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REVIEW

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of the materials submitted for participation in the competition for the academic position of "**Associate Professor**" at the "Coastal Zone Dynamics" Department of the Institute of Oceanology - BAS, Varna, in the field of higher education: code 4. "Natural Sciences, Mathematics and Informatics"; Professional field: code 4.4. "Earth Sciences"; Scientific specialty: "**Oceanology**"; Scientific field: "Wave processes, coastal hydrodynamics and risk in the coastal zone"

This review was prepared based on Order No. 298/26.09.2025 of the Director of the Institute of Oceanology – BAS, Varna for conducting a procedure for occupying the academic position of "Associate Professor", in accordance with the requirements of the Law on the development of the academic staff in the Republic of Bulgaria (LDASRB), the Regulations for its application of the BAS and the Regulations of the Institute of Oceanology – BAS and a decision from the first meeting of the Scientific Jury.

In the competition for occupying the academic position of "Associate Professor", announced in the State Gazette No. 63 / 01.08.2025 and on the information website of the Institute of Oceanology - BAS for the needs of the Department "Coastal Zone Dynamics", the **only candidate** is Dr. Natalia Kamenova Andreeva, holding the position of Chief Assistant Professor (Ch. Asst. Prof.) the same Department.

The candidate is admitted to participate in the competition after a review by a Commission to verify the regularity of the submitted documents and a decision by the Scientific Jury that the candidate meets the minimum national requirements for the academic position of "Associate Professor".

1. General data on the candidate's career and thematic development

Ch. Asst. Prof. Dr. Natalia Andreeva graduated from the Naval Academy "N.Y. Vaptsarov", Varna, in 1997 with the educational and qualification degree "Master" in the specialty "Oceanology". In 1998, she received a European Master's degree in Environmental Protection and Sustainable Development from the University of Chemical Technology and Metallurgy in Sofia, Bulgaria. Between 1998 and 2010, she completed several specialized training courses to enhance her professional qualifications (IO - BAS, SRTI - BAS, and ESRI Bulgaria) and improve her language skills (Lloyd's Language Centre, Varna, and University of Cambridge ESOL Examinations, British Council, Varna). The career development of Dr. Andreeva began at the IO - BAS, where she joined as a specialist "Oceanologist" in 2003 in the Department "Coastal Zone Dynamics". In 2004, she was elected as a Research Associate III degree, and subsequently rose to the position of Ch. Asst. Prof., which she was elected to in 2011. In the same Department, she developed a doctoral dissertation on the topic "Experimental methods for studying the nonlinearity of wind waves in the coastal zone", which she successfully defended in 2013. In the following years, she participated in specialized training courses to improve her professional qualifications and skills, for which she attached certificates to the competition documentation.

Dr. Andreeva has worked on interdisciplinary international and national projects, gaining experience in organizing and conducting marine and coastal expedition activities. She has skills in working with specialized hydroacoustic equipment for measuring sea waves and currents, as well as hydrographic measurement of water volume through profiles. She has actively participated in topographic coastal surveys and sampling for determining hydrophysical parameters. She possesses strong computer skills in working with specialized software programs for processing and analyzing geodatabases and spatial information, as well as for mapping and visualizing them. She is fluent in English and Russian.

2. Opinion on the presence or absence of plagiarism in the scientific publications submitted for evaluation

Upon review of the materials submitted for the competition, **no evidence of plagiarism** was found.

3. General description of the materials submitted for review

Dr. Andreeva has submitted all the documents, references, and declarations required for the procedure in accordance with the LDASRB, its implementing regulations, and the requirements for the development of the academic staff specified in the Regulations on the conditions and procedure for acquiring educational and scientific degrees and for holding academic positions (RCPAESDHAP) of the Institute of Oceanology - BAS. The set of documents includes: an application for participation in the competition; a list of documents; a curriculum vitae in European format; notarized copies of diplomas for higher education and for the educational and scientific degree "Doctor"; a certificate of internship in the specialty in the relevant scientific field; a list of scientific publications; scientific papers (copies of publications); summaries of peer-reviewed publications in Bulgarian and English; a reference for original scientific contributions; a reference for citations in scientific publications; a list of participation in scientific research projects and scientific forums; evidence of national minimum requirements and the requirements of RCPAESDHAP in the Institute of Oceanology - BAS (Annex to Art. 1a and in tabular form).

