ABSTRACTS

of the scientific publications submitted by Assist. Prof. Dr.Vasko Galabov, for participation in the competition for the academic position "Associate Professor"in professional area 4.4 Earth Sciences, , announced in State newspaper 64/03.08.2021 .

Group/№	Publication: author, title, publishing information, type, abstract
	Publications in Group C (Bulgarian version – 'B')
1.	Galabov ,V, Kortcheva, A, Marinski, J. SIMULATION OF TANKER ACCIDENTS IN THE BAY OF BURGAS, USING HYDRODYNAMIC MODEL. 12th International Multidisciplinary Scientific GeoConference, www.sgem.org, SGEM2012 Conference Proceedings, 3, 2012, ISSN:1314-2704, DOI:10.5593/SGEM2012/S14.V3009, 993-1000. The accurate prediction of the behavior of oil pollution is crucial for the successful decision making and planning of operations to combat the pollution of the coastal zone and to protect the environment. Potential oil spills in the Burgas Bay of West Black Sea may cause extra contamination of port waters in different terminals of the Burgas port with oil and liquid dangerous products, which is extremely undesirable from an environmental point of view as well as for the forthcoming certification of the Burgas port. The present study aims to assess the impact of the risk of oil spills in the aquatory of Burgas Port and to determine the potentially dangerous areas of contamination in the inner basins of the port and the conditions for their occurrence. The numerical model MOTHY, developed by Météo-France is used to predict the drift of pollutants on the sea surface. The numerical simulations are carried out in the Burgas bay and harbor waters for 20 locations of potential oil spill accidents. The range of hypothetical scenarios includes various wind and currents conditions. Finally, the simulation results indicate the places with a high risk of oil pollution in the Burgas port. The outcomes of the present study are a part of the implementation of a preliminary pilot monitoring plan developed for the Burgas Port in the work program of ECOPORT 8 project(Environmental management of trans-border corridor ports) and they are used indetermining the permanent monitoring stations.
2.	Dimitrova, M, Kortcheva, A, Galabov, V. THE USE OF JASON2 SATELLITE ALTIMETER DATA FOR VERIFICATION OF THE OPикаERATIONAL WAVE FORECASTING SYSTEM OF NIMH-BAS. 13th SGEM GeoConference on Water Resources. Forest, Marine And Ocean Ecosystems, www.sgem.org, SGEM2013 Conference Proceedings, 2013, ISBN:978-619-7105-02-5, ISSN:1314-2704, DOI:10.5593/SGEM2013/BC3/S15.007, 863-870. Satellite Earth Observation (EO) altimetry data plays an important role in storm surge and wave modeling and forecasting. The Operational Wave Prediction System operated by the National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences (NIMH-BAS) consists of a coupled system which includes a third-generation spectral wave models WAVEWATCH III (WW3) and SWAN and the limited area Numerical Weather Prediction (NWP) model ALADIN. The operational numerical models will be used for the hindcast study in the frame of FP7 EU project "Increasing Resilience through Earth

	Observation"(IncREO), in order to identify the hazard zones (strong winds and high waves) along the Bulgarian coastal zone. In these applications accuracy of the numerical models is of major importance. This work has been designed to demonstrate how the Near Real Time (NRT) operational Jason-2 satellite altimeter wave data used to evaluate the quality of the wind and wave model results for the Black Sea. The near real time significant wave height from the Jason-2 satellite are received, processed and used for the wave model validation. Preliminary results for the period October - December 2012 are shown for the wave height from the WW3 wave model, in a comparison with the Ku-band altimeter data from JASON-2 satellite. Scatter plots of observed versus modelled wave height, along-track plots and monthly validation statistics are presented.
