

SHELL MORPHOLOGY OF RAPANA THOMASIANA SAMPLED FROM THE ROMANIAN BLACK SEA COAST

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ABSTRACT

Rapana thomasiana is a predatory gastropod which is considered an environmental threat for many bivalves of economic interest. While managing rapanas' spread is difficult, large amounts of gastropods are available. This paper is part of an extensive study of marine organisms' capitalization, in particular *Rapana thomasiana*, marine bio-waste from the Romanian coast of the Black Sea as raw material for production of biocompatible materials with medical application. The paper presents the collection phase with focus on the morphological analysis of shells. For this purpose, representative integer samples were sampled from several sites of the Romanian seaside. Each individual was morphologically analyzed. The measurement results were processed with statistical methods in order to highlight useful information of rapana populations from the Romanian coast. For each group the mean shell weight, length, width and thickness distribution curves were plotted and the group statistics were calculated. Further, distribution normality tests (Kolmogorov-Smirnov test) were conducted and the gastropods weight was correlated according to the geometrical characteristics of the shells. Statistical analysis of rapana collected from the Romanian coast of the Black Sea, reveals that the nature of seaside substrate determinate the mass and geometric characteristics of the shells. Length and thickness of the shells have the greatest variability.

Keywords: *Rapana thomasiana*, shell morphology, marine waste, statistical evaluation

A DATA ASSIMILATION SCHEME TO IMPROVE THE WAVE PREDICTIONS IN THE WESTERN SIDE OF THE BLACK SEA

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ABSTRACT

Numerical wave models are widely used in various studies related to the wave climate in order to produce continuous wave data, in both space and time. The performances of the wave models strongly depend on the quality of the driving wind fields, which are usually less accurate in enclosed seas. For this reason, methods to increase the quality of the wave predictions are necessary to be applied. Model errors can be reduced by applying data assimilation techniques that combine the measured wave parameters with those predicted by numerical models in order to derive better estimations of the sea states. In this context, the aim of the present study is to improve the wave predictions in the western side of the Black Sea, and especially in the Romanian nearshore, by assimilating local wave measurements. Numerical simulations have been performed with the SWAN model for a ten-year period (1999-2008). The wave measurements from that Gloria drilling unit have been considered in the present work for the assimilation procedure. A data assimilation scheme based on the successive correction method has been implemented. This assumes linear regressions to perform corrections to the model predictions in order to fit better the observations. As a result, a visible improvement in the model prediction is obtained.

Keywords: data assimilation, Black Sea, hindcast, storm conditions, SWAN

BIOACCUMULATION OF HEAVY METALS IN SEAHORSE TISSUE AT THE ROMANIAN BLACK SEA COAST

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ABSTRACT

This paper analyzes the concentrations of five heavy metals (Cu, Cd, Pb, Ni, Cr) in the whole tissue of the long-snouted seahorse (*Hippocampus guttulatus*), as compared to heavy metal concentrations recorded in the surrounding water and sediments, expressed by the Bioconcentration Factor (BCF) and the Biota-Sediment Bioaccumulation Factor (BSAF). These two factors are a measure of the extent of chemical sharing between the organism and the surrounding environment. The seahorse (*Hippocampus guttulatus*) samples were collected from three sampling locations along the southern Romanian coast. Water and sediment samples were also collected from the same sampling locations, and subsequently all samples were analyzed using standard methods. The analyses showed that seahorses do bioaccumulate elements such as Cu, Cd, Pb, Ni, Cr, certain differences being reported between stations and chemical element. The conclusion of this research on the heavy metal bioaccumulation in the Black Sea *Hippocampus guttulatus* whole tissue confirms the hypothesis that seahorses, like most of marine species, bioaccumulate the heavy metals reaching the aquatic environment, which could pose a threat to the species if concentrations significantly overtake normal background levels.

Keywords: *Hippocampus guttulatus*, Black Sea, Bioconcentration Factor (BCF), Biota-Sediment Bioaccumulation Factor (BSAF), heavy metals

CONSIDERATIONS ON NUMERICAL WAVE TANK MODELLING

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ABSTRACT

The naval structures are permanently the subject of the environment induced loads, such as currents, waves and wind. This is the reason for, in the design stage, the assessment of these loads proves to be crucial. The numerical simulations can represent a useful instrument in order to provide the necessary data for a correct assessment and further on, for an appropriate design of the naval structures, such as ships or offshore structures. For a proper development of a numerical simulation that aims the structure behavior in waves it is very important to have a correct numerical model for wave generators and fluid domain.

This work provides a comparative analysis of the results of a numerical wave tank simulation, carried with two different commercial CFD codes.

The numerical model was developed by considering the Reynolds Averaged Navier – Stokes equations, solved through the Finite Volumes Method (FVM) and Volume of Fluid method (VOF). The flow domain was discretized by using a structured mesh.

There were carried studies on the numerical parameters influence (such as: time and space discretization scheme, the timestep and mesh refinement) in order to identify the optimal solution for solving the wave generation and propagation problem.

Keywords: FVM, VOF, numerical, wave, tank

DYNAMICS OF SPILLED OIL NATURAL TRANSFORMATION ON THE SEA COASTS IN DIFFERENT GEOGRAPHICAL CONDITIONS

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ABSTRACT

The paper is devoted to the comparative analysis of results of long-term field observations carried out on geographically different sea coasts contaminated by spilled fuel oil. Such investigations are of particular interest as they make it possible to assess the rates of oil pollution natural transformation as well as their correlation with principal geographical factors such as climatic and hydrological conditions, coast exposure and geomorphology, sediment types, intensity of biogeochemical cycles.

For these purposes, the authors have chosen three zones where the accidental oil spills occurred in the last years: on the north-western coast of France (tanker “Erika” accident in December 1999; accident at an oil refinery in the Loire River Estuary in March 2008), on the north-western coast of Spain (tanker “Prestige” accident in November 2002) and in the Strait of Kerch (tanker “Volgoneft-139” accident in November 2007). The duration of long-term observations ranged from 5 to 13 years.

The present investigation included visual assessment and sampling of oil slicks and sediment cores. The analysis of samples were carried out with the use of thin layer and column chromatography, optical and gravimetric methods making possible to determine separately the sum of saturated, mono- and di-aromatic hydrocarbons (HC), the sum of polycyclic aromatic hydrocarbons (PAH) and the sum of asphaltic components (AC) as well as the presence of hydrocarbons of contemporary biological origin.

