

REVIEW

by Prof. Dr. Dimitar Kirilov Teodosiev from SRTI - BAS, appointed a member of the Scientific Jury, by order № 15 /24.01.2020 of the Director of SRTI - BAS, in a competition for obtaining the academic rank PROFESSOR 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 (Studies of the Processes in the Middle and High Atmosphere of the Earth)" for the needs of the section "Atmospheric Optical Investigations", Stara Zagora Department, published in the State Newspaper no. 98 of December 13, 2019.

Documents for participation in the competition, in accordance with the regulatory requirements, have been submitted by only one candidate - Assoc. Prof. Dr. Veneta Hristova Guineva, from Atmospheric Optical Investigations Section, at the Stara Zagora Department of SRTI-BAS. The review of the documents shows that all procedures arising from the Act on Development of the Academic Staff in the Republic of Bulgaria (art. 60, sect. 1 and 2), the Regulations for its application and the Regulations for the terms and conditions for acquisition of scientific degrees and obtaining academic ranks at BAS and SRTI at BAS.

I. Candidate details

Assoc. Prof. Dr. Veneta Hristova Guineva graduated as an engineer - physicist, majoring in "Radiophysics and Electronics", in 1980 from the Faculty of Physics at Sofia University "St. Kliment Ohridski" with excellent marks. In 2001 she successfully defended her thesis on "CO⁺ in the Halley Comet spectrum by data from the three-channel spectrometer on board VEGA - 2", and was awarded the scientific - educational degree "Doctor", in the scientific specialty " Physics of the Ocean, Atmosphere and near-Earth space", with a decision of the Higher Attestation Commission, Commission 06, Minutes № 7 of 03.04.2001.

She works consecutively as: designer at the United factories for storage devices, Stara Zagora, physicist, research associate II degree, research associate I degree, in section "AOI", Stara Zagora Department at the Central Laboratory for Space Research (CLSR) - BAS, and since 2008, as a senior research associate II degree in the same institute, since 2010 until now, as an "associate professor" at the Space Research and Technology Institute of BAS.

For the development and becoming of Assoc. Prof. Dr. Veneta Guineva, as a leading scientist with her own profile and contribution to science, her participation in the implemented national and international space projects related to the development, testing, processing and interpretation of the results from satellite experiments in ionospheric-magnetospheric plasma and ground-based optical observations of processes in the Earth's atmosphere is of essential importance.

In her joint work with scientists from leading European and world research centers, Assoc. Prof. Dr. Veneta Hristova Guineva has had opportunities to master and improve her work with the state-of-the-art experimental techniques and equipment, to develop mathematical models and to process data from space experiments in the study of near-Earth plasma, to conduct and lead research in the field of space physics, development of new research procedures and methodologies, principles of analysis and their theoretical justification, through theoretical calculations or modeling.

II. Scientific results.

The results of the overall scientific work of Assoc. Prof. Dr. Veneta Hristova Guineva include 123 publications and 1 author's certificate, 33 of which are published in international scientific journals with impact factor (IF), such as: *Advances in Space Research*, *Annales Geophysicae*, *Planetary and Space Science*, *Geomagnetism and Aeronomy*, *Journal of Atmospheric and Solar-Terrestrial Physics (JASTP)*, *J. Adv. Space Res.*, *Chemical Physics Letters*, *Солнечно-земная физика*, *Comptes Rendus de l'Académie Bulgare des Sciences*.

On the topic of the competition for professor, the applicant Assoc. Prof. Dr. Veneta Hristova Guineva has submitted a total of 76 publications, 13 of them are in international scientific journals with an impact factor.

An up-to-date list of observed citations of the candidate is enclosed, in scientific journals, referenced and indexed in world-famous databases of scientific information, in monographs and collective volumes and in non-refereed peer reviewed journals. The citations list contains a total of 65 citations, which is extremely indicative and proves unequivocally the excellent assessment of the results and scientific contributions of Assoc. Prof. Dr. Veneta Guineva, and the quality of her scientific output.

In accordance with the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its application, the publications submitted for review do not duplicate those used by the candidate in the thesis for the scientific-educational "Doctor" and in the competition for "Associate Professor".

III. Analysis of the scientific and scientific - applied contributions.

In general, the applicant's contributions, according to the submitted materials, are both scientific and applied, in the field of space research and space physics.

The scientific contributions of the candidate Assoc. Prof. Dr. Veneta Guineva are mainly related to the study of the substorms development and the variations of oxygen emissions 5577Å and 6300 Å, in the presence of high-speed streams in the solar wind, study of the influence of the solar activity and the fluxes in the solar wind on the magnetosphere, auroras and magnetic disturbances, study of trace gas components in the Earth's atmosphere; studying the influence of various factors on temperature and temperature trends.