3.	Galabov ,V, Kortcheva, A, Kortchev, G, Marinski, J. Contamination of Bourgas port waters with oil. In Proceeding of global congress on ICM, 30 Oct - 03 Nov 2013, Marmaris, Turkey, E. Ozhan (editor), 30, 2013, DOI:10.13140/2.1.2682.8489, 1077-1086 Accurate prediction of the behavior of oil pollution is crucial for successful decision making and planning of operations to combat pollution of the coastal zone to protect the environment. In addition, the oil spills in the Bourgas Bay of West Black Sea may cause extra contamination of port waters in different terminals of Port of Bourgas with oil and liquid dangerous products which is extremely undesirable from the environmental point of view. The present study aims to assess the impact of the risk of oil spills in the auquatory of Bourgas Port and to determine potentially dangerous areas of contamination in the inner basins of the port and the conditions for their occurrence. The numerical model MOTHY, developed by Météo-France, have been used to predict the drift of pollutants on the sea surface. Numerical simulations are carried out in the Bourgas bay and harbor waters for potential and real oil spill accidents. The range of hypothetical scenarios includes various winds and current conditions. The simulation results indicate the places with a high risk of oil pollution in the port of Bourgas. The proposed methodology utilized in this study is applicable to risk assessments for other ports and coastal areas potentially affected by floating pollutants.
4.	Atanas Rusev, Vasko Galabov, Razvan Popescu-Mirceni. GIS Investigation of Mass Dolphin Death. GIM International, 30, 6, 2016, 21-23 The paper describes the investigation of mass dolphin (phocoena phocoena) death in the summer of 2015. The investigation was carried out using numerical modelling and GIS analysis.
5.	Atanas Rusev, Vasko Galabov, Razvan Popescu. INVESTIGATING OF DOLPHIN'S STRANDING USING MOTHY MODEL AND ADVANCED GIS ANALYSIS. Proceedings, 6 th International Conference on Cartography and GIS, 13-17 June 2016, Albena, Bulgaria, Eds: Bandrova T., Konecny M., 1, 2016, ISSN:1314-0604, 85-90

	In August 2015 more than 300 dolphin calves were stranding on the Bulgarian seacoast. Data were collected from witnesses, organized by us in a network, using IT online services and other communications. Further these data were formatted in GIS context. Using the numerical model MOTHY and the estimated exact hour of death of dolphin carcasses, were chosen 28 specific cases were chosen. We simulated 252 possible trajectories for 25 days, with more than 50 000 coordinate points. These raw data from the model were organized in a specific geodatabase. The results point a place in Black sea, 35 km north of Snake Island that was the most probable place where the calves died around 25 July 2015. The applied new advanced methods and workflow can beused to investigate different types of past time accidents in the sea.
6.	Emilie Bresson, Philippe Arbogast, Lotfi Aouf, Denis Paradis, Anna Kortcheva, Andrey Bogatchev, Vasko Galabov, Marieta Dimitrova, Guillaume Morvan, Patrick Ohl, Boryana Tsenova, Florence Rabier. On the improvement of wave and storm surge hindcasts by downscaled atmospheric forcing: application to historical storms. Natural Hazards and Earth System Sciences, 18, Copernicus Publications, 2018, DOI:10.5194/nhess-18-997-2018, 997-1012. Winds, waves and storm surges can inflict severe damage in coastal areas. In order to improve preparedness for such events, a better understanding of storm-induced coastal flooding episodes is necessary. To this end, this paper highlights the use of atmospheric downscaling techniques in order to improve wave and storm surge hindcasts. The downscaling techniques used here are based on existing European Centre for Medium-Range Weather Forecasts reanalyses (ERA-20C, ERA-40 and ERA-Interim). The results show that the 10 km resolution data forcing provided by a downscaled atmospheric model gives a better wave and surge hindcast compared to using data directly from the reanalysis. Furthermore, the analysis of the most extreme mid-latitude cyclones indicates that a four-dimensional blending approach improves the whole process, as it assimilates more smallscale processes in the initial conditions. Our approach has been successfully applied to ERA-20C (the 20th century reanalysis).