In the competition for "Associate Professor", Ch. Asst. Prof. Dr. Natalia Andreeva has presented two separate lists of publications: the first contains an abstract of the dissertation work and **6** publications for the acquisition of the Educational and scientific degree "doctor" (PhD), and the second is a list with a total of **26 publications** under this competition, of which grouped by indicator [B4] – 9 publications (129 points); 17 publications under indicator [G] (193 points; the reviewer's calculate is 198 points), of which 14 under [G7] and 3 under [G8] (45 points). The complete list of publications contains **5** more beyond the national minimum requirements, which will be taken into account during the review.

No matches or overlaps are found with and in publications submitted for the acquisition of the ONS "doctor". The publications presented in the author's reference for compliance with the minimum national requirements are based on indicators [B] and [G] and are research-based, published in reputable international (quartiles from Q1 to Q4 or with SJR) and national journals.

4. Reflection of the candidate's scientific publications in the literature (known citations)

The author reference presents citations, indicating the following indicators: total number of citing sources – 204, distributed as follows: indicator [D.11]- 162; indicator [D.12]- 16; and indicator [D.13] – 26. Upon reviewing the citations, it is found that they are respectively: 28 citations by Bulgarian authors and 176 citations by foreign authors.

5. General characteristics of the candidate's activities

5.1. Assessment of scientific and applied scientific activities

All scientific publications submitted for participation in the competition are co-authored (26 under indicators B4, G7, and G8), including 5 additional ones that comply with regulatory requirements. The last 5 are reports from conferences held in Varna, for which, according to the criteria for academic growth in the professional field, 4.4. Earth Sciences, no points are counted. The publications fully correspond to the topic of the announced competition and are dedicated to important problems for the study of storm activity and the vulnerability of the Bulgarian Black Sea coast. A separate document presents summaries in English and Bulgarian of the peer-reviewed publications. They are structured by topic and point to the essence of the scientific contributions of the candidate's main studies. The publications can be classified as follows:

By type: by indicator [B4] there are 9 publications, of which 4 scientific articles in journals and 5 scientific reports in proceedings of international conferences (with quartiles respectively Q1 – 1, Q2

-2, Q4 – 2 and the remaining 4 with SJR). By indicator [G] there are 14 publications, by indicator [G7] there are 7 scientific articles in journals and 7 scientific reports in proceedings of conferences (with quartiles respectively Q1 – 2, Q2 -1, Q3 – 1, Q4 – 1, the remaining 8 are with SJR and 1 is in a national journal), and by indicator [G8] there are 3 chapters of collective monographs.

By the language in which they are written: by indicators [B] and [G], out of a total of 26 publications, 24 are in English and 2 in Bulgarian. Of the additional 5 publications, 4 are in English and 1 is in Bulgarian.

By number of co-authors: by indicators [B] and [G] out of 26 publications 2 have one co-author ([B4-2, G7-1]), 3 have two co-authors, 21 - with three or more co-authors. Of the additional 5 publications 2 have two co-authors, and the remaining 3 - with three or more co-authors.

In order of authors, by indicators [B] and [G] out of a total of 26 publications, she is the first author in 5, the second author in 7, and the third and subsequent author in 14. In the additional 5 publications, Dr. Andreeva is the first author in 2 of them, the second author in 1, and the third author in the remaining 2.

Thirty-one publications were peer-reviewed before publication.

I accept the candidate's participation as equivalent to the research work presented in joint publications with other co-authors, since no separation protocols for authorship have been provided. The research work of the Coastal Zone Dynamics Department at the Institute of Oceanology - BAS involves collective efforts in carrying out multidisciplinary research and presenting their results in joint publications. I consider the contribution of Dr. Andreeva to the research and practical activities of the Department, reflected in the collective scientific works in which she is the first and second author, to be significant (12 issues under indicators [B] and [G] and 3 issues in additional publications).

When checking available publications by Dr. Andreeva in world-renowned databases of scientific information for the period 2005 - November 2025, it was found that 34 publications were referenced in Scopus, of which 28 publications had 244 independent citations and 23 publications in Web of Science (WoS) CC with 198 independent citations, and for 2025 until November they were 6 in Scopus and 5 in (WoS), respectively. It is noteworthy that two publications ([B4-1] and [G7-6]) were cited over 50 times by foreign and Bulgarian authors, in which Dr. Andreeva is the second and third author, respectively. The large number of citations of co-authored scientific works is an indicator of the candidate's achievements and recognition, serving as a certificate of the high assessment of the scientific results published in renowned international and national publications. All citations are positive.

Dr. Andreeva has presented a list of participations in research projects as a member of the scientific team (10 international and 18 national, one of which she is the coordinator), which demonstrates good teamwork skills, as well as in 62 international and national scientific forums. Her numerous participations in scientific forums, with reports and posters, are evidence of significant achievements in popularizing the scientific and applied results of the Coastal Zone Dynamics Department's activities.

