REVIEW

by Prof. Dr. Christo Georgiev Georgiev – member of a scientific jury in selection procedure of academic position "Associated Professor" in professional field 4. 4. Earth Sciences, scientific specialisation Meteorology, in Marine Forecasting Division at Forecasting and Information Service Department, with the only applicant Assistant Proffesor Dr. Vasko Nikolaev Galabov

The review was prepared following up the Order of the Director General of NIMH № ND-04-32 of 08/10/2021 г. and the decision of the meeting of the scientific jury held on 14/10/2021. It is in accordance with the requirements of the Law for the development of the academic staff in the Republic of Bulgaria (ZRASRB), the Regulations for its implementation (RIZRASRB) and the NIMH Rules on ZRARRB.

I. Requirements to the applicant

according to Art. 24 (1) and Art. 26 (1), (2) of ZRARRB, Art. 53(1) and Art. 54(1) of RIZRASRB and Art. 53 (1) and Art. 54 (1) of the NIMH Rules on ZRASRB

Vasko Nikolaev Galabov completes the full course of the Faculty of Physics of Sofia University "St. Kliment Ohridski" in 1997 and obtains the qualification Master of Physicss, specialization Meteorology. Initially works for NIMH, branch Pleven as a forecaster from 1999 to 2002, and from 01.03.2002 works for Forecasting Department of NIMH. In 2005 he is involved in the staff of Marine Forecasting Division at the same Department with the task operational support and development of Numerical Marine Forecasting models. He performed free doctorate at NIMH, and in 2017 defended a thesis entitled „Building of a system for prediction of severe hydro-dynamical events in the Black Sea coastal zone" and obtains PhD educational and scientific degree. Shortly afterwards, Dr. Vasko Galabov successfully participate in a competition for Assistant Professor in Marine Forecasting Division at Forecasting and Information Service Department of NIMH. The election was held in March 2018, and started to act as a head of this Division in 2019 г. He has managed 2 projects with external funding from the National Programme Young Scientists and Post doctors – module Postdocs in 2020 and 2021. The first one entitled „Study of the frequency and intensity of the Black Sea storms which impact Bulgarian coast", is for the period 01/03/2020 – 31/08/2020. The work on the project is arranged with agreement CR-04-6/28.02.2020 and after the expiration of the deadline for implementation, the work on the project ends with order CR-06-19 / 24.08.2020 of the Director General of NIMH.

In the inspection of the submitted materials for the competition there are no violations in the procedure or non-fulfillment of any of the conditions for eligibility of the

candidate to the competition, according to ZRASRB and the regulations for its implementation.

II. Requirements regarding scientific and research-applied activities

Art. 24 (1), p.1, p. 3, p. 4, p. 5 and Art. 26 (1) of ZRASRB, Art. 53 (1), p.1, p. 3, p. 4, p. 5 and Art. 54 of RIZRASRB, Art. 53, p.1, p. 4, p. 5, p. 6, p.7 of the NIMH Rules on ZRASRB

A list of 40 publications is presented for the competition. Eight of them are reduced due to the fact that they are listed in the dissertation abstract.

The candidate submits a report on his research works, according to which he covers the required number of points in all groups of indicators of the minimum national requirements.

The requirements for PhD in 4.1 Physical Sciences are covered by 50 points from a defended dissertation and 35 points from 3 articles indexed in Scopus / Web of Science.

SUMMARY TABLE

ON THE VOLUME AND TYPE OF OF SCIENTIFIC PRODUCTION under Art. 1a (1) and (2) of RIZRASRB as well as Art. 2 (4) of NIMH Rules on ZRARRB

of Assistant Professor Dr. Vasko Nikolaev Galabov

Indicators Group	For participation in an Associated Professor's competition	
	Number of Candidate points	Number of points required
А	50	50
Б		-
В	177	100
Г	212.85	200
Д	65	50
Е		-

Twenty eight publications of Dr. Vasko Galabov are subject to review in the competition, as follows: 13 refereed and indexed, 8 of which in proceedings of scientific conferences; 17 peer-reviewed publications in other issues, of which 2 papers in proceedings of scientific conferences and 2 published extended abstracts of papers of scientific conferences. Only three publications are in Bulgarian, and the remaining works are published in English. Seven of the publications presented for the competition are one-man works, and in other 8 Dr. Vasko Galabov is the first author. Of the evaluated publications, 14 are papers at scientific conferences, 5 of which have been published in collective volumes indexed in Scopus / Web of Science.