7.	Lyubka Pashova, Anna Kortcheva, Vasko Galabov. ON THE NECESSITY OF IMPROVING THE RESEARCH INFRASTRUCTURE IN THE WESTERN BLACK SEA FOR THE PURPOSES OF FLOOD RISK MANAGEMENT. Springer, 2017, 58-78 This paper aims to emphasize the necessity to improve the Bulgarian research infrastructure in the western part of the Black Sea region, which can enhance the capability for more effective flood hazard assessment and risk management in the coastal area. To fulfill the requirements of the Directive 2007/60/EC flood hazard and risk maps of the Areas with Potential Significant Flood Risk (APSFR) for coastal zone have to be prepared. Short overview of the approaches for compiling such maps has been presented as well as all parameters' evaluations needed and their uncertainties based on the available information and models. Still existing obstacles to the provision of timely geospatial information from monitoring stations along the coastal area are discussed, and some suggestions for improving the research infrastructure in the western part of the Bulgarian Black Sea coast are listed.

8.	Vasko Galabov, Hristo Chervenkov. On the Winter Wave Climate of the Western Black Sea: The Changes During the Last 115 Years. Lecture Notes in Computer Science, 10665, 10665, Springer, 2018, ISSN:03029743, DOI:10.1007/978-3-319-73441-5_51, 466-473 We present a study of the Black Sea storms, using a long hindcast of the western Black Sea wind waves. The goal of the work is to study the trends in the storminess indicators. We identify 238 storms with significant wave height above 4 m for the period 1900–2015. We study the cyclogenetic regions of the cyclones causing these storms and focus specifically on the Black Sea storms associated with cyclones originating over the Gulf of Sidra and the adjacent areas. We also identify which of these storms are associated with the so-called explosive cyclogenesis (with deepening rate above 1 Bergeron) and find that 3 out of 5 cases of severe Black Sea storms associated with explosive cyclones are caused by cyclones originating in the Gulf of Sidra. We find no evidence of steady trends in the western Black Sea storminess.
9.	Kortcheva, A, Galabov, V, Marinski, J, Stylios, Christosomos, Andrea, Veronika. New Approaches and Mathematical Models for Environmental Risk Management in Seaports. IFAC- Papers OnLine, 51, 30, Elsevier, 2018, ISSN:2405-8963, DOI:10.1016/j.ifacol.2018.11.333, 366-371 Seaports and surroundings areas environmental conditions are depending on meteorological and oceanographic conditions that affect their infrastructure and also their operations. The increase of marine traffic in the Black Sea Basin has raised issues concerning the environmental quality of coast areas and the sea water. Therefore, accurate and timely predictions of extreme weather and sea state are important for efficient port management in terms of safety, while they are also significant for the sustainable development and environmental quality of seaports and their adjacent coastal areas. The aim of this paper is to present an innovative, fully automated marine monitoring system for the Black Sea Basin, which is able to provide real time monitoring and analysing historical data of wind, wave, storm-surge and oil spill drift. The system is based on advanced numerical models and ICT tools for simulation and visualization of essential information, including early warnings for marine extreme phenomena and hazards. Within ECOPORTIL project new ICT tools will be developed to provide online training and capacity building of stakeholders and decision makers in order to improve their knowledge on legislation issues and adopt good environmental practices.
10.	Dimitrova, M., Galabov, V., Kortcheva, A., Marinski, J., Use of satellite data in marine early warning system (2019), 14th MEDCOAST Congress on Coastal and Marine Sciences, Engineering, Management and Conservation, MEDCOAST 2019 1, pp. 139-150 Accurate and timely prediction of extreme weather events is crucial for sea safety and for successful decision-making and planning of operations to combat potential pollution of coastal areas and to protect the environment. This paper

	shows the results of improving the performance of NIMH early warning marine forecasting system via use of remote sensing technology for verification of numerical wind and wave forecast in the Black Sea. Satellite altimeter wind and wave data from Jason-2, Jason-3, and SARAL AltiKa and scatterometer wind data from MetOP ASCAT-B are used for the statistical evaluation of the marine forecasts and calibration of the operational wave models. This approach minimizes errors in the wave data from deep waters, allowing better boundary wave conditions for high-resolution grids in coastal regions. Analysis of the statistical data shows that the SWAN model provides an effective framework for prediction of the wave conditions in the Black Sea area and the coastal environment. Further the advanced GIS and WEB-based technologies are highly effective in all phases of disaster management cycle. Capabilities of a WEB GIS are demonstrated by the visualization of the sea state forecast provided by the SWAN. The SWAN wave model produces its output (significant wave height) in a NetCDF format that allows import, further processing and dynamical visualization in GIS. The results of numerical simulation technologies used in marine forecasting will be applied during integrated training activities within the ECOPORTIL project.