The obtained results show that even 10 to 13 years after the oil spills their weathered traces are still present in the coastal zone, especially in its upper part. In the course of time an exponential diminution in the oil pollution level and the ratio between hydrocarbons and asphaltic components (HC/AC) was revealed. In the studied cases, the half-periods of fuel oil natural transformation varied from 1 to 5 years. The highest activity of the self-cleaning process was observed for small fuel oil traces on the rocky substrate exposed to the influence of fresh air, solar radiation, storm waves and surf action. On the Strait of Kerch coasts influenced by shallow, slightly salted and highly bio-productive waters of the Sea of Azov the spilled fuel oil tends to disappear more rapidly than on French and Spanish coasts washed by the Atlantic Ocean.

Keywords: oil pollution, natural transformation, sea coasts, the Bay of Biscay, the Strait of Kerch, self-cleaning, geographical conditions.

**ECOLOGICAL AND BIOCHEMICAL ASPECTS OF *Mytilus galloprovincialis*
FROM THE ROMANIAN BLACK SEA COAST**

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ABSTRACT

The aim of the paper is to emphasize the role of *Mytilus galloprovincialis* (mussel) in the marine ecosystem and economy in the way of sustainable development and exploitation.

The paper presents the general biochemical (moisture, mineral and organic substance, protein, lipid and carbohydrate contents) and ecological aspects of mussels from the four areas for the development and exploitation of mollusks in the Romanian coastal area which are designated according to the requirements of implementing the EU legislation in Romania, the EU “Shellfish Waters” Directive No. 2006/113/EC.

The biochemical analysis of the soft tissue indicated high organic substance and protein contents, which represent very important elements with economic significance.

In 2006, *M. galloprovincialis* was the dominant species in all areas analyzed, being relatively evenly distributed and represented by young individuals in three of the four areas of shellfish growth, over 60% of individuals having the length below 25 mm.

In 2009, in mussels from the sedimentary substrate very young individuals predominated only in area 2 (30%), in areas 3 and 4 their share in the population being very low (5% in area 3 and 2% in area 4).

In 2012, the mussels had a uniform distribution along the Romanian coast, so the species recorded the highest abundances and biomasses in the north, an area which in the past used to record the lowest values

The population structure showed the predominance of the young individuals. The biomass and abundance are influenced by the low salinity in the northern part of the Romanian Black Sea coast due to the Danube river influence.

Keywords: *Mytilus galloprovincialis*, Black Sea, ecology, biochemistry, EU legislation

ENGINEERING SOLUTIONS FOR THE MANAGEMENT OF THE BLACK SEA COASTAL ZONE

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ABSTRACT

The coastal erosion is a continuous phenomenon on the Black Sea littoral zone of the Romanian territory, which is difficult to stop, and it constitutes one of the main threats to the coastline, therefore it requires efficient and sustainable management.

Human activities in the coastal zone of the Black Sea are closely linked to the development of the coastal protection and the construction of protective structures. One approach for the development of coastal protection involves measures that result from a series of "hard" and "soft" structural solutions, methods introduced by coastal engineering and which provide solutions for the Integrated Coastal Zone Management.

This paper presents the strategic options for the management of the coastal erosion proposed to be used along the Romanian shoreline and a case study of the coastal protection solutions proposed to be adopted for the southern coast, an analysis of their advantages and disadvantages, the elements of impact on the environment and the expected results following the adoption of the analysed solutions.

Keywords: erosion, coastal zone, management, engineering solutions, Black Sea

ESTIMATING THE RELIABILITY OF CONTAMINATED LIQUID PURIFICATION SYSTEMS ON VESSELS

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ABSTRACT

In article have been characterized types of liquid pollution on marine transport vessels are characterized. The examples of systems in Ship machinery responsible for cleaning polluted water. On the basis of data obtained from literature and the author's research components of systems of liquid (water) purification on vessels have been assigned damage distributions characteristic of them. Complex devices and technical systems are characterized by damage of mechanical, electrical, electronic element. These components have different up time distributions, such as exponential, Weibull, normal, log-normal, power law and gamma . In case of the summation of many different streams of damages one can use the mixtures (compositions) of up time and fault time distributions of devices and technical systems by combining the selected distributions.

Keywords: marine power plant systems of contaminated liquid purification, distribution compositions

**ESTUARINE AND SHALLOW SHELF ENVIRONMENTAL CHANGES
RECONSTRUCTED BY GEOCHEMISTRY OF BOTTOM SEDIMENTS IN
AMUR BAY (JAPAN SEA) OVER THE LAST 200 YEARS**

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ABSTRACT

Amur Bay, Sea of Japan is one of the most studied areas in relation to seasonal anoxia in the estuarine-shelf basins, induced by the water inflow increase (Razdolnaya-Suifun River) during the summer monsoon. Eutrophication is associated with stratification of the water column due to warm fresh water entry, and also to synchronous increase of the phytoplankton productivity in July and August. To identify the causes of anoxia, sediment layers accumulated over the past 200 years near the mouth of the Razdolnaya River in the Amur Bay were tested. A new approach to the study of sediment records has appeared due to an automatic technique for scanning microanalysis along cores *in situ*. X-ray fluorescence analysis on synchrotron radiation (XRF SR) in the Institute of Nuclear Physics (Novosibirsk, Russia) was used to determine more than 35 elements in freshly opened cores and in solid preparates with steps of 0.1-1 mm.

Tracing of sediment composition along the river-sea profile showed a reduction of carbonate-organophilic elements (Ca, Br, and Sr) closer to the river mouth. Respectively, high values of Fe, Rb, Y, Th and Rb/Sr ratio represent the flooding accumulation of clay material and hydroxides in that shallow freshened zone. High Br content, Mo/Mn and Rb/Sr and low Mn and Ca are observed within the axial part of the bay with seasonally anoxic bottom waters. The results suggest the increase of seasonal anoxia in bottom waters north of the Amur Bay and the Razdolnaya estuary in dry summer periods. Yearly drops of Br content mark extremal floods during typhoon events 1-3 times per decade. Zn, Ni, Cu, as well as Hg, most probably indicate the degree of technogenic contamination in sediments, together with an increase in eutrophication and organic matter content for the last 50 years.

High-resolution studies of the element composition show alternating periods of marine or more dilute waters. The subdivision into layers was based on statistical models (cluster analysis, discriminant analysis), whilst the chronological framework was established using the ²¹⁰Pb and ¹³⁷Cs technique.