A list of 72 found out citations of 13 publications of the candidate is presented, a significant number of which are in refereed and indexed scientific journals. Three of the publications were cited once, and for the remaining ten 2 to 12 citations were found out.

A significant part of the scientific results of Dr. Vasko Galabov are his own contributions to the study of the climate of the waves and the extreme storm surges as a result of meteorological and sea storms in the Black Sea. The first of these papers [5] was published as a one-man work in 2013 in the Proceedings of a Scientific Conference, an indexed scientific publication. An assessment of the potential of the Black Sea wave energy has been made, a characteristic that determines the opportunities for the energy industry in the region. The study was performed using a high-resolution wave numerical model with input meteorological information from ERA re-analyzes by the European Center for Medium-Range Weather Forecasts (ECMWF) for the period 1996-2003. The results of the numerical modeling were compared with measurements from one station on the east coast and 3 stations on the west coast. Conclusions are drawn on the applicability of the approach, which does not give satisfactory results on the west and southwest coasts, which are of the greatest interest from an energy point of view. The topic and the results are contemporary and the publication has been cited 11 times. The study continues with a second independent work on the topic [36], accepted for publication in 2021 in the journal NIMH Bulgarian Journal of Meteorology and Hydrology. There are two significant contributions from this study. The first is related to the more accurate determination of the wave energy potential in the southwestern part of the Black Sea, as the wave model is forced by higher-resolution wind data than the ALADIN model for the period 2012-2015. The second contribution is on the determination of the climate change in wave energy using re-analyzes from the ERA-CLIM project over a 110-year period. The connection of the studied processes in separate parts of the Black Sea with different types of large-scale atmospheric circulation in remote areas is shown.

Another group of works on this research topic are presented in publications with leading participation of Dr. Galabov, which examines the wave climate of the Black Sea in connection with the atmospheric circulation in the Mediterranean region. The original result is the conclusions made in [11], [12] and [33] for a significantly longer period of similar studies by other authors as a result of using input from ERA CLIM and ERA5. One of them is an article in *Pure and Applied Geophysics*, a magazine with an impact factor published by *Springer*, and the other 2 are conference papers, one of which was published in a collective volume indexed in Scopus / Web of Science. Papers [28], [34]

and [35] also belong to this group, the last of which are one-man works. Here, the candidate's contribution is about the research of various excitement characteristics and storminess indicators, based on numerical modelling. Two of these articles have been published in the journal of NIMH. According to the applicant, the publication [34] in a collection of papers from a scientific conference is the first to attempt to study storm surges in the Black Sea based on long-term numerical simulations. The collective work [28], published in the journal of NIMH, assesses the statistical characteristics of the Black Sea tide and the risk of a significant wave. An important contribution of the candidate are the conducted simulations with numerical model with high resolution for 111-year period.

The works [10], [14], [40] are scientific research based on numerical simulations of historical storms in order to analyze the risks of coastal floods. They are conducted by international teams, mainly under the project with European funding IncREO FP7. Special attention is given to the article [14] by French and Bulgarian scientists, published in *Natural Hazards and Earth System Sciences* in 2018, for which 5 citations have been noticed so far. In this study, contemporary techniques are applied to achieve a sufficiently high horizontal and temporal resolution (downscaling) in simulations of cases of extreme waves and sea storm surges since the early 20th century. For this purpose, the numerical modeling is performed on an appropriately selected combination of ECMWF ERA-20C, ERA-40 and ERA-Interim re-analyzes. In his report on contributions and citations, Dr. Vasko Galabov emphasizes that his contribution to the study is fundamental to the Black Sea part of the publication, and during his work at Meteo France he has some participation in the study conducted by French authors.

The basis of these results are the scientific and applied contributions of Dr. Vasko Galabov in building and developing a system of numerical models for operational maritime forecasting, but a significant part of them are relate to his dissertation for "doctor". The contributions from this group, subject to evaluation in this selection procedure, are connected with the activity presented in publications [13, 15, 16, 17, 19, 21, 27, 29, 30, 31, 32], in which other colleagues from Marine Forecasts have leading role. Until 2010, the section headed by Assoc. Prof. Dr. Anna Korcheva implements in NIMH the French wave models VAG, WAVEWATCH III and WAM, as well as MOTHY - a model for forecasting the spread of pollutants and floating objects, thanks to long-term bilateral cooperation of NIMH with Meteo-France. Verification of wave models is performed by comparison with satellite measurements of sea level. Considering the qualification and the work of the candidate, in my opinion he has an important contribution to these scientific and applied publications, as well as to upgrading the operating systems of NIMH. In connection with his dissertation, in 2011 the SWAN model for forecasting sea waves in coastal areas with high-resolution was implemented, and in 2015 a model of Meteo-France for storm surge forecasting was re-introduced, improvements have been made, including coupling with the SWAN model.