The scientific and applied contributions of the applicant are related to: design, calibration of devices for optical research, by rocket and satellite experiments; creation of a system of methods and high-speed means for measuring photometric quantities; laboratory, experimental and theoretical research on the spectral, color and other photometric characteristics of brown coal, in order to develop methods for rapid remote determination of the ash content in them.

Without analyzing in detail all scientific and scientific-applied contributions, I will focus only on some of them, as for me the most accurate assessment of the quality of the scientific production of Assoc. Prof. Dr. Veneta Hristova Guineva, remain the numerous citations of her works in the most renowned international journals, in the scientific field of the announced competition, as well as the participation in a number of international scientific projects.

Scientific and scientific-applied contributions of the candidate in the field of solar-earth physics.

Scientific contributions related to the study of the influence of solar activity and flows in the solar wind on the magnetosphere, aurora borealis emissions and magnetic disturbances. The development of the substorms has been studied and the variations of the oxygen emissions 5577Å, 6300 Å and their ratio at auroral and high latitudes during high-speed recurrent streams in the solar wind were analyzed:

- It was found that the polar boundary of the substorm bulge is associated with the precipitating electrons with the highest energies (R1.3, R1.6, N4, N25, N47, N49).

- For the first time, a definition of the polar boundary of the substorm bulge has been proposed and criteria have been developed for determining the boundaries of the polar edge of the substorm bulge by optical measurements (N3, N17).

Using data from the MAIN system in Apatity, magnetic data and data for the solar wind and IMF:

- Interesting events under different conditions in the solar wind, which caused strong geomagnetic activity (R2.2, R2.5, R2.6, N9, N23, N27, N28, N34), were studied and analyzed;

- Classification of the substorms in different groups and subgroups depending on the geomagnetic conditions under which they occur has been realized. A definition of a structured recovery phase for geomagnetic storms has been proposed, and a criterion has first been proposed for determining when the recovery phase is structured (R1.10, N29);

The relationship between long-term changes in solar activity and the predominant type of atmospheric circulation has been studied:

- A connection has been established between the activity of the southern and northern solar hemispheres, when the solar activity increases in the secular solar cycle, and the increase of the zonality and meridionality in the atmospheric circulation, respectively (R1.1);

Contributions, related to the development and use of various models related to time series, radiation transfer and optical spectra:

- To study the processes in the summer mesosphere and thermosphere at high latitudes, rocket measurements of direct Lyman alpha radiation penetrating the atmosphere are planned. A methodology has been developed and programs have been created for calculating the profiles of O₂ concentration, pressure and temperature using the vertical profile of Lyman alpha obtained from the measurements (R1.2, R1.11);

- When modeling time series, a method for statistical processing of the data by the GASCOD-BG device was created, which was subsequently improved and expanded (R1.5, N2);

- Using linear multiple regression, the influence of internal and external climatic factors on land and ocean temperatures, as well as on global and hemispheric temperatures (R1.7, N22, N35) has been determined.

Investigation of trace gas components in the Earth's atmosphere, using the GASCOD-BG instrument, for measuring the zenith spectra by the DOAS method, from which the column concentration of NO₂ and O₃ is determined, and GUV 2511 device, by the measurements of which the O₃ content is calculated, related to forecasting the development of the Earth's climate:

- The long-term trend of NO₂ over Stara Zagora (N2) has been studied. A comparative analysis of the long-term trends of NO₂ for Stara Zagora, with other European mid-latitude stations and 2 subtropical stations, taking into account the influence of various factors (R1.5) has been done;

- Methods for determining the content of ozone in the stratosphere have been developed (N10, R2.7). New methods have been developed to determine the ultraviolet index (UVI) (N13), which, in accordance with the directives of the World Health Organization (WHO), helps people to protect themselves from risks to their health;

- The results of measurements for ozone, ultraviolet index and cloud characteristics were validated, using satellite data, by the METOP-B satellite (EUMETSAT in collaboration with NOAA) and the AURA satellite. The comparison shows a very good correspondence for the time when the satellites fly over the territory of Stara Zagora (N30, N40, R2.7);

Study of the influence of various factors on temperature and temperature trends and the related climate change:

- Through statistical studies of temperature time series over the earth's surface and over the ocean, as well as global and hemispheric time series, the influence of external and internal climatic factors is analyzed (R1.7, N22);

- The course of temperature anomalies is predicted for the next decades, based on the predicted course of the CO₂ concentration and the values of the AMO index (R1.7, N35).