	Publications in Group D (Bulgarian version – 'Г')
1	Galabov ,V. ON THE WAVE ENERGY POTENTIAL OF THE BULGARIAN BLACK SEA COAST. 13th SGEM GeoConference on Water Resources. Forest, Marine And Ocean Ecosystems, www.sgem.org, SGEM2013 Conference Proceedings, 2013, ISBN:978-619-7105-02-5, ISSN:1314-2704, DOI:10.5593/SGEM2013/BC3/S15.003, 831-838. In the present study we evaluate the approaches to estimate the wave energy potential of the western Black Sea shelf with numerical models. For the purpose of our evaluation and due to the lack of long time series of measurements in the selected area of the Black Sea, we compare the modeled mean wave power flux output from the SWAN wave model with the only available long term measurements from the buoy of Gelendzhik for the period 1997-2003 (with gaps). The forcing meteorological data for the numerical wave models for the selected years is extracted from the ERA Interim reanalysis of ECMWF (European Centre for Medium range Forecasts). For the year 2003 we also compare the estimated wave power with the modeled by SWAN, using ALADIN regional atmospheric model winds. We try to identify the shortcomings and limitations of the numerical modeling approach to the evaluation of the wave energy potential in Black Sea.
2	Vasko Galabov, Hristo Chervenkov. Study of the Western Black Sea Storms with a Focus on the Storms Caused by Cyclones of North African Origin. Pure and Applied Geophysics, 175, 11, Springer International Publishing, 2018, ISSN:0033-4553, DOI:10.1007/s00024-018-1844-7, 3779-3799. We present a study of the winter wave climate of the Western Black Sea with a focus on the annual maximums and the mean seasonal wave heights. We did a numerical simulation of the wave parameters in the Black Sea by the wave model SWAN for a period of 110 years. The input wind fields are from the atmospheric reanalysis ERA-CLIM. We also performed a hindcast for the period 1980–2015

	using winds from the CFSR reanalysis. Extended winter (December–March) was studied. We also studied the characteristics of the pressure gradients in a larger region attempting to quantify this way the interaction of Mediterranean lows with blocking highs. No significant long term changes were found for any of the characteristics of the mean and extreme wave climate.
3	Anna Kortcheva, Marieta Dimitrova, Vasko Galabov. Implementation and development of numerical models for marine meteorological forecasts in the Black Sea basin. Bulgarian Journal of Meteorology and Hydrology. 5, 15, 2010, ISSN:0861-0762, 36-40 (In Bulgarian) The paper describes in the form of a short review the development of the components of the Bulgarian operational marine meteorological system, functioning at NIMH.
4	Kortcheva, A, Dimitrova, M, Galabov ,V. A wave prediction system for real time sea state forecasting in Black Sea. Bulgarian Journal of Meteorology and Hydrology, 15, 2, 2010, 66-80 This paper briefly describes the existing operational system for wind waves forecasting in the Black Sea. It is a system of coupled atmospheric and wave numerical models aiming at a detailed and accurate sea state forecast on an operational level. The system was created at the National Institute of Meteorology and Hydrology Bulgarian Academy of Sciences (NIMH-BAS) in collaboration with the Meteorological Office of France - Meteo-France. The present work introduces the use of wave models at NIMH-BAS and shows the model results, as well as an intercomparison. The numerical wave models VAG, WAVEWATCH III and WAM, developed by the research groups of Meteo-France, NCEP and WAMDI, have been adopted for the Black Sea area and implemented at the NIMH-BAS to allow real-time forecasts and hindcasts of the waves in the Black Sea. The coupling of two atmospherics models ARPEGE and ALADIN has been used to force the wave models. The operational use has indicated that the system is suitable for general purposes and the results are generally satisfactory. The wave models are evaluated through a comparison with the altimeter satellite measurements. A comparison between the model results and the altimeter data from the satellites ERS1/2 and ENVISAT demonstrates that the models call fairly reproduces the observed characteristics of waves.
