

## REVIEW

ИНСТИТУТ ЗА КОСМИЧЕСКИ ИЗСЛЕДВАНИЯ И ТЕХНОЛОГИИ - БАН	
Вх. №	796
	30.09.2020

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member of Scientific Jury in competition for the academic position "Associate Professor", announced in the State Gazette no. 56/23. 06. 2020 by the Institute for Space Research and Technology BAS in the field of higher education 4. Natural sciences, mathematics and informatics, Professional field 4.4. Earth Sciences; Scientific specialty "Remote Sensing of the Earth" for the needs of the Section "Remote Sensing Systems".

This review has been prepared according to the Act for Development of the Scientific Staff in the Republic of Bulgaria (ADSSRB) and the Regulations for its implementation, as well as with the implementation of a decision of the Scientific Jury, appointed by order № 87/10. 07. 2020 of the Director of SRTI BAS and Minutes № 1 from a meeting of the Scientific Jury dated № 1//10.09.2020.

### **Details about candidate**

According to the two-month term set in the announcement of the competition, there are regularly submitted documents from Assistant Professor PhD Hristo Stoianov Nikolov from the Remote Sensing Systems Department at SRTI-BAS, who is the only candidate. He graduated in the University of Mining and Geology "St. Ivan Rilski "(former Higher Institute of Mining and Geology) in 1990. In 1991 he started working at STIL BAS as a software engineer and from 1998 to 2011 he become a research associate II-I degree. In 2018 defended his PhD thesis in the field of "Remote Sensing of the Earth and the Planets" on "Application of nonlinear methods of image recognition theory in remote sensing of the Earth." Until now, his activities are mainly related to solving scientific and scientific-applied tasks in the field of receiving, pre-processing and thematic interpretation of multi-channel data from in-situ and satellite instruments.

### **Compliance with legal requirements**

The candidate has submitted documents that are in compliance with the requirements for the academic position of "Associate Professor" and the Act for Development of the Scientific Staff in the Republic of Bulgaria (ADSSRB) and the Regulations for its implementation, the Regulations for the acquisition and occupation of academic positions in the Bulgarian Academy of Sciences (RAOAP BAS) and the Regulations for implementation of the ADSSRB in the Institute of Space Research and Technology - BAS (RI ADSSRB SRTI-BAS). According to the requirements of the mentioned regulations, a commission has been appointed, by order of the Director of SRTI BAS, which after examination the documents presented by the candidate allowed him to participate in the competition, as they show that the candidate meets the minimum requirements under Art. 2b, para 2 and para 3, respectively to the requirements under art. 2b, para 5 of ADSSRB and are in accordance with RAOAP BAS for the field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.4. Earth Sciences. The above gives me grounds to claim that the competition is in compliance with current regulations of the national legislation.

From the author's summary submitted by the candidate in fulfillment of the minimum national requirements summarized in Table 1 below and after their review it was established that Hristo Nikolov has a total of 598.6 points, while the minimum number of points required for holding the position "Associate Professor" in BAS 430. This shows that the applicant, both in total and as well in groups of indicators B, Γ and Д, exceeds the requirements according to the above-mentioned legal documents. The scientific papers presented for participation in this competition are sufficient in volume and are at a high scientific level. They fully reflect the achieved scientific and scientific-applied results of his scientific activity. Excluded from them are the publications included in his PhD thesis.

**Table 1**

Group of indicators	Requirements for the position "Associate Professor" as in the RI ADSSRB	Requirements for the position "Associate Professor" as in the RI ADSSRB in SRTI-BAS	Total number of points by groups of the candidate
A	50	50	50
Б	-	-	
B	100	100	254
Γ	200	220	230.57
Д	50	60	64
E	-	-	

### **Research activity**

In the Appendix 1 of the submitted CV the total number of publications of the candidate is 160, and with 40 of them he participates in this competition. In compliance with RAOAP BAS 10 of the publications presented in a group of indicators B I treat as monograph, those being equivalent to 254 points while the required number is 100. The indicators from group Γ are divided in two - indicator Γ.7 (6 scientific publications that are referenced and indexed in well-known databases with scientific information) and Γ.8 (24 publication in non-refereed journals with scientific review or in edited collective volumes). The total number of publications indexed in Web of Science (WoS) and Scopus is 16. The list of citations includes 4 publications, which are cited in 6 articles indexed in WoS and Scopus, 9 publications have 17 citations in journals with scientific review. The publications presented by the candidate are related to his research in the field of remote sensing methods applied in Earth investigation.