Keywords: Estuary, micro XRF, geochemical records, seasonal anoxia, time series

**EVALUATION OF PHYSIC-CHEMICAL AND BIOLOGICAL CONDITIONS
FROM THE PSAMMIC HABITATS THAT ARE POPULATED BY
INTERSTITIAL CNIDARIAN SPECIES (CNIDARIA-HYDROZOA) FROM
VAMA VECHE, ROMANIAN BLACK SEA COAST**

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ABSTRACT

Nearly 15 years ago, we signaled for the first time the presence of a representative of the interstitial meiofauna, a Cnidaria of the genus *Halammohydra* (**Hydrozoa-Coelenterata**) in the Black Sea, in the Vama Veche mediolittoral sedimentary habitats. We specify that our subsequent studies realized over the entire Romanian littoral (in the shallow waters and deep zones) allowed us to signal these Cnidaria only in these habitats with coarse sediments located in the shore line in the southern extremity of the Romanian littoral.

The purpose of our study was to evaluate the way in which the population of the cnidarian develops within the interstitial invertebrate community of the mediolittoral level at Vama Veche and evaluation of physic-chemical and biological conditions from sedimentary habitats.

The mediolittoral meiofauna community in the interstitial space of the sediments includes, apart from typical representatives of this category (Cnidaria-**Hydrozoa**, **Turbellaria**, **Nematoda**, **Polychaeta**, **Oligochaeta**, **Acarina**, **Ostracoda**, **Harpacticoida**), also juvenile representatives of the macrofauna in the neighboring habitats (whose size is under 1 mm: **Polychaeta**, **Oligochaeta**, **Amphipoda**, **Tanaidacea**, **Cumacea**, **Isopoda**, **Insecta**). Even though the Cnidaria population does not have high values of the average density (according to abundance: 49 indiv.m⁻²), by its position from the trophic point of view (exclusively predatory regime), it has however an important role in the fauna community of the psamic habitats.

Keywords: mediolittoral, meiofauna, psammon, interstitial invertebrates, cnidaria

GEOSYNTHETIC BASED SCOUR PROTECTION AROUND THE SLENDER PILE UNDER WAVES

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ABSTRACT

Conventional and geosynthetic scour protections around the slender pile under the waves were experimentally studied in the laboratory flume. One layer dumped stones was used for conventional protection. As a geosynthetic supported protection, geogrid wrapped one layer stones and geomembrane applications under the stone layer were used for protection around the pile. Experiments show that stones behave individual and turn, slide and roll through scour at the edge of protection at conventional random stone dump. Geogrid wrapped stone layer shows elastic behavior against edge scour and supplies better protection than classical way and geomembrane solution. Geomembrane which spreads under the stone layer also give better protection regarding classical way against edge scour although stones move over geomembrane and edges of membrane moves with waves.

Keywords: slender pile, waves, scour, scour protection, geogrid, geomembrane

IDENTIFICATION AND ANALYSIS OF BIOPOLYMERS FROM CRUSTACEANS DECAPOD OF THE ROMANIAN BLACK SEA WATERS

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ABSTRACT

The using of marine resources for the industrial, biomedical applications and human consumption has got a quickly growth in previous decade in the world. The Romanian Black Sea environment, containing lots of organisms, which have considerable ecological and biological properties, is one of the most unstudied biological resources.

In this paper, we have identified three species of crustaceans on Romanian sea waters of the Black Sea, as possible sources of chitin and chitosan.

Because these species constitute a rich source of value-added products, as chitin, protein pigments and flavour compounds, the full exploitation of this easily accesible resource has attracted much interest. Chitin and chitosan, the naturally renewable polymers have excellent properties such as biodegradability, biocompatibility, non-toxicity and adsorption.

The extraction and characterization of these biopolymers have been studied by optical microscopy and FTIR/ATR spectroscopy. Results of the preliminary studies revealed from: FTIR/ATR „fingerprint spectra”, intensities and stretching, characteristic functional groups of bands, the presence of chitin and chitosan in the samples. Spectra samples were compared with those of chitin and chitosan standards. By optical microscopy and FTIR/ATR coupled analytical methods the results have been checked and also, indicated morphological differences between the chitin and chitosan standards.

The material (crustacean shell) was dried, milled and sieved (dimensions of the particles less than 150 µm) and than digested in a mixture of peroxide, nitric acid and hydrochloric acid. Metallic elements, such as As, Cd, Cr, Cu, Fe, Mo, Ni, Pb, Se, Zn, V, Al, Ca, Mg, Na, K, were analyzed using inductively coupled plama optical emission spectrometry. High contents of Ca, Mg, Na and K were recorded.

Keywords: Chitin, chitosan, crustaceans decapod, biopolymer, metallic elements

**IDENTIFICATION OF THE ROMANIAN BLACK SEA WATER TYPES -
ASSESSMENT RELATED TO THE MARINE STRATEGY FRAMEWORK
DIRECTIVE IMPLEMENTATION**

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ABSTRACT

The main objective of the Marine Strategy Framework Directive (MSFD, 2008/56/EC) is to achieve or to establish and maintain the "good environmental status" (GES) until 2020. The Black Sea is one of the fourth marine regions assigned for implementing the MSFD through two countries and EU Member States: Romania and Bulgaria. Through the MSFD Guiding Improvements in the Black Sea Integrated Monitoring System (MISIS Project), for the Romanian waters were defined and delimited the types of the seawater. Using the short and long-term data analysis of the physical parameters (temperature and salinity from available data since 1955 – 2012), the main features of the western Black Sea water bodies was characterized. In addition, the corresponding salinity of water bodies in the western Black Sea were evaluated, using the grid points $0.5^\circ \times 0.5^\circ$, calculating for each quarter from the corresponding number of measured data: the mean, standard deviation and the coefficient of variation. Based on the physical parameters, the degree of anthropogenic impact, chlorophyll-a concentration, bathymetry etc., four categories of the Romanian Black Sea waters types were identified: RO-TT03 – the northern part, marine waters under the direct influence of the Danube, at depths of at least 30 m; RO-CT01 – the marine waters from the central to the southern area (Portita down to Vama Veche), from the baseline to 30 m isobath; RO-MT01 – that corresponds to the inner and the outer shelf marine area from the 30 m to the 100 m isobaths and RO-MT02 – the perimeter for the type of offshore seawater located at depths of at least 100 m.