5	Vasko Galabov, Georgi Kortchev, Anna Kortcheva. Implementation in NIMH of a system for prediction of oil pollutant drifts Bulgarian Journal of Meteorology and Hydrology, 15, 5, 2010, ISSN:0861-0762, 41-48 (in Bulgarian) The paper describes the adaptation to the Black Sea and implementation of the MOTHY model with example scenarios for the Burgas Bay.

6	Dimitrova, M, Kortcheva, A, Galabov ,V. Validation of the operational wave model WAVEWATCH III against altimetry data from JASON-2 satellite. Bulgarian Journal of Meteorology and Hydrology, 18, 1-2, 2013, 4-17 The coastal zones are areas of high vulnerability to natural hazards. The combination of extreme waves and storm surges is normally associated with extreme events in the coast, severe coastal erosion or overtopping/flooding. Satellite Earth Observation (EO) altimetry data plays an important role in storm surge and wave modeling and forecasting. The Marine Wave Prediction System operated by the National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences is aimed at operational forecasting of the wind waves in the Black Sea. The operational wave models will be used for the hindcast study in the frame of FP7 EU project "Increasing Resilience through Earth Observation"(IncREO), in order to identify the hazard zones (strong winds and high waves) along the Bulgarian coastal zone. In these applications accuracy of the numerical models is of major importance. Results from the verification of the WW3 wave model against remote sensing observations are presented. The near real time satellite significant wave height from Radar Altimeter instruments on the Jason-2 satellite are received, processed and used for the wave model validation. Preliminary results for December 2012 are shown for the wave height from the WW3 wave model, in a comparison with the Ku-band altimeter data from JASON-2 satellite. Scatter plots of observed versus modelled wave height, alongtrack plots and monthly validation statistics are presented
7	Marieta Dimitrova, Anna Kortcheva, Vasko Galabov. VALIDATION OF THE MARINE MULTI-HAZARD SYSTEM OF NIMH-BAS THROUGH THE SATELLITE EARTH OBSERVATION DATA. SES 2013 Ninth Scientific Conference with International Participation SPACE, ECOLOGY, SAFETY 20 – 22 November 2013, Sofia, Bulgaria, SES 2013,2014, Bulgarian Academy of Sciences, 2014, 416-423 *Strong winds, high waves and storm surges are the greatest environmental danger for the coastal areas. Therefore accurate prediction of the sea-state is absolutely necessary to minimize the risk at the sea and along the coastal zones. Wind waves and storm surge forecasting is the main part of the marine multi-hazard warning system for the western part of the Black sea. The National Institute of Meteorology and Hydrology, Bulgarian Academy of Sciences (NIMH-BAS) is responsible for this forecast services in Bulgaria and has combined its wave prediction system with a verification system in order to issue more accurate operational forecast products. The wind and wave model evaluation for the Black Sea is a difficult task because of the lack of conventional (in situ) wave data from buoys and weather ships. The advancement in satellite technology has created a possibility to use remotely sensed wave data for the validation of the atmospheric and wave models. Altimeter and scatterometer data from the satellite missions ERS-1/2, TOPEX-POSEIDON, ENVISAT,*

	JASON1/2 and Metop-A has played a key role in the development of the operational numerical wind and wave forecast at NIMH-BAS during the last two decades. Wind speed and wave height measured by satellite scatterometer and altimeter over the Black Sea area represent a reliable data source to the study of regional wind and wave conditions. Simulation of historical storm situations is a key tool in examining potential natural hazards along the Bulgarian coast of the Black Sea. The wind and wave model data from the simulation of historical storm situations in the Black sea are compared with altimeter wind and wave data from ENVISAT, JASON1/2 satellites and the scaterometer wind data from the Advanced Scatterometer (ASCAT) on board the Metop-A satellite. This study has been done in the frame of FP7 EU Project "Increasing Resilience through Earth Observation" (IncREO). The results from the statistical model validation show that the model simulations are in good agreement with altimeter measurements in terms of the mean and standard deviation of the variables (significant wave height and wind speed).