5.2. Assessment of teaching and learning activities (work with students and doctoral candidates)

The documentation submitted for the competition does not contain any data on the candidate's reported teaching and learning activities.

5.3. Contributions (scientific, scientific-applied, applied)

The scientific papers submitted for review show that Dr. Andreeva works on the topic and has scientific achievements in the field of: research of the wind-wave climate in the Black Sea, storm activity and morphodynamics of sandy beaches along the Bulgarian Black Sea coast, assessment of wave impact and vulnerability of the coastal zone, assessment of the energy potential of sea waves in the Black Sea and along the Bulgarian coast, coastal risk from extreme storms and the influence of coastal protection hydro-technical facilities on the dynamics of coastal processes.

The presented extended reference of Dr. Andreeva's scientific and applied contributions reflects the results of her research and the research teams in which she participates. They are obtained from research activities carried out within the framework of various international and national projects, as noted in the contributions she has formulated.

I accept the **scientific** and **scientific-applied** systematized contributions by the candidate Dr. Andreeva, as presented in detail in the author's reference. They relate to:

- Scientific contributions:

- Validation of the spectral wave model WAM Cycle 4 for the Black Sea by comparing model results with in situ measurements from buoys and shore wave recorders; assessment of the model's performance under different wind conditions and its use for standardizing methodologies for long-term climate reconstructions; assessment of seasonal and spatial regional differences in the wind and wave regime, including the recurrence of storm events from a long-term database of wind and wave parameters for the entire Black Sea basin
- Summarizing information on the frequency, seasonality, and spatial manifestation of extreme storm events along the Bulgarian Black Sea coast for more than a century. Using an interdisciplinary approach, quantitative characteristics from historical descriptions of storm phenomena have been assessed, and parameters of individual events have been reconstructed by comparing archival information with modern instrumental data and numerical models. Storm activity in the shelf zone of the Bulgarian Black Sea coast has been assessed. A new integral wave index has been proposed for distinguishing storm events, and a comprehensive set of 11 storm intensity indicators for the period 1948-2010 has been developed and applied.
- Statistical characteristics and frequencies of joint occurrence of significant wave height Hs, peak period Tp, and mean wave propagation direction Dm for the Burgas Bay region have been derived. The estimated statistical characteristics of wind waves, measured with a hydroacoustic Doppler profilograph, form the basis for improving wave models, assessing wave and storm regimes in the bay, and developing more accurate forecasts of storm impacts on the coastal zone.
- Critical thresholds of storm impact on the morphology of sandy beaches along the Bulgarian northern Black Sea coast have been determined for the first time based on a combination of wind-wave data from retrospective analysis (hindcast) and long-term series of profile measurements; ranges of integral wave energy in storms causing significant morphological changes and for destructive events with the potential for irreversible changes to the coastline, which are determined by local geomorphological conditions, have been defined.
- The factors - seasonal storm conditions and interdecadal climate variations, driven by the global atmospheric circulation using large-scale atmospheric indices (NAO, AMO, EA, AO, EA/WR and SCAND) that determine the migration of the coastal underwater wall at the NIB "Shkorpilovtsi" trestle on the Kamchiysko-Shkorpilov beach - have been identified; the relationships between specific nonlinear wave characteristics of storm phenomena and the morphodynamic changes of the beach and the underwater coastal slope (including river-sea interaction) along the Bulgarian coast under different wave regimes and types of wave destruction causing significant erosion have been assessed.
- For the first time, it has been established that the average longitudinal coastal currents are more intense on a dissipative coast than on a reflective coast, where cross-coastal currents predominate. The scientific result was obtained from comparative synchronous studies of hydrodynamic and lithodynamic processes on representative beach strips on the dissipative coast near the village of Lubyatovo (Poland), located on the Baltic Sea, and the more reflective coast near the Shkorpilovtsi Research Base of the IO-BAS on the Black Sea. The results lead to a new scientific understanding of the mechanisms governing the different morphodynamic types of coasts and to a more accurate assessment of their resistance to extreme storm impacts.
- By taking into account the intensity of wave impact, its spatial extent, and the morphodynamic response of the coastal system, parameters for the quantitative assessment of wave energy impact in the coastal zone have been proposed for the first time. The proposed indicators allow for objective and more precise quantitative assessments of wave dynamics.