Keywords: Black Sea, MSFD, temperature, salinity, chlorophyll-a

**LONG-TERM MONITORING OF THE ARAL SEA BY REMOTE SENSING
DATA**

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ABSTRACT

This paper presents research results of space monitoring water surface of the Aral Sea area for the 1975-2013 period based on LANDSAT imagery and for the 2000-2013 period based on Terra/MODIS data

Keywords: Aral Sea, Remote sensing, Space monitoring, Landsat, MODIS

**LONGSHORE CURRENTS EVALUATION
ALONG THE ROMANIAN BLACK SEA COAST**

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ABSTRACT

The objective of the present work is to evaluate the nearshore current patterns along the Romanian Black Sea coast. In order to give a full perspective of the nearshore circulation, three target areas (Saint George, Mamaia and Mangalia) were considered for analysis. The above selection is based on the fact that each of these coastal areas presents specific bathymetric features. For the numerical simulations, a 1D surf model was used in order to determine the nearshore current variations. This is based on the input provided by the SWAN phase averaged spectral wave model. Some case studies related to the most relevant environmental conditions were considered. They were defined taking into account the in situ wave measurements performed at the Gloria drilling unit. Since the waves are in fact the most important factor in the coastal dynamics, because both of their direct and indirect (via the nearshore currents) actions, in the final part of the paper a detailed assessment of the wave conditions was carried out in each target area.

Keywords: Black Sea, Romanian nearshore, SWAN, longshore current, waves

**MAIN RESULTS OF SUMMER OCEANOGRAPHIC SURVEYS IN THE
EASTERN GULF OF FINLAND IN THE FRAMEWORK OF THE TOPCONS
PROJECT**

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ABSTRACT

Fieldwork was conducted in two stages: 23-27.06.2013 and 17-22.07.2013, in the Eastern Gulf of Finland by sailing-motor catamaran «Centaurus II» in the framework of the TopCons Project. Main scientific direction of the summer oceanographic surveys was conduction of experimental research for environmental monitoring of marine ecosystem in the Eastern Gulf of Finland. Full complex of hydrological and hydrochemical observations has included measurement of salinity and water temperature, flow parameters in the bottom layer at four stations within the specified polygon, sampling and their quantitative chemical analysis. Authors present the main analysis results of hydrophysical and hydrochemical fields for the period of observations. The fieldwork is done in the framework of the SOUTH-EAST FINLAND – RUSSIA ENPI CBC PROGRAMME 2007–2013 Project “TOPCONS – Transboundary tool for spatial planning and conservation of the Gulf of Finland”, Grant Contract 2011-022-SE511. The advanced analyzing made with financial support of the Ministry of education and science of within the state order 2014/166 and state contract 14.515.11.0002.

Keywords: hydrological and hydrochemical observations, Eastern Gulf of Finland, environmental monitoring of marine ecosystem

MONITORING OF TREATED WASTE WATERS PARAMETERS EVACUATED IN THE BLACK SEA

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ABSTRACT

The monitoring of the purification processes parameters is an essential activity in the wastewater treatment plants, being closely linked to the environmental monitoring. The aim of this monitoring is to track the degree of compliance with the Romanian legislation.

This work presents the quality parameters of the treated wastewater which are evacuated from the waste water treatment plants in the Black Sea, Romania.

In the elaboration of this paper, are used the results of the physical and chemical analyses made by “Romanian Waters” National Administration, “Dobrogea – Litoral” Branch.

Based on these analyses, made in the period 2011 - 2013, the charts were drawn up with the variation of some indicators in time and compared the analyzed indicators of the effluent water to the maximum values establishes by the current legislation.

Keywords: waste water, waste water treatment plants (WWTP), monitoring, quality indicators.

**ON ATLANTIC WATER INFLOW TO ARCTIC OCEAN:
UNIQUE ARGO BUOY TRIP ACROSS ATLANTIC AND BARENTS SEA**

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ABSTRACT

There is a case study of ARGO buoys possibilities for Arctic Ocean scientific investigations with innovative ocean technologies on the base of geospatial measurement and information systems that are part of decision support systems. The compiled data base of some ARGO buoys (DB ARGO) penetrated into arctic and subarctic waters from Atlantic (DB ARGO ATL) developed. It is intended to research the patterns of Atlantic Waters penetration into the Arctic Ocean. One of these buoys had unique long Odyssey from warm waters near southern coast of Nova Scotia to high latitude arctic area near northern cap of Novaya Zemlya. This trip began 2008 summer and lasted near five years. Over 180 vertical profiles of temperature and salinity provided with 10 days interval and transferred to ARGO Data Center. Over year this buoy moved inside depth of Barents Sea dragged by Atlantic Waters. It crossed area of Stockman gas-oil field in 2012 and then came to northern cap of Novaya Zemlya where ended functioning at 2013 early spring. Till now it is the only ARGO buoy trip in the Barents Sea. The measurement results obtained during this drift indicated a significant inflow of atypically warm Atlantic Waters into high latitude area between Franz Josef Land and Novaya Zemlya. It was accompanied by later dates of ice appearance in this area. This case study clearly demonstrates the ARGO buoys resources for Arctic Ocean scientific investigations including patterns and scenarios of climate change for Arctic with Atlantic Waters engagements. Resources of internet platform https://www.researchgate.net/profile/Valery_Abramov2/?ev=hdr_xprf were used for wide preliminary discussion and data exchange in the frame of this research. Here we used data that was collected and made freely available by the International Argo Project <http://www.argo.net> and national initiatives that contribute to it. Argo is a pilot programme of the Global Ocean Observing System. The Ministry of education and science of Russia provided financial support for this research with the state order 2014/166 and state contract 14.515.11.0002.

Keywords: ocean technologies, ARGO buoys, Atlantic water inflow, Arctic Ocean, decision support systems

**PREDICTION OF THE TOWING FORCE GENERATED BY A KITE
ATTACHED TO A KVLCC2 TANKER MODEL**

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ABSTRACT

The naval industry is oriented towards a greener operation for the ships; this goal can be achieved by implementing green technology onboard vessels, even if we are not dealing with new constructions, but rather with ships that are the subject of retrofitting. By implementing during the retrofitting period technologies that aims Renewable Energy Sources, the overall efficiency of the propulsion system will be surely increased.

In this paper there are carried out transient RANS – VOF simulations for the flow around a KVLCC2 tanker model which has attached a towing kite to its bow, in order to determine the additional power that becomes available when using the high altitude towing kite which is designed to decrease considerably to operating costs of a ship, by lowering the consumption rates by 10% to 35% average winds. This concept was developed to act as a supplementary power source in addition to ship's main engine. The simulation is carried by using Ansys CFX simulation package. Attention will be given to the discretization of the convective term and the modelling of turbulence.