8	Galabov ,V, Kortcheva, A, Kortchev, G. Modelling of Floating Pollutants along the Bulgarian Black Sea coast. Science and Technologies, 5, 2, Union of Scientists- Stara Zagora, 2015, ISSN:1314-4111, 80-85 (in Bulgarian) Accidental leaks of floating pollutants on the sea surface (mainly oil products) are a major environmental threat for the coastal zones. Of key importance for the minimization of the consequences of such accidents is the reliable prediction of the spill behaviour during the days after the initial leak. When the leakage of the pollutant is nearby the coast, the requirements are higher- the forecast of the spill behaviour must be accurate not with daily, but with hourly temporal resolution and with higher spatial resolution. The article presents the state of the operational system for floating pollutants drift forecast of NIMH-BAS. The system is based on a modified version of the French numerical oil spill model MOTHY. The model is based on two components- two dimensional depth integrated hydrodynamic component that simulates the surface currents and a second component that simulates the spill drift based on Lagrangian approach. In this work after a short summary of the use of the system in the past, we present the modifications that we implemented in the system during the last 3 years in the frame of a few scientific projects. The implemented changes include one way coupling with an operational wave model, taking into account the influence of the waves on wind driven currents, which may potentially influence the results especially in bays like the Varna Bay and Bourgas Bay. These two bays are the most important maritime ports of Bulgaria and therefore the accuracy of the forecast for these locations in case of accident is particularly important. The simulations show that taking into account of the wave influence on currents leads to conclusions about a higher risk during stormy conditions of pollution of the port of Varna and southern part of the Varna Bay, which is not properly simulated otherwise.
9	Galabov ,V, Kortcheva, A, Peneva, E, Kortchev, G, Dimitrova, M, Marinski, J. Application of Hydrodynamic, Pollution Drift and Wave Models as Tools for

	Better Environmental Management of Ports. In : Sustainable Development of Sea-Corridors and Coastal Waters,. Sustainable Development of Sea-Corridors and Coastal Waters, Book chapter: 8, Springer International Publishing, 2015, ISBN:978331913845, DOI:10.1007/978-3-319-11385-2_8, 69-76 Numerical modelling provides additional information useful for implementation of the sustainable model for environmental-friendly development of the port networks. This chapter presents an improved modelling approach using better interconnections between the components of the system. The input data has been produced by the usage of an operational hydrodynamic model for the areas in the vicinity of ports, which makes the system applicable in case of extreme situations. This provides the decision makers with examples of worst-case scenarios of pollution drifts during extreme cases like combinations of strong winds, high waves and storm surges.
10	Kortcheva A., V. Galabov, A. Chotrova, P. Christov. GIS-based visualization of numerical wave forecast for the Black Sea. Bulgarian Journal of Meteorology and Hydrology, 22, 1-2, 2017, ISSN:0861-0762, 18-26 This paper presents an example of an integration of sea state parameters (significant wave height and direction of wave propagation) into the Geographic Information System and a dynamic visualization of the SWAN wave model results in the GIS environment using ArcGIS tools. We discuss the advantages of the ArcGIS technology to present, visualize, animate, analyze and distribute the results of numerical wave forecasts in comparison with the standard Generic Mapping tools. We show how marine geospatial data can contribute to the implementation of the EU Floods Directive and INSPIRE in Bulgaria. We present the examples of a potential application of geospatial wave data.
11	Neykov, N.M., Galabov, V. N., Korcheva, A., Neytchev, P.N.. Return value estimates of significant wave height along Bulgarian Black Sea coast. Bulgarian Journal of Meteorology and Hydrology (BJMH), 22, 1-2, National institute of meteorology and hydrology, Bulgarian Academy of Sciences, 2017, ISSN:0861-0762; 2535-0595, 2-17 The classical monthly block maxima approach in extreme value analysis is adapted for the estimation of the return values of significant wave (Hs) heights hindcast data at the open-sea locations near Shabla, Emine and Ahtopol stations in the western Black Sea. The hindcast data consists of 3 hourly generated data by the Simulating Waves Nearshore (SWAN) model covering the period of 111 years (1901–2010). The ERA-CLIM wind fields produced by the European Center for Medium-Range Weather Forecasts (ECMWF) are used to force the SWAN model. The standard and profile likelihood return values are computed for several return periods and compared with previously estimated return values based on visual observations.