Another contribution that I will emphasize is related to the design and manufacturing of optical research devices:

- Under the international project for rocket experiments HOTPAY1, from the 6th Framework Program of the EU, a modern device for rocket experiments - Lyman-alpha detector (ASLAF - attenuation of the solar Lyman alpha flux), based on ionization camera and modern electronics, to record the attenuation of direct Lyman-alpha radiation in the atmosphere was developed, calibrated and tested. The operating characteristics of the device were studied (R1.2, R1.11, N33, N51);

- Theoretical developments of instruments and main components of instruments for measurements of solar Lyman-alpha radiation have been made (N50, N52, N53, N54).

For the level and quality of the scientific production of Assoc. Prof. Dr. Veneta Hristova Guineva, the high citation rate is very indicative - more than 65 citations in renowned international scientific journals, which I have checked in the databases, and I consider completely sufficient to meet the requirements for scientific rank professor.

IV. Teaching, organizational and expert activity of the candidate.

Assoc. Prof. Dr. Veneta Guineva has been the head of four successfully completed international research projects: 1. Project "Influence": Study of the influence of the solar activity and solar wind fluxes on magnetospheric disturbances, particle precipitations and aurora emissions – a joint Russian-Bulgarian project in Fundamental Space Research (FSR) between SRTI - BAS and the Polar Geophysical Institute, Kola Research Center, RAS, Apatity, Russia, number 2.14 (2008-2010); 2. Project "Influence": Study of the influence of the solar activity and solar wind fluxes on magnetospheric disturbances, particle precipitations and aurora emissions – a FSR project between SRTI - BAS and Polar Geophysical Institute, Kola Scientific Center, RAS, Apatity, Russia, number 3.7 (2010-2011); 3. Project "Influence": Study of the influence of the solar activity and solar wind fluxes on magnetospheric perturbations, particle precipitations and aurora emissions - a FSR project between SRTI - BAS and Polar Geophysical Institute, Kola Research Center, RAS, Apatiti, Russia, number 2.14 (2011-2015); 4. "Influence" project: Study of the influence of the solar activity and solar wind fluxes on magnetospheric disturbances, particle precipitations and aurora emissions - a FSR project between SRTI - BAS and Polar Geophysical Institute, Kola Scientific Center, RAS, Apatity, Russia, number 1.2.10 (2015-2016).

Assoc. Prof. Dr. Veneta Guineva participates in the teams of four international research projects: 1. "Relationship between the processes in the low and middle atmosphere and the impact of solar activity on them", a project between Solar-Terrestrial Influences Institute - BAS and the Institute of Atmospheric Physics, Academy of Sciences of the Czech Republic (2008-2011); 2, 3, 4. Study of the influence of solar activity on changes in the total content and altitude profiles of concentrations of nitrogen dioxide NO₂, ozone O₃ and other trace gases in the Earth's atmosphere (Malsost) "- projects between SRTI - BAS, and the Polar Geophysical Institute, Kola Scientific Center, RAS,

Apatity, Russia (2010-2011, 2012-2015, 2015-2016), from the joint Russian-Bulgarian projects in Fundamental Space Research, led by Prof. R. Werner.

Assoc. Prof. Dr. Veneta Guineva, has participated in two national research projects: National Strategy for Research Development 2020: "Information Complex for Aerospace Environmental Monitoring (ICAMOS)" (2014-2016) and a contract with the Ministry of Education and Science, Scientific Research Fund: Center for European Dimensions of Bulgarian Space Research and Technologies - 0515/05, (2005-2008), led by Assoc. Prof. Dr. D. Petkov.

Assoc. Prof. Dr. Veneta Guineva was the leader of a national research project: "Study of mesopause processes by rocket measurements of the direct Lyman-Alpha radiation penetrating the atmosphere", Contract with National Research Fund № NZ 1515/05, (2005-2008).

All projects have completed with an excellent grade.

Assoc. Prof. Dr. Veneta Guineva did not present data on the management of successfully defended doctoral students. This fact, in my opinion, is due to the limited opportunities to find candidates for the preparation of doctoral dissertations in the Department of SRTI - BAS in Stara Zagora, where is the workplace of Assoc. Prof. Dr. V. Guineva.

V. Personal impressions of the candidate

I have known the work of Assoc. Prof. Veneta Hristova Guineva for more than three decades, as colleagues in SRTI and our joint participation in a number of national and international space projects. I also have excellent personal impressions from the presentation of Assoc. Prof. Dr. Veneta Guineva at international scientific conferences at home and abroad, as well as from the evaluation of colleagues from the Institute of Atmospheric Physics at the Czech Academy of Sciences, with whom we work on various topics for many years.