Keywords: towing, kite, tanker, renewable, KVLCC2

SCENARIOS FOR THE NAVIGATION ROUTES IN THE BLACK SEA CONSIDERING THE SEAKEEPING SAFETY CRITERIA

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ABSTRACT

Having as target the basin of the Black Sea, the main objective of the present work is to perform an analysis for some shipping routes between various destinations, taking into account the seakeeping safety criteria. The identification of the navigating conditions was done based on scenarios considering two navigation routes for a 800 TEU container ship. Rough sea situations were considered when extreme conditions can be achieved both in terms of amplitudes and accelerations on the three degrees of freedom (vertical, pitch and roll). The scenarios for the navigation routes include eight points in the Black Sea area (denoted as P1, P2 ... P8). The satisfaction survey of the seakeeping safety criteria is achieved for the period between 03.02.2005-04.02.2005, with three-hour records, when extreme sea state conditions occur. The study concluded that for the ship service speed of 18 knots, the proposed routes have some navigation restrictions, mainly due to the oscillation amplitude roll.

Keywords: seakeeping criteria, navigation restrictions, extreme sea conditions, navigation scenarios

SEA WATER HYDROSTATIC PRESSURE INFLUENCE ON THE DIVER'S COMFORT. AERODYNAMIC ASPECTS

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ABSTRACT

Dynamics of the air flow through the system comprising the breathing apparatus and the human breathing ways affects the easiness the diver is breathing with and, subsequently his underwater comfort. Experimental investigation on eight divers in a wet hyperbaric simulator allowed us to collect data regarding the breathing flow rate and frequency, and to estimate the breathing consumed power at different depth level. In order to eliminate the metabolic influence, the results are obtained in terms of a new proposed amount: the added consumed power due to an increased breathing aerodynamic resistance.

Keywords: man beneath the sea, gas dynamics, aerodynamic resistance.

**STREAMS OF ENERGY FACTORS METHOD DETERMINING THE
ELEMENT VALIDITY IN THE OILY WATER PURIFICATION SYSTEM IN
THE VESSEL GYM**

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ABSTRACT

During the operation of complex technical systems it is often required to identify the element or device that plays the most important part in the system. This also applies to marine oily water purification systems. In order to determine accurately the degree of validity of the elements in the system, the so called elements validity measurements have been constructed. Selection of an appropriate measurement for a specific practical application largely depends on the fact, what aspect of the element validity is in this case most important. The following measures are considered: Birnbaum reliability measurement, Birnbaum structural measurement, Vesely-Fussell validity measurement, the critical measurement, potential for improving the reliability, measures of validity independent of time, the Barlow and Proschan measurement, Lambert measurement. The author proposes using a method based on the evaluation of the amount of streams of energy factors flow through individual elements (devices) in the functional structure of the technical system. The validity and importance of the element in the system is evaluated based on the amount of streams of energy factors that flow to and from the element. The greater the number of these streams, the more responsible the element for the operation of the system in this state is. The validity of an element in the structure is described by the total sum of streams of energy factors (*the stream measurement*), which flows to and from the element.

Keywords: validity measurement, element validity in the

**WATER EXCHANGE BETWEEN THE PACIFIC AND THE BERING SEA
WITH IMPACT ON CLIMATE CHANGE IN THE ARCTIC AND SUBARCTIC**

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ABSTRACT

Scientific investigation of essential patterns and scenarios of water exchange between the Pacific and deep water part of the Subarctic Bering Sea were done. In the research our compiled sub database “DB ARGO Bering” was used. It contains data of all the ARGO buoys have ever found in the Bering Sea including entered through Aleutian Straits from the Pacific. The research illustrates the ARGO buoys resources for the Arctic Ocean investigations and innovative ocean technologies based on geoinformation system as the part of intellectual decision support system. Here we used data that was collected and made freely available by the International Argo Project <http://www.argo.net> and national initiatives that contribute to it. Argo is a pilot programme of the Global Ocean Observing System. Convenient instrument https://www.researchgate.net/profile/Valery_Abramov2/?ev=hdr_xprf gave excellent opportunities to preliminary discussion and data exchange in the framework of this research. Financial support provided by The Ministry of Education and Science of Russian Federation for this research with the state order 2014/166 and state contract 14.515.11.0002.

Keywords: ARGO buoys, Pacific, Bering Sea, ocean technologies, decision support systems

SHELL MORPHOLOGY OF RAPANA THOMASIANA SAMPLED FROM THE ROMANIAN BLACK SEA COAST

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ABSTRACT

Rapana thomasiana is a predatory gastropod which is considered an environmental threat for many bivalves of economic interest. While managing rapanas' spread is difficult, large amounts of gastropods are available. This paper is part of an extensive study of marine organisms' capitalization, in particular *Rapana thomasiana*, marine bio-waste from the Romanian coast of the Black Sea as raw material for production of biocompatible materials with medical application. The paper presents the collection phase with focus on the morphological analysis of shells. For this purpose, representative integer samples were sampled from several sites of the Romanian seaside. Each individual was morphologically analyzed. The measurement results were processed with statistical methods in order to highlight useful information of rapana populations from the Romanian coast. For each group the mean shell weight, length, width and thickness distribution curves were plotted and the group statistics were calculated. Further, distribution normality tests (Kolmogorov-Smirnov test) were conducted and the gastropods weight was correlated according to the geometrical characteristics of the shells. Statistical analysis of rapana collected from the Romanian coast of the Black Sea, reveals that the nature of seaside substrate determinate the mass and geometric characteristics of the shells. Length and thickness of the shells have the greatest variability.

Keywords: *Rapana thomasiana*, shell morphology, marine waste, statistical evaluation

A DATA ASSIMILATION SCHEME TO IMPROVE THE WAVE PREDICTIONS IN THE WESTERN SIDE OF THE BLACK SEA

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ABSTRACT

Numerical wave models are widely used in various studies related to the wave climate in order to produce continuous wave data, in both space and time. The performances of the wave models strongly depend on the quality of the driving wind fields, which are usually less accurate in enclosed seas. For this reason, methods to increase the quality of the wave predictions are necessary to be applied. Model errors can be reduced by applying data assimilation techniques that combine the measured wave parameters with those predicted by numerical models in order to derive better estimations of the sea states. In this context, the aim of the present study is to improve the wave predictions in the western side of the Black Sea, and especially in the Romanian nearshore, by assimilating local wave measurements. Numerical simulations have been performed with the SWAN model for a ten-year period (1999-2008). The wave measurements from that Gloria drilling unit have been considered in the present work for the assimilation procedure. A data assimilation scheme based on the successive correction method has been implemented. This assumes linear regressions to perform corrections to the model predictions in order to fit better the observations. As a result, a visible improvement in the model prediction is obtained.