12	Lyubka Pashova, Anna Kortcheva, Vasko Galabov, Marieta Dimitrova. Advantages of GIS-Integrated maritime data in the Black Sea region for

	multipurpose use. CMDRCOE proceeding, 2017, 2017, ISSN:2367-766X, 218-233 The paper describes the role of geospatial data for the marine/ maritime environmental management of the Black Sea region. The paper addresses some issues related to the international standarts and recommended practices and procedures. Capability of a web based GIS system is presented (developed in the frame of MISBS project).
13	Ognyan Kounchev, Lyubka Pashoba, Lachezar Filchev, Damyan Kalaglarski, Vasile Kraciunescu, Vasko Galabov, Elisaveta Peneva, Maya Ilieva, Bozhidar Srebrov, Zahari Bibov. SATWEBMARE PRODUCTS AND SERVICES IN SUPPORT OF THE SUSTAINABLE MANAGEMENT OF THE BULGARIAN COASTAL ZONE. proceedings of FOURTEENTH INTERNATIONAL CONFERENCE ON MARINE SCIENCES AND TECHNOLOGIES, Varna Scientific and Technical Unions, 2018, ISSN:1314-0957, DOI:10.7546/IO.BAS.2018.3, 251-255 The coastal zones have important ecological, social, and economic impact on the human life and are undergoing the severe anthropogenic degradation that is happening against the backdrop of environmental alterations due to climate change. To address the challenges of present and future environmental changes in coastal areas, this article aims to represent a prototype of Web-based integrated system SatWebMare designed to provide through geo-portal innovative products and services for integrated coastal zone management of the Bulgarian coastal zone, inline with the nowadays concepts of Big Data. The SatWebMare prototype system will combine geo-database sets from different sources, which will be used for improving a spatial and temporal accuracy of modeling the air-land-sea interaction processes and their forecast. An overview of the system architecture consisting of three main modules will be presented. The SatWebMare geo-portal aims to provide an access to products and services with added-value information for ministries, agencies, local authorities, and other stakeholders in support of the integrated coastal zone management.
14	Anna Kortcheva, Vasko Galabov (2020) Systems for early warning in the aquatories of the sea ports and surrounding waters. In Book: “Protection of the environment in the Bulgarian ports and the surrounding areas. Editors: Jordan Marinski, Irina Faytondgieva-Radevska 2020 “ www.unipress.bg ISBN 978-954-07-4928-0239-252 (In Bulgarian) In the National Institute of Meteorology and Hydrology an automatic system for early warnings for dangerous hydrometeorologycal events has been developed. Here we give a brief description of the system based on numerical models and communication technologies, as well as GIS tecgnologies.
15	Vasile Craciunescu , Ognyan Kounchev , Damyan Kalaglarski , Lyubka Pashova , Lachezar Filchev , Vasko Galabov , Maya Ilieva , Bozhidar Srebrov (2020) SATWEBMARE INTERACTIVE WEB-MAPPING SYSTEM IN SUPPORT OF THE SUSTAINABLE MANAGEMENT OF THE BULGARIAN COASTAL ZONE. Варненски медицински форум, т. 9, 2020, 78-83

	The article aims to represent a general overview of the prototype web-mapping interactive system SatWebMare for the Bulgarian coastal zone. The interactive system is designed to provide through geo-portal innovative products and services for integrated coastal zone management. The web-mapping system combines geo-databases from different sources such as satellite imagery, maps, vector layers and other datasets. The content of the SatWebMare Geo-Portal is briefly outlined. The web-interface system will provide access to applications and products with an improved spatial and temporal resolution for three areas of interest-sea waves, natural hazards and geomagnetism in the Area of Interest (AOI). The web-mapping system is developing based on the free and open-source software, OGS standards and following the EU INSPIRE Directive recommendations.