- Scientific-applied contributions:

- The wave impact and vulnerability of the Varna coast from Cape Ekrene to Cape Paletsa (Thumb) has been assessed, identifying and objectively distinguishing separate critical zones with high, medium and low energy pressure, which are a priority for coastal protection measures; a spatial

assessment of vulnerability to storm events has been carried out and areas with varying degrees of sensitivity to erosion and flooding have been identified; the first quantitative classification of the openness (exposure) of the Bulgarian Black Sea coast to wave impact has been made based on a systematic study and critical zones with high risk for the population and infrastructure have been determined.

- The wave energy potential in the waters off Varna and Burgas Bays has been assessed through stochastic analysis, which identifies the waves that can be utilized for energy generation, including those in the shelf zone of the entire Black Sea basin, based on numerical simulations.
- The cultural and institutional factors that influence coastal risk management in the city of Varna have been analyzed and assessed; the factors that lead to a significant reduction in the effectiveness of the applied coastal protection measures have been identified and specific practical guidelines for its increase have been proposed; the coastal risk has been assessed using the methodology "Coastal Risk Assessment Framework" developed under the international RISC-KIT project and coastal areas with high vulnerability have been identified; inundation, vulnerability and coastal risk maps have been prepared; the vulnerability of the Varna regional coast to floods has been assessed by applying the index approach to four selected receptor categories, adapted to local conditions; probable direct damage has been assessed under different scenarios for partial or complete destruction of the infrastructure using the INDRA model; Tests and verifications of empirical models for coastal flooding during extreme storm events were conducted and indicators were selected for assessing the threat of flooding and erosion, which were used to identify the most vulnerable sectors along the Varna coast.
- The risk of coastal flooding due to storm events on the Burgas coast has been assessed using the CRAF methodology, and flood, vulnerability, and coastal risk maps have been prepared. Specific threatened local areas have been identified for which protective measures and adaptation policies can be planned at the local level.
- A prototype of an early warning system for coastal storm impacts has been developed and applied to the area in front of the Shkorpilovtsi Research Base. The system has been shown to predict wave parameters and morphodynamic changes with sufficient accuracy for operational application.
- A multi-component Delft-FEWS (Flood Early Warning System) has been developed and implemented for Varna Bay, providing 3–5 day forecasts of storm impacts. An integrated approach has been applied to assess the risk of flooding and erosion along the Vranje coast, and inundation and erosion maps have been prepared using current and future climate scenarios; impacts on the coast have been assessed, and coastal protection engineering solutions have been proposed to reduce the risk of flooding and erosion in the coastal zone during future extreme events.
- Reconstructions of extreme storm events along the Bulgarian Black Sea coast have been carried out, and the specificity of their impacts has been assessed, taking into account local morphodynamics and degree of development.
- The impact of coastal protection hydro-technical facilities on the dynamics of coastal processes in the area of the fishing port in the town of Chernomorets has been assessed, and a redirection of coastal currents and the formation of zones with increased sediment accumulation and erosion have been established. The results obtained are useful for practice in assessing environmental risk and for optimizing similar infrastructure projects planned for implementation along the Bulgarian Black Sea coast.

The analysis of the submitted documentation, scientific works, project activities, and participation in scientific forums of Dr. Natalia Andreeva allows me to conclude that she has actively contributed to the organization, implementation, and reporting of the scientific research activity reflected in the evidentiary materials for the competition. The significance of Dr. Andreeva's contributions and published scientific results, as well as those of the teams she participates in, can be judged by the large number of citations. The citations in the Scopus and WoS databases, which were not included in the author's reference list for this competition, were identified during the reviewer's check and serve as an indicator that Dr. Andreeva's scientific research work is highly valued and continues to be cited in the scientific literature.

Based on the author's reference submitted by the candidate for compliance with the minimum national and additional (of the Institute of Oceanology - BAS) requirements for participation in the competition for the academic position of "Associate Professor" at the "Coastal Zone Dynamics" Department at the Institute of Oceanology - BAS, Varna in the field of higher education: code 4. "Natural Sciences, Mathematics and Informatics"; Professional field: code 4.4. "Earth Sciences"; Scientific specialty: "Oceanology"; Scientific field: "Wave processes, coastal hydrodynamics and risk in the coastal zone" it is established that for each group of indicators, there is compliance or exceeding of the minimum required points, as follows:

- Indicator A – 50 points (50 points required)
- Indicator Group B – 129 points (100 points required)
- Indicator Group G – 243 points (220 points required)
- Indicator Group D – 905 points (60 points required)

6. Assessment of the candidate's personal contribution

Ch. Asst. Prof. Dr. Natalia Andreeva presents a list of a total of 26 scientific papers (with an additional 5 outside the requirements), of which 2 are with one co-author and 5 – with two co-authors, which shows a particular personal contribution to the developed scientific topic, including 12 papers by indicators [B] and [G] and 3 papers in additional publications of which she is the first and second author. The publications are in English (except for 3 in Bulgarian). They are accessible in international scientific journals or in the proceedings of scientific conferences, ensuring wide dissemination among the scientific community of the results obtained and the original scientific and scientific-applied contributions made by the candidate. Based on the analyzed documentation and the indicated achievements, I have reason to give a high assessment of Dr. Andreeva's publication and project activities. She has a clearly outlined profile of scientific research work in the field of oceanographic and geomorphological studies of coastal zone dynamics.