Keywords: data assimilation, Black Sea, hindcast, storm conditions, SWAN

BIOACCUMULATION OF HEAVY METALS IN SEAHORSE TISSUE AT THE ROMANIAN BLACK SEA COAST

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ABSTRACT

This paper analyzes the concentrations of five heavy metals (Cu, Cd, Pb, Ni, Cr) in the whole tissue of the long-snouted seahorse (*Hippocampus guttulatus*), as compared to heavy metal concentrations recorded in the surrounding water and sediments, expressed by the Bioconcentration Factor (BCF) and the Biota-Sediment Bioaccumulation Factor (BSAF). These two factors are a measure of the extent of chemical sharing between the organism and the surrounding environment. The seahorse (*Hippocampus guttulatus*) samples were collected from three sampling locations along the southern Romanian coast. Water and sediment samples were also collected from the same sampling locations, and subsequently all samples were analyzed using standard methods. The analyses showed that seahorses do bioaccumulate elements such as Cu, Cd, Pb, Ni, Cr, certain differences being reported between stations and chemical element. The conclusion of this research on the heavy metal bioaccumulation in the Black Sea *Hippocampus guttulatus* whole tissue confirms the hypothesis that seahorses, like most of marine species, bioaccumulate the heavy metals reaching the aquatic environment, which could pose a threat to the species if concentrations significantly overtake normal background levels.

Keywords: *Hippocampus guttulatus*, Black Sea, Bioconcentration Factor (BCF), Biota-Sediment Bioaccumulation Factor (BSAF), heavy metals

CONSIDERATIONS ON NUMERICAL WAVE TANK MODELLING

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ABSTRACT

The naval structures are permanently the subject of the environment induced loads, such as currents, waves and wind. This is the reason for, in the design stage, the assessment of these loads proves to be crucial. The numerical simulations can represent a useful instrument in order to provide the necessary data for a correct assessment and further on, for an appropriate design of the naval structures, such as ships or offshore structures. For a proper development of a numerical simulation that aims the structure behavior in waves it is very important to have a correct numerical model for wave generators and fluid domain.

This work provides a comparative analysis of the results of a numerical wave tank simulation, carried with two different commercial CFD codes.

The numerical model was developed by considering the Reynolds Averaged Navier – Stokes equations, solved through the Finite Volumes Method (FVM) and Volume of Fluid method (VOF). The flow domain was discretized by using a structured mesh.

There were carried studies on the numerical parameters influence (such as: time and space discretization scheme, the timestep and mesh refinement) in order to identify the optimal solution for solving the wave generation and propagation problem.

Keywords: FVM, VOF, numerical, wave, tank

DYNAMICS OF SPILLED OIL NATURAL TRANSFORMATION ON THE SEA COASTS IN DIFFERENT GEOGRAPHICAL CONDITIONS

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ABSTRACT

The paper is devoted to the comparative analysis of results of long-term field observations carried out on geographically different sea coasts contaminated by spilled fuel oil. Such investigations are of particular interest as they make it possible to assess the rates of oil pollution natural transformation as well as their correlation with principal geographical factors such as climatic and hydrological conditions, coast exposure and geomorphology, sediment types, intensity of biogeochemical cycles.

For these purposes, the authors have chosen three zones where the accidental oil spills occurred in the last years: on the north-western coast of France (tanker “Erika” accident in December 1999; accident at an oil refinery in the Loire River Estuary in March 2008), on the north-western coast of Spain (tanker “Prestige” accident in November 2002) and in the Strait of Kerch (tanker “Volgoneft-139” accident in November 2007). The duration of long-term observations ranged from 5 to 13 years.

The present investigation included visual assessment and sampling of oil slicks and sediment cores. The analysis of samples were carried out with the use of thin layer and column chromatography, optical and gravimetric methods making possible to determine separately the sum of saturated, mono- and di-aromatic hydrocarbons (HC), the sum of polycyclic aromatic hydrocarbons (PAH) and the sum of asphaltic components (AC) as well as the presence of hydrocarbons of contemporary biological origin.

The obtained results show that even 10 to 13 years after the oil spills their weathered traces are still present in the coastal zone, especially in its upper part. In the course of time an exponential diminution in the oil pollution level and the ratio between hydrocarbons and asphaltic components (HC/AC) was revealed. In the studied cases, the half-periods of fuel oil natural transformation varied from 1 to 5 years. The highest activity of the self-cleaning process was observed for small fuel oil traces on the rocky substrate exposed to the influence of fresh air, solar radiation, storm waves and surf action. On the Strait of Kerch coasts influenced by shallow, slightly salted and highly bio-productive waters of the Sea of Azov the spilled fuel oil tends to disappear more rapidly than on French and Spanish coasts washed by the Atlantic Ocean.

Keywords: oil pollution, natural transformation, sea coasts, the Bay of Biscay, the Strait of Kerch, self-cleaning, geographical conditions.

**ECOLOGICAL AND BIOCHEMICAL ASPECTS OF *Mytilus galloprovincialis*
FROM THE ROMANIAN BLACK SEA COAST**

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ABSTRACT

The aim of the paper is to emphasize the role of *Mytilus galloprovincialis* (mussel) in the marine ecosystem and economy in the way of sustainable development and exploitation.

The paper presents the general biochemical (moisture, mineral and organic substance, protein, lipid and carbohydrate contents) and ecological aspects of mussels from the four areas for the development and exploitation of mollusks in the Romanian coastal area which are designated according to the requirements of implementing the EU legislation in Romania, the EU “Shellfish Waters” Directive No. 2006/113/EC.

The biochemical analysis of the soft tissue indicated high organic substance and protein contents, which represent very important elements with economic significance.

In 2006, *M. galloprovincialis* was the dominant species in all areas analyzed, being relatively evenly distributed and represented by young individuals in three of the four areas of shellfish growth, over 60% of individuals having the length below 25 mm.

In 2009, in mussels from the sedimentary substrate very young individuals predominated only in area 2 (30%), in areas 3 and 4 their share in the population being very low (5% in area 3 and 2% in area 4).

In 2012, the mussels had a uniform distribution along the Romanian coast, so the species recorded the highest abundances and biomasses in the north, an area which in the past used to record the lowest values

The population structure showed the predominance of the young individuals. The biomass and abundance are influenced by the low salinity in the northern part of the Romanian Black Sea coast due to the Danube river influence.

Keywords: *Mytilus galloprovincialis*, Black Sea, ecology, biochemistry, EU legislation

ENGINEERING SOLUTIONS FOR THE MANAGEMENT OF THE BLACK SEA COASTAL ZONE

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ABSTRACT

The coastal erosion is a continuous phenomenon on the Black Sea littoral zone of the Romanian territory, which is difficult to stop, and it constitutes one of the main threats to the coastline, therefore it requires efficient and sustainable management.

