

2. Candidate's research activity

The submitted documentation for the competition is clear, systematized and complete with the necessary evidence, leaving a positive overall impression of the significant volume and high quality of the achieved scientific results.

2.1.View publications and citations

Ivelina Zlateva participated in the competition with a total of 27 scientific publications, of which 20 are in indexed and refereed scientific periodicals and indexed books in the world-renowned scientific information databases Scopus and/or Web of Science, distributed as follows: Q1 – 3 (*Marine Pollution Bulletin*, *Toxins* , *Front. Mar. Sci.*) , Q2 – 6, Q3 - 2 , Q4 - 4 , book chapters indexed in Scopus - 5. The candidate is the lead or second author of 12 (44%) of the publications in the competition, which distinguishes her as a researcher with a significant personal contribution in the application of statistical methods and mathematical modeling in the study of geospatial, ecological, population and genetic characteristics of marine phytoplankton, zooplankton and fish, and the dynamics of marine litter. I also fully appreciate her participation in larger author teams as a third and subsequent author, as this is evidence of the implementation of broad research cooperation and successful integration into the national and international scientific community.

After checking the scientific databases Scopus and Web of Science, I confirm that the candidate meets and exceeds the minimum national, BAS and IO-BAS requirements under criteria C.4 "habilitation thesis - scientific publications" – 135 points and D.7 "publications outside the habilitation thesis" - 255 points.

The reference for citations in scientific publications lists 51 citations, most of which are in refereed and indexed publications, respectively, indicator D.11 is estimated at 237 points and exceeds nearly 4 times the minimum requirements (60 points). The citations visible only in the scientific database Scopus (61 citations, excluding auto-citations – 305 points), testify that the candidate in the competition meets the regulatory requirements for this indicator.

2.2.Participation in research projects

Ivelina Zlateva is the coordinator for the Institute of Environmental Protection of the Bulgarian Academy of Sciences in two internationally funded projects and has participated as a

member of the scientific team in another 16 international projects, as well as in 13 nationally funded projects for the period from 2018 to the present. The highest project activity has been implemented in the management, analysis and quality control of data in the field of fisheries for the assessment of stocks and the status of populations of commercially important fish species and the provision of advice to fisheries management authorities. Another area of significant project activity concerns the assessment of the quantity, transport and mapping of marine plastic waste pollution in the Black Sea and the Danube River Basin, and the bioaccumulation of microplastics in important species of the food webs in the Black Sea ecosystem. A third diverse group of projects with the participation of the candidate concerns the training of students in engineering and mathematical methods in oceanology, raising public awareness of marine science, citizen science, etc.

2.3. Most important scientific and applied scientific contributions

Ivelina Zlateva's scientific research is interdisciplinary in nature, uniting the fields of oceanology and ecology of marine biological communities and species, through the application of data science, numerical modeling, and statistical analyses. A variety of results have been obtained that develop the scientific basis for environmental risk assessment and improved management of marine biological resources in the Black Sea.

As the most significant scientific contributions of an original or confirmatory nature, I would distinguish the following:

1. For the first time, spatial distribution and habitat suitability models have been developed for six commercially important fish species in the Bulgarian Black Sea region: *Sprattus sprattus* , *Mullus barbatus* , *Trachurus mediterraneus*, *Pomatomus saltatrix* , *Merlangius merlangus* and *Scophthalmus maximus* , by applying machine learning (maximum entropy method – MaxEnt), based on integration of abiotic and biotic and environmental factors, validated with monitoring data. Projections of the habitat suitability model for *S. maximus* under different climate scenarios have been made and the status of turbot populations in the Bulgarian waters of the Black Sea in relation to fishing pressure has been assessed. The results obtained are of essential importance for the conservation and effective management of stocks of economically important fish species in the region. The contribution is original.

2. As an original contribution, I define the prediction of habitat suitability using statistical methods and machine learning and the preparation of habitat maps of the distribution of phytoplankton cysts in the surface sediments of the Black Sea: of three potentially toxic species of microalgae (*Lingulodinium polyedra* , *Polykrikos hartmannii* and *Alexandrium spp*) and the bloom-inducing *Scrippsiella acuminata* complex. Key environmental factors such as salinity, temperature, currents, oxygen and nutrients have been identified that determine the likelihood of cysts of the potentially toxic species *Alexandrium spp.* , *L. polyedra* and *P. hartmannii* and *S. acuminata*. The areas with the highest probability of occurrence of cysts of the toxic species *L. polyedra*, as well as blooms of *S. acuminata* have been determined - the waters along the western coast and shelf of the Black Sea. The results obtained can serve to develop a system for monitoring and assessing the ecological risks of blooms of potentially toxic and other "harmful" phytoplankton species.