7. Critical notes and recommendations

The documentation submitted for review is appropriately structured and meets the minimum national scientometric indicators for holding the academic position of "Associate Professor". The scientific and scientific-applied contributions are well-structured thematically and described in quite detail. The candidate, Ch. Asst. Prof. Dr. Natalia Andreeva applies modern approaches in scientific research and has made recognized scientific and scientific-applied contributions, as evident from the cited publications.

The review and evaluation of the submitted documentation give me reason to note the following:

- The scientific publications submitted by Dr. Andreeva for the competition are co-authored, with no independent scientific works. The publications reflect the scientific results of the teams that implemented international and national projects with her participation, as noted in the references to scientific and scientific-applied contributions. This reference should note the specific scientific publications that contain these contributions in order to highlight the personal contribution of the candidate. The candidate's contribution to the development, adaptation, and application of coordinated methodologies and approaches developed and improved within the framework of the implementation of the international research projects should also be specified.
- Regarding the list of publications, the one indicated under number 6.2.2-11 is with quartile Q1, and not with the reported Q2, which reduces the indicator [G7] by 5 points.
- In the list of participations in international and national scientific forums, the author who gave the presentation or presented the poster should be indicated.

The remarks made do not belittle the merits of the candidate in this competition. They aim to stimulate precision in the technical preparation of the documentation and individual expression in the preparation of independent scientific publications. Based on her accumulated research experience, Dr. Andreeva has the potential to develop and publish her own research independently.

I would recommend that Dr. Andreeva continue her research in her chosen scientific field by actively developing research projects to lead, as well as continuing to publish her scientific results in reputable international and national scientific journals, including those in Bulgarian. It is advisable to disseminate the obtained scientific and applied research results to responsible state institutions and organizations involved in decision-making related to the integrated management of the country's coastal zone. The research experience accumulated by Dr. Andreeva can be shared with students and undergraduates through participation as a teacher or lecturer, as well as with future doctoral students at the Institute of Oceanology - BAS.

8. Personal impressions

I personally know Dr. Natalia Andreeva from her participation in conferences where she presented the results of scientific research from the Department of Coastal Zone Dynamics, and I have excellent impressions of her presentations. From the competition documentation, I judge that she has demonstrated qualities and opportunities for scientific development, with clearly outlined topics and contributions in the field of oceanographic research on coastal zone dynamics. I believe that she is a well-prepared and promising scientist for the future of the Coastal Zone Dynamics Department at the Institute of Oceanology-BAS.

9. Conclusion

The candidate Ch. Asst. Prof. Dr. Natalia Kamenova Andreeva has submitted a set of documents for participation in the competition for the academic position of "Associate Professor" at the Institute of Oceanology - BAS, which meet all regulatory requirements. The scientific works with which she is associated, as well as the evidence of her participation in international and national projects, are sufficient in number. The scientific results of her research activity have been published in prestigious international and national publications, referenced and indexed in the global databases of Scopus and Web of Science, and have been cited many times by Bulgarian and foreign authors. The results achieved by Dr. Andreeva exceed the minimum national requirements, as outlined in the LDASRB and the Regulations for their implementation, including the additional requirements specified in the RCPAESDHAP of the Institute of Oceanology - BAS.

Considering the above and after the analysis of the materials and scientific papers submitted for participation in the competition, the analysis of their significance and the assessment of the original scientific and scientific-applied contributions, I give my positive assessment and propose to the esteemed Scientific Jury to prepare a report-proposal to the Scientific Council of the Institute of Oceanology at the Bulgarian Academy of Sciences, Varna, that Ch. Asst. Prof. Dr. Natalia Kamenova Andreeva be elected as an "Associate Professor" in the field of higher education: code 4. "Natural Sciences, Mathematics and Informatics"; professional field: code 4.4. "Earth Sciences"; scientific specialty: "Oceanology"; scientific field: "Wave processes, coastal hydrodynamics and risk in the coastal zone".

14.11.2025 г.

Sofia