16	Galabov, V (2020) The western Black Sea waves 1980-2020- study based on ERA5. Proceedings of 1st International conference on Environmental protection and disaster RISKs, edited by: Gadzhev, G and Dobrinkova, N., Vol 2, 302-310, DOI: 10.48365/ENVR-2020.1.27 The study presents a reconstruction of the Western Black Sea wave climate based on a numerical hindcast using the SWAN wave model and ERA5 input data. While there are many wave hindcasts reconstructing the Black Sea wave climate, based on various atmospheric reanalysis projects, the present work is the first based on the state of art ERA5 reanalysis. We focus on the storminess affecting the Bulgarian coast. The storminess in the recent decade (2010-2019) was found to be the highest compared to the previous 3 decades covered by the reanalysis (while the previous 2000-2009 is with the lowest), but the trends in the storm proxies used in the study are not statistically significant. This confirms the conclusions of other studies that the wave climate of the Western Black Sea is steady.
17	Galabov, V (2020) Storm surges affecting the Bulgarian coast- study based on 41 years numerical hindcast. International conference on Environmental protection and disaster RISKs, edited by: Gadzhev, G and Dobrinkova, N., Vol 2, 302-310, 311-318, DOI: 10.48365/ENVR-2020.1.28 We present the results of the numerical hindcast of the storm surges affecting the Bulgarian Black Sea coast during the period 1979-2020, using atmospheric data from the ERA5 reanalysis. The aim of the study is to evaluate the changes in the surge intensity and frequency during the period. The highest identified surges in the hindcast output are the surges of February 1979, January 1981 and February 2012-the surge of 2012 is the highest, while the surge of 1979 was found to be the longest and the most energetic event. We found no statistically significant inter annual change in the number, total duration and the introduced index characterizing the total energy of the surges above 60cm or 80cm was found. The total annual number of events above 40cm is with increasing trend

	which is statistically significant, but the total duration of events above 40cm does not show statistically significant trend-we observe more …
18	Galabov, V (2020) The Black Sea waves 2011-2020- hindcast based on ALADIN wind data. Bulgarian Journal of Meteorology and Hydrology The Black Sea wave climate studies are a hot topic of a scientific research during the last decade. Due to the lack of long enough measurements these studies are based on numerical hindcasts using input wind data from atmospheric reanalysis. The present study follows slightly different approach using input data from an operational regional atmospheric model. We study the wave climate of the Bulgarian coast during the last decade based on numerical hindcast using the SWAN wave model and ALADIN model input wind data. The overall conclusions are that during the period there are no significant changes. The years 2012 and 2015 are notable with higher storminess and 2015 is with the highest wave energy. While in the studies based on reanalysis data the southern Bulgarian coast (represented by Ahtopol) is with a higher values of the storminess indicators, the use of operational model wind data suggests that the northernmost Bulgarian coast (represented by Shabla) is with higher storminess and wave energy than the southern coast.
19	Galabov, V (2021) The Black Sea wave energy: The present state and the Twentieth century changes. Bulgarian Journal of Meteorology and Hydrology (in print) The article presents a study of the present state of the Black Sea wave energy. The studies of other authors are based on the use of input data from atmospheric reanalysis or a downscaling of such reanalysis. Instead of reanalysis data, we use input data from the operational limited area numerical weather prediction model ALADIN. We show that the highest values of the mean annual wave power flux is between 4.5 and 5.0 kW/m and the near shore areas with the highest wave energy potential are the southernmost Bulgarian coast and the coast of Turkey north of Bosporus. While the reanalysis data underestimates the wave power, it is useful to study the long term changes of the wave power of the Black Sea. We use the 10m winds from the ERA-20C reanalysis, which covers the period 1901-2010 and is an outcome of the ERA-CLIM project. We performed a 110 years hindcast with ERA-20C winds using the SWAN wave model. The results for the area with the highest mean annual wave power shows that there was an increase during the first half of the XX century followed by a small decrease and again a period with elevated wave energy during the seventies. After 1980 there is a decrease of the Western Black Sea wave energy.