Assistant Prof. Dr. Vasko Galabov has significant scientific and applied contributions in connection with the application of the Meteo-France system for forecasting the spread of oil spills with high-resolution, based on the MOTHY model [18]. The topic is very relevant, but mostly economically and economically significant. In

spite of this, 14 citations of these 8 publications have been noted, and the MOTHY model is also used in the internationally funded projects ECOPORT8, TEN ECOPORT and ECOPORTIL to analyze the threat of the port of Bourgas in oil spills [2, 6]. The technology was further developed by Dr. Vasko Galabov and used in other applications [22, 23, 38], as one-way interaction was added to the model (using the excitation wave model). The MOTHY ability to simulate the movement of floating objects back in time was also used. Convergence of trajectories in Ukrainian waters near the Romanian waters and in this connection the probable cause of death of dolphins in the Black Sea in 2015, related to illegal catching of poaching vessels, has been established. The publications resulting from these studies [8, 9] are co-authored with specialists in marine mammals and geo-information technologies from Bulgaria and Romania. The first is published in *GIM International*, an impact factor journal in the field of criminal investigation.

The activity of Dr. Vasko Galabov for the development of operational numerical models at NIMH is not only related to the field of marine forecasts. He also introduced the regional numerical model for weather forecasting HRM in the operational practice of NIMH in 2002, and in 2003, in the National Meteorological Service of the United Arab Emirates, where he conducted training for its use.

The strength of the candidate is his active participation in a large number of international projects, including IncREO FP7, UPGRADE - Black Sea Scene, ECOPORT8, TEN Ecoport, ASCABOS, MISBS. Taking into account the scientific and scientific-applied contributions of Assistant Prof. Dr. Vasko Galabov, he can be considered a leading scientist at NIMH in numerical modeling of waves, the spread of pollutants, floating objects in the sea and the extreme increase in its level as a result of meteorological and sea storms. His scientific and applied developments provide important activities of NIMH for supporting the activities of our Black Sea port administration, as well as other national institutions with forecasts, expertise, including the judiciary.

III. Opinions, recommendations and notes

I know well the qualities of Dr. Vasko Galabov, working close to him for almost 20 years. He strives to work in priority areas for NIMH, showing interest in solving a wider range of scientific problems. It has significant potential to build on what has been achieved since its habilitation. This is confirmed by the report on the contributions, in which he not only presents what has been achieved so far, but also gives brief information about the development plans in the main research and application activities in the section. Weakness of the candidate's presentation is the very schematic description of the contributions and the lack of documents accompanying the information on implementations and participation in research projects.

I have worked several times at the same time with Dr. Vasko Galabov in Meteo-France as well. I have very good impressions of his performance, including on the basis of positive feedback on his effective work from colleagues in the Operational Marine ForecastingDepartment of the French Meteorological Service.

Conclusion

The examination of the submitted materials for the selection process does not reveal any violations in the procedure. The requirements Art. 24 (1), p.1, p. 3, p. 4, p. 5, (2) and Art. 26 (1) of ZRASRB, Art. 53 (1), p.1, p. 3, p. 4, p. 5 and Art. 54 of RIZRASRB, Art. 53, p.1, p. 4, p. 5, p. 6, p.7 and Art. 54 of the NIMH Rules on ZRASRB are fulfilled.

On the basis of consideration of the documents of the applicant for the selection procedure and the assessment, according to Art. 27 (3), (4) of ZRASRB on the publications submitted by him, I propose that the Scientific Council of the National Institute of Meteorology and Hydrology vote for election of Assistant Professor Dr. Vasko Nikolaev Galabov for "Associated Professor" in professional field 4. 4. Earth Sciences, scientific specialisation Meteorology.

Дата:

MEMBER OF THE JURY:

/Prof. Dr. Christo Georgiev /