The publications of the candidate under this procedure may also be classified according to the following criteria:

- individual - 3 pcs.
- co-authored - 37 pcs.
- in Bulgarian - 6 pcs.
- in English - 43 pcs.
- in Russian - 1 pc.

In general, these publications can be thematically grouped as follows:

- development and application of new mathematical methods in multi-channel spectral data (MSD) processing;
- publications related to the design and development of in-situ spectrometric instruments for obtaining multi-channel data;
- synergetic use of ground-based and satellite-based hardware complexes for obtaining information in monitoring objects on the earth's surface.

I accept the scientific and applied contributions as formulated by the candidate.

### **Scientific and scientific-applied contributions**

In the author's report submitted by the candidate the scientific and scientific-applied contributions are in the following directions:

1. Development and implementation of innovative mathematical methods for thematic processing of multichannel spectral data and in particular:
  - use of parallel environments for pre- and thematic processing of multichannel spectral images - publications [B4.1, B4.3, Г8.5, B4.2, Г8.2, Г8.7];
  - focus on probabilistic approaches in the selection of training data sets from MSD, which allowed to increase the accuracy of classification - publications [B4.7, Г7.2, Г8.1]
  - results from creation and training of classification models implementing artificial neural networks (publications [D7.1, D8.3, D8.4]), and support vector machines (publications [Г8.19, Г8.20]).
2. Design and development of field laboratory instruments for conducting in-situ and remote sensing experiments and their integration into an information system - publications [B4.4, B4.6, Г8.8, Г7.3, Г8.10, Г7.4, Г7.6]
3. Usage of remotely sensed data in assessing the impact of risk processes on the environment having natural and man-made origin to solve specific applied tasks - publications [B4.5, B4.8, B4.9, Г8.6, Г8.9, Г8.11, Г8.14, Г8.15, Г8.16, Г8.17, Г8.18, Г8.21, Г8.23]

Among the scientific and scientific-applied contributions outlined by the candidate the following can be distinguished - the use of a parallel environments for processing multi-channel spectral data; creation of a prototype of an information system that allows integration of data from different sensor systems; assessment of the ecological condition of areas around non-functioning opencast mining by means of multichannel data from satellite and in-situ spectrometric instruments.

#### **Critical remarks and recommendations<sup>4</sup>**

I have no significant critical remarks on the scientific and scientific-applied contributions formulated by the candidate.

I would like make the following recommendations - to increase the number of publications as single author, which will show the candidate's ability to independently formulate and solve

scientific problems; to continue the research in the synergistic use of data from active and passive sensor systems for remote sensing, which will increase the quality of the received thematic information.

### Conclusion

After a thorough acquaintance with the materials of the competition I make the following conclusions:

1. The procedure complies with the requirements of ADSSRB and the regulations for its implementation (PI ADSSRB, RAOAP BAS and RI ADSSRB SRTI BAS).
2. The candidate fulfills the minimum requirements as required by Art. 2b, Para 2 and Para 3, respectively to the requirements under Art. 2b, Para 5 of ADSSRB.
3. The presented original scientific publications are at a high scientific level and their number is sufficient for participation in this competition. They unambiguously prove the experience and achievements of the candidate, which is confirmed by the fact that 16 of them are referenced and indexed in well-known world databases of scientific information (Web of Science and Scopus).
4. The scientific and scientific-applied contributions included in the author's reference correspond to the scientific specialty in which the competition has been announced.

All the above mentioned conclusions provide me grounds to give a positive assessment of the scientific papers submitted for participation in the competition and I will vote "FOR" the academic position of "Associate Professor" at SRTI-BAS to be awarded to the Assistant Professor PhD Hristo Nikolov in the field of higher education 4. Natural Sciences, Mathematics and Informatics, professional field 4.4. Earth Sciences; scientific specialty "Remote sensing of the Earth and the planets".

Member of the Scientific Jury: *Ivan*

Prof.. Ivan Georgiev, DSc

ВЯРНО С ОРИГИНАЛА

