrated with a detailed soil-geomorphological map. This publication introduces the concept of a soil catena for Central Thrace and, in particular, for the Tundzha structural depression. A katene is an association of soil types that recur in close alternation, depending on the relief and bedrock. The identification of a katene introduces repeatability and predictability into soil mapping.

Publication G.7.16 presents several types of natural waters in the Eastern Thracian Lowland that correspond to the main rock associations.

Publication G.7.23 is devoted to the microstructure of calcretes and dolocrete from southeastern Bulgaria. One of the main conclusions, aside from the description of the microstructure, is that magnesium carbonate crusts are widespread in this region.

Publication G.7.28 is devoted to the geochemical interactions of rainwater with the soil and the soil substrate. My contribution was in the design of the experimental setup used for this study.

Publication G.7.30. This was the initial publication announcing the study of calcretes in Bulgaria. Until that time, the concept of "calcrete" as a pedogenic term was unknown in Bulgaria.

2.4. Stratigraphic and tectono-stratigraphic studies

This group of publications examines (i) the evolution of marine terraces and the regressions and transgressions in the Black Sea following the Würm glaciation (G.7.2.), (ii) a pattern has been established showing that everywhere above the washed-out deposits from the last glacial period, a layer of pelitic clays has been deposited in river channels, corresponding to the general rise in the levels of the Black and Aegean Seas after the Würm (G.7.19., G.7.26.), (iii) Carboniferous

palynomorphs from an outcrop of black argillites in the Fakia River valley in Strandzha have been published (G.7.29), (iv) data on the little-known Salina orogeny during the Late Ordovician and Silurian; as part of his work at New Brunswick, Assoc. Prof. Ivanov is collecting new data on the structural evolution during this orogeny, (v) new data are presented on a Cretaceous formation from the Grudovska Group, exposed in Strandzha (G.7.37.).

2.5. Structural-geological studies

The candidate's contributions relate to the study and analysis of geological settings in various parts of the country. (i) Based on data from outcrops in the Tundzha River valley, the candidate analyzes the possibility that the intense deformations in the area of the village of Konevets are due to the Tundzha Fault (G.7.7), which was introduced into Bulgarian geological literature based on geophysical interpretation, but no actual description of the outcrops from its deformation zone has been presented. (ii) The structure of a section in the immediate vicinity of the Prokhorovo copper deposit is described (G.7.8). Based on these observations, a model for the evolution of the deposit is proposed, which includes the intrusion of the Prokhorovo intrusion along two fault systems that opened simultaneously as a result of the main tectonic stress being oriented appropriately. (iii) Folding interference in Early Paleozoic and Late Cretaceous rocks from various parts of the country is described (G.7.13, G.7.25, G.7.27). (iv) The evolution of the Sub-Balkan Lowlands is examined (G.7.31, G.7.33), and the hypothesis is put forward that they are tectonic extension basins or pull-apart basins.

2.6. Geotechnical studies of rock masses

Interdisciplinary research combining structural geology and geotechnical engineering, aimed at demonstrating the deep connection between fundamental structural geology and modern geotechnical engineering. (i) The engineering-geological role and root cause of deep weathering in the Northern Pirin granite were analyzed in the context of the construction of the Struma Highway (B.4.7, B.4.8, V.4.9). (ii) An unstable rock slope is analyzed, which threatens the existence of an important hydraulic engineering structure with wedge sliding and toppling. The publication (G.7.3.) presents a geotechnical and stereographic analysis of these processes and concludes that protecting the structure is practically impossible, and that it would be more rational to relocate it. (iii) The structural-geological characteristics of the rock discontinuities that degrade the geotechnical properties of the rock mass along the route of the Kostenez–Septemvri high-speed railway line are described (G.7.5). A large volume of data has been summarized, indicating the possibility that the tunnel tubes could be cut by numerous small and medium-sized N-S-trending faults, which are also currently active, as shown by the Bulgarian Academy of Sciences' (BAS) GNSS monitoring stations. In this study, as well as in G.7.8, a methodology is applied for determining the principal kinematic axes through the inversion of fault displacements (originally known as the Jacques Angelier method). (iv) The stability of tunnels excavated along a steep slope is assessed (G.7.9). It is shown how shear stress along fractures and faults can be estimated and how this value can be used to ensure the safety of the support system under adverse scenarios. (v) The fractures in the mine pit at the Elatsite Mine have been described and modeled (G.7.12).

Overall, Dr. Ivan D. Ivanov's scientific contributions can be classified as the discovery of new facts and the expansion of existing knowledge through the application of classical approaches.

3. Citation Analysis

The list submitted by the candidate includes 33 citations of a total of 22 works. 18 citations are in Bulgarian publications and 15 are in foreign publications. The citations are distributed as follows: 24 – in publications referenced and indexed in world-renowned scientific databases or in monographs and edited volumes; 1 – in peer-reviewed monographs and edited volumes; 8 – in non-referenced peer-reviewed journals.

The most frequently cited (in international publications with an impact factor) are the publications presented by the candidate as equivalent to a habilitation thesis. These are collaborative articles in which Assoc. Prof. Ivanov's contribution is clearly recognizable.

4. Contributions to collective publications

Although it is not explicitly mentioned in the majority of the publications in which Assoc. Prof. Ivanov is listed as an author, I believe that his contribution is clearly recognizable and consists of structural analysis and modeling, the analysis and rating of rock masses in relation to road and tunnel construction, and the modeling of mineral deposits.

Comment

An evaluation of the submitted materials with regard to compliance with the minimum national scientometric indicators demonstrates that: (i) the candidate has submitted the required number of scientific articles—refereed and indexed in global databases—corresponding to a habilitation thesis (Indicator B), with the total number of points exceeding the required minimum (156 points), (ii) the status of the candidate's scientific publications under Indicator D allows the minimum threshold to be exceeded (259 points), (iii) the citations attributed to the candidate are in reputable publications, resulting in the minimum requirements under Indicator E being exceeded (139 points), (iv) his supervision of three doctoral students who have successfully defended their dissertations, as well as his participation in scientific projects, more than doubles the requirements under criterion E (340 points).

His participation in scientific forums is significant, with international appearances predominating.

Assoc. Prof. Ivanov's scientific contributions are recognized internationally, as evidenced by their frequent citation in impact-factor journals outside the country.

An analysis of Assoc. Prof. Ivanov's scientific contributions shows that they involve the establishment of new facts and the enrichment of existing knowledge through the application of classical approaches.

The candidate's participation in scientific projects is significant.

Assoc. Prof. Ivanov's scientific and applied contributions are impressive—he has 12 commercial discoveries of mineral deposits that have been registered under the Mineral Resources Act, reported in the National Reserve Balance Sheet, and are currently being mined.

Conclusion

An analysis of the documents and scholarly works submitted by Assoc. Prof. Dr. Ivan D. Ivanov shows that they meet the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria, the Regulations for its Implementation, as well as the Rules and Procedures for Filling Academic Positions at the Mining and Geology University “St. Ivan Rilski.” His scientific contributions present the candidate as a distinguished scholar specializing in structural and engineering geological mapping and modeling, as well as in the exploration and modeling of mineral deposits. This gives me reason to recommend to the esteemed members of the scientific jury that they propose to the Faculty Scientific Council of the Faculty of Geological Exploration at the Mining and Geology University “St. Ivan Rilski” to appoint him to the academic position of “professor” in professional field 4.4. “Earth Sciences,” scientific specialty “Methods and Techniques of Geological Research,” in the Department of Geology and Geoinformatics at the “St. Ivan Rilski” University of Mining and Geology.

July 16, 2026
Sofia

Reviewer:
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