Human activities in the coastal zone of the Black Sea are closely linked to the development of the coastal protection and the construction of protective structures. One approach for the development of coastal protection involves measures that result from a series of "hard" and "soft" structural solutions, methods introduced by coastal engineering and which provide solutions for the Integrated Coastal Zone Management.

This paper presents the strategic options for the management of the coastal erosion proposed to be used along the Romanian shoreline and a case study of the coastal protection solutions proposed to be adopted for the southern coast, an analysis of their advantages and disadvantages, the elements of impact on the environment and the expected results following the adoption of the analysed solutions.

Keywords: erosion, coastal zone, management, engineering solutions, Black Sea

ESTIMATING THE RELIABILITY OF CONTAMINATED LIQUID PURIFICATION SYSTEMS ON VESSELS

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ABSTRACT

In article have been characterized types of liquid pollution on marine transport vessels are characterized. The examples of systems in Ship machinery responsible for cleaning polluted water. On the basis of data obtained from literature and the author's research components of systems of liquid (water) purification on vessels have been assigned damage distributions characteristic of them. Complex devices and technical systems are characterized by damage of mechanical, electrical, electronic element. These components have different up time distributions, such as exponential, Weibull, normal, log-normal, power law and gamma . In case of the summation of many different streams of damages one can use the mixtures (compositions) of up time and fault time distributions of devices and technical systems by combining the selected distributions.

Keywords: marine power plant systems of contaminated liquid purification, distribution compositions

**ESTUARINE AND SHALLOW SHELF ENVIRONMENTAL CHANGES
RECONSTRUCTED BY GEOCHEMISTRY OF BOTTOM SEDIMENTS IN
AMUR BAY (JAPAN SEA) OVER THE LAST 200 YEARS**

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ABSTRACT

Amur Bay, Sea of Japan is one of the most studied areas in relation to seasonal anoxia in the estuarine-shelf basins, induced by the water inflow increase (Razdolnaya-Suifun River) during the summer monsoon. Eutrophication is associated with stratification of the water column due to warm fresh water entry, and also to synchronous increase of the phytoplankton productivity in July and August. To identify the causes of anoxia, sediment layers accumulated over the past 200 years near the mouth of the Razdolnaya River in the Amur Bay were tested. A new approach to the study of sediment records has appeared due to an automatic technique for scanning microanalysis along cores *in situ*. X-ray fluorescence analysis on synchrotron radiation (XRF SR) in the Institute of Nuclear Physics (Novosibirsk, Russia) was used to determine more than 35 elements in freshly opened cores and in solid preparates with steps of 0.1-1 mm.

Tracing of sediment composition along the river-sea profile showed a reduction of carbonate-organophilic elements (Ca, Br, and Sr) closer to the river mouth. Respectively, high values of Fe, Rb, Y, Th and Rb/Sr ratio represent the flooding accumulation of clay material and hydroxides in that shallow freshened zone. High Br content, Mo/Mn and Rb/Sr and low Mn and Ca are observed within the axial part of the bay with seasonally anoxic bottom waters. The results suggest the increase of seasonal anoxia in bottom waters north of the Amur Bay and the Razdolnaya estuary in dry summer periods. Yearly drops of Br content mark extremal floods during typhoon events 1-3 times per decade. Zn, Ni, Cu, as well as Hg, most probably indicate the degree of technogenic contamination in sediments, together with an increase in eutrophication and organic matter content for the last 50 years.

High-resolution studies of the element composition show alternating periods of marine or more dilute waters. The subdivision into layers was based on statistical models (cluster analysis, discriminant analysis), whilst the chronological framework was established using the ²¹⁰Pb and ¹³⁷Cs technique.

Keywords: Estuary, micro XRF, geochemical records, seasonal anoxia, time series

**EVALUATION OF PHYSIC-CHEMICAL AND BIOLOGICAL CONDITIONS
FROM THE PSAMMIC HABITATS THAT ARE POPULATED BY
INTERSTITIAL CNIDARIAN SPECIES (CNIDARIA-HYDROZOA) FROM
VAMA VECHE, ROMANIAN BLACK SEA COAST**

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ABSTRACT

Nearly 15 years ago, we signaled for the first time the presence of a representative of the interstitial meiofauna, a Cnidaria of the genus *Halammohydra* (**Hydrozoa-Coelenterata**) in the Black Sea, in the Vama Veche mediolittoral sedimentary habitats. We specify that our subsequent studies realized over the entire Romanian littoral (in the shallow waters and deep zones) allowed us to signal these Cnidaria only in these habitats with coarse sediments located in the shore line in the southern extremity of the Romanian littoral.

The purpose of our study was to evaluate the way in which the population of the cnidarian develops within the interstitial invertebrate community of the mediolittoral level at Vama Veche and evaluation of physic-chemical and biological conditions from sedimentary habitats.

The mediolittoral meiofauna community in the interstitial space of the sediments includes, apart from typical representatives of this category (Cnidaria-**Hydrozoa**, **Turbellaria**, **Nematoda**, **Polychaeta**, **Oligochaeta**, **Acarina**, **Ostracoda**, **Harpacticoida**), also juvenile representatives of the macrofauna in the neighboring habitats (whose size is under 1 mm: **Polychaeta**, **Oligochaeta**, **Amphipoda**, **Tanaidacea**, **Cumacea**, **Isopoda**, **Insecta**). Even though the Cnidaria population does not have high values of the average density (according to abundance: 49 indiv.m⁻²), by its position from the trophic point of view (exclusively predatory regime), it has however an important role in the fauna community of the psamic habitats.

Keywords: mediolittoral, meiofauna, psammon, interstitial invertebrates, cnidaria

GEOSYNTHETIC BASED SCOUR PROTECTION AROUND THE SLENDER PILE UNDER WAVES

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ABSTRACT

Conventional and geosynthetic scour protections around the slender pile under the waves were experimentally studied in the laboratory flume. One layer dumped stones was used for conventional protection. As a geosynthetic supported protection, geogrid wrapped one layer stones and geomembrane applications under the stone layer were used for protection around the pile. Experiments show that stones behave individual and turn, slide and roll through scour at the edge of protection at conventional random stone dump. Geogrid wrapped stone layer shows elastic behavior against edge scour and supplies better protection than classical way and geomembrane solution. Geomembrane which spreads under the stone layer also give better protection regarding classical way against edge scour although stones move over geomembrane and edges of membrane moves with waves.