VI. General conclusions

The materials submitted for review fully characterize the candidate, as a built scientist with her profile, in the field of space research, related to the study of the influence of solar activity and fluxes in the solar wind on the magnetosphere, aurora emissions and magnetic disturbances; creation and testing of various models related to time series, radiation transfer and optical spectra; study of trace gas components; studying the influence of various factors on temperature and temperature trends; the development of new research procedures and methodologies for analysis and justification, through theoretical calculations or modeling, and last but not least the design of optical research devices.

Particularly characteristic of the work and appearance of Assoc. Prof. Dr. Veneta Hristova Guineva are her qualities as a profound and versatile scientist. The results of the scientific activity of Assoc. Prof. Dr. Veneta Guineva have been presented at

renowned international scientific forums and have received a serious positive response in the world scientific literature, among the scientific circles working in the field of space research, as evidenced by numerous citations in international scientific journals with a high impact factor.

The materials presented by the applicant and the calculated points for each of the indicators are presented in the following table. I have checked the compliance in accordance with the requirements of the Act on Development of the Academic Staff in the Republic of Bulgaria and the Regulations for its application.

Group of indicators	Content	Points received from assoc. prof. Dr. V. Guineva on individual indicators (see Table 2)	Required points for the academic rank PROFESSOR of NACID/BAS
A	Indicator 1	50	50
Б	Indicator 2	-	-
В	Indicators 3 or 4	149,75	100
Г	Sum of the indicators from 5 to 9	389,02	200 / 220
Д	Sum of the indicators from 10 to 12	258	100 / 120
Е	Sum of the indicators from 13 to the end	260	150
Total:		1106,77	600 / 640

The analysis of the points received by the candidate on the individual indicators, according to the minimum requirements by groups of indicators, for obtaining the academic rank "professor" in the field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.4. Earth Sciences, from the Regulations for the application of the Act on development of the academic staff in the Republic of Bulgaria Prom. - SG, amended and add., no. 56 from 06.07.2018, effective from 06.07.2018; ed. and add., no. 15 of 19.02.2019, are presented in the table and categorically confirms the conclusions that the candidate Assoc. Prof. Dr. Veneta Guineva meets the minimum requirements of the Act on development of the academic staff in the Republic of Bulgaria, the Regulations for its application, as well as the adopted Regulations of the General Assembly of BAS and SRTI-BAS, for obtaining the academic rank "Professor", field of higher education 4. Natural sciences, mathematics and informatics, professional field 4.4. Earth sciences.

The indicators according to these criteria for the candidate Assoc. Prof. Dr. Veneta Hristova Guineva, exceed almost twice the minimum requirements for the announced competition.

VII. Recommendations and remarks on the submitted materials in the competition.

I can make only two recommendations to the candidate, Assoc. Prof. Dr. Veneta Guineva, which are related to the final submission of all applications and materials for the competition, according to the requirements of the Act on development of the academic staff in the Republic of Bulgaria and the new Regulations for its application. They derive from the procedure for verification of the competition data, which is carried out by NACID.

The first recommendation is to add to the lists of publications of the candidate, their e-mail addresses, for search and verification in the relevant databases, according to the requirements of NACID.

And the second recommendation is to correct the data on the candidate's participation in national and international scientific and educational projects, included in the "group of indicators E", by removing from the projects presented under this indicator, the projects, which were implemented before the candidate's position "senior research associate II degree" or "associate professor", i.e. before 2008.

The implementation of these recommendations will in no case lead to non-compliance with the requirements of the Act on development of the academic staff in the Republic of Bulgaria and the Regulations for its application, because as it can be seen from the data in the table, the points collected by the applicant Assoc. Prof. Dr. Veneta Guineva exceed almost twice the minimum requirements for obtaining the rank "professor", according to the announced competition.

VIII. Conclusion.

Based on the above, I accept without remarks the materials submitted by the candidate, give a positive assessment of their quality and in accordance with the requirements for the academic rank of "professor", I recommend the Scientific Jury to make a decision to propose to the esteemed Scientific Council of SRTI - BAS, to vote for the election of Assoc. Prof. Dr. Veneta Hristova Guineva, to obtain the academic rank of "Professor" 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 (Studies of the processes in the middle and high atmosphere of the Earth)", for the needs of the section "Atmospheric optical investigations", Stara Zagora Department of SRTI - BAS.

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Prepared the review:


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