3. A relationship between the abundance and spatial distribution of toxic microalgae and phycotoxins and environmental parameters has been established by applying multivariate statistical and gradient methods. The results will help to build a hypothesis regarding the influence of environmental factors on the toxigenic potential of species and can be used to build systems and algorithms for assessing risk to human health and ecosystem health. The contribution is original.

4. Conceptual and applied frameworks for assessing the state of fish resources and their sustainability have been developed, which combine the use of biological, ecological and socio-economic indicators and apply a systematic approach to modeling and simulation of the marine ecosystem. This integrated approach allows for the assessment of the interaction between natural processes and anthropogenic impacts, as well as the development of scenarios for sustainable fisheries management in the Black Sea. The contribution is original.

5. Stratified spatial methodologies for quantitative assessment of marine litter, mapping of pollution hotspots and determination of threshold values for indices of environmental plastic waste loading have been developed. A Lagrangian numerical model has been applied to study the complex dynamics and transport of plastic pollution from river and land-based sources to the Black Sea, providing a basis for quantitative assessment of transboundary loading. The contribution original application of existing methodologies in modelling of marine litter pollution.

I would highlight the following developments as the most important scientific and applied contributions:

6. Software tools have been developed to use available libraries and functions in the R and Python programming environments for pre-processing, qualitative analysis and post-processing of multidimensional ecological and climatic datasets and time series, for spatial modeling of marine biological species and for data integration from numerical models. I define the developments as an original contribution to the application of data science in the field of oceanology and marine ecology.

7. The spatial distribution and habitat suitability models of six commercially important fish species, the projections of turbot habitat suitability under different climate scenarios, and the introduced indicators for assessing the status and sustainable exploitation of fish stocks have scientific and applied significance for developing management policies aimed at sustainable fisheries and strategic planning of the sector.

8. The developed model and conceptual framework for predicting the habitat suitability of potentially toxic and other "harmful" microalgae and the established relationships with environmental factors have practical value for predicting the probability of bloom phenomena and for their inclusion in systems for monitoring and managing environmental risks.

9. The application of Lagrangian numerical models and stratified spatial methodologies for quantitative assessment of transboundary transport and mapping of "hotspots", accumulation and divergence zones of marine plastic litter have scientific and applied value for the development of monitoring programs, programs of measures and the formulation of policies for the management and reduction of marine litter pollution.

CONCLUSION: Ivelina Zlateva has a clearly outlined profile of an established scientist-researcher in the scientific field of the announced competition: "Application of data science, machine learning, statistical and numerical methods in marine sciences". The candidate's publication output is significant in volume, with high scientific quality and impact - citation. The project activity convincingly testifies to the high scientific and research workload and ensured scientific commitment of the candidate, determining the objective necessity of occupying the academic position of "Associate Professor" in the scientific field of the competition. In addition, the candidate has experience in carrying out teaching activities in the scientific field of the competition as a part-time teacher of students at TU-Varna and of students on a project basis at the Institute of Oceanology-BAS. The achieved results on the mandatory scientometric indicators fully meet and exceed the requirements under Art. 2b, para. 2 and 3, respectively, the requirements under

Art. 2b, para. 5 of the Law on the Development of the Academic staff in the Republic of Bulgaria, the requirements under Art. 1a, para. 1 and 2 of the Implementing regulation to the Law on the Development of the Academic staff in the Republic of Bulgaria, the requirements under Art. 2, para. 4.3 of the Implementing regulation to the Law at the Bulgarian Academy of Sciences, respectively, the requirements under Art. 1a, para. 1 of the Implementing regulation to the Law at the Institute of Oceanology-BAS.

On these grounds, I express my positive opinion that Ivelina Zlateva should be elected to the position of "Associate Professor" in the "Marine Physics" Dept. at the Institute of Oceanology, Bulgarian Academy of Sciences.

11.11.2025

Prof. Dr.  Todorova

Varna