Keywords: slender pile, waves, scour, scour protection, geogrid, geomembrane

IDENTIFICATION AND ANALYSIS OF BIOPOLYMERS FROM CRUSTACEANS DECAPOD OF THE ROMANIAN BLACK SEA WATERS

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ABSTRACT

The using of marine resources for the industrial, biomedical applications and human consumption has got a quickly growth in previous decade in the world. The Romanian Black Sea environment, containing lots of organisms, which have considerable ecological and biological properties, is one of the most unstudied biological resources.

In this paper, we have identified three species of crustaceans on Romanian sea waters of the Black Sea, as possible sources of chitin and chitosan.

Because these species constitute a rich source of value-added products, as chitin, protein pigments and flavour compounds, the full exploitation of this easily accesible resource has attracted much interest. Chitin and chitosan, the naturally renewable polymers have excellent properties such as biodegradability, biocompatibility, non-toxicity and adsorption.

The extraction and characterization of these biopolymers have been studied by optical microscopy and FTIR/ATR spectroscopy. Results of the preliminary studies revealed from: FTIR/ATR „fingerprint spectra”, intensities and stretching, characteristic functional groups of bands, the presence of chitin and chitosan in the samples. Spectra samples were compared with those of chitin and chitosan standards. By optical microscopy and FTIR/ATR coupled analytical methods the results have been checked and also, indicated morphological differences between the chitin and chitosan standards.

The material (crustacean shell) was dried, milled and sieved (dimensions of the particles less than 150 µm) and than digested in a mixture of peroxide, nitric acid and hydrochloric acid. Metallic elements, such as As, Cd, Cr, Cu, Fe, Mo, Ni, Pb, Se, Zn, V, Al, Ca, Mg, Na, K, were analyzed using inductively coupled plama optical emission spectrometry. High contents of Ca, Mg, Na and K were recorded.

Keywords: Chitin, chitosan, crustaceans decapod, biopolymer, metallic elements

**IDENTIFICATION OF THE ROMANIAN BLACK SEA WATER TYPES -
ASSESSMENT RELATED TO THE MARINE STRATEGY FRAMEWORK
DIRECTIVE IMPLEMENTATION**

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ABSTRACT

The main objective of the Marine Strategy Framework Directive (MSFD, 2008/56/EC) is to achieve or to establish and maintain the "good environmental status" (GES) until 2020. The Black Sea is one of the fourth marine regions assigned for implementing the MSFD through two countries and EU Member States: Romania and Bulgaria. Through the MSFD Guiding Improvements in the Black Sea Integrated Monitoring System (MISIS Project), for the Romanian waters were defined and delimited the types of the seawater. Using the short and long-term data analysis of the physical parameters (temperature and salinity from available data since 1955 – 2012), the main features of the western Black Sea water bodies was characterized. In addition, the corresponding salinity of water bodies in the western Black Sea were evaluated, using the grid points $0.5^{\circ} \times 0.5^{\circ}$, calculating for each quarter from the corresponding number of measured data: the mean, standard deviation and the coefficient of variation. Based on the physical parameters, the degree of anthropogenic impact, chlorophyll-a concentration, bathymetry etc., four categories of the Romanian Black Sea waters types were identified: RO-TT03 – the northern part, marine waters under the direct influence of the Danube, at depths of at least 30 m; RO-CT01 – the marine waters from the central to the southern area (Portita down to Vama Veche), from the baseline to 30 m isobath; RO-MT01 – that corresponds to the inner and the outer shelf marine area from the 30 m to the 100 m isobaths and RO-MT02 – the perimeter for the type of offshore seawater located at depths of at least 100 m.

Keywords: Black Sea, MSFD, temperature, salinity, chlorophyll-a

**LONG-TERM MONITORING OF THE ARAL SEA BY REMOTE SENSING
DATA**

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ABSTRACT

This paper presents research results of space monitoring water surface of the Aral Sea area for the 1975-2013 period based on LANDSAT imagery and for the 2000-2013 period based on Terra/MODIS data

Keywords: Aral Sea, Remote sensing, Space monitoring, Landsat, MODIS

**LONGSHORE CURRENTS EVALUATION
ALONG THE ROMANIAN BLACK SEA COAST**

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ABSTRACT

The objective of the present work is to evaluate the nearshore current patterns along the Romanian Black Sea coast. In order to give a full perspective of the nearshore circulation, three target areas (Saint George, Mamaia and Mangalia) were considered for analysis. The above selection is based on the fact that each of these coastal areas presents specific bathymetric features. For the numerical simulations, a 1D surf model was used in order to determine the nearshore current variations. This is based on the input provided by the SWAN phase averaged spectral wave model. Some case studies related to the most relevant environmental conditions were considered. They were defined taking into account the in situ wave measurements performed at the Gloria drilling unit. Since the waves are in fact the most important factor in the coastal dynamics, because both of their direct and indirect (via the nearshore currents) actions, in the final part of the paper a detailed assessment of the wave conditions was carried out in each target area.

Keywords: Black Sea, Romanian nearshore, SWAN, longshore current, waves

**MAIN RESULTS OF SUMMER OCEANOGRAPHIC SURVEYS IN THE
EASTERN GULF OF FINLAND IN THE FRAMEWORK OF THE TOPCONS
PROJECT**

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ABSTRACT

Fieldwork was conducted in two stages: 23-27.06.2013 and 17-22.07.2013, in the Eastern Gulf of Finland by sailing-motor catamaran «Centaurus II» in the framework of the TopCons Project. Main scientific direction of the summer oceanographic surveys was conduction of experimental research for environmental monitoring of marine ecosystem in the Eastern Gulf of Finland. Full complex of hydrological and hydrochemical observations has included measurement of salinity and water temperature, flow parameters in the bottom layer at four stations within the specified polygon, sampling and their quantitative chemical analysis. Authors present the main analysis results of hydrophysical and hydrochemical fields for the period of observations. The fieldwork is done in the framework of the SOUTH-EAST FINLAND – RUSSIA ENPI CBC PROGRAMME 2007–2013 Project “TOPCONS – Transboundary tool for spatial planning and conservation of the Gulf of Finland”, Grant Contract 2011-022-SE511. The advanced analyzing made with financial support of the Ministry of education and science of within the state order 2014/166 and state contract 14.515.11.0002.

Keywords: hydrological and hydrochemical observations, Eastern Gulf of Finland, environmental monitoring of marine ecosystem

MONITORING OF TREATED WASTE WATERS PARAMETERS EVACUATED IN THE BLACK SEA

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ABSTRACT

The monitoring of the purification processes parameters is an essential activity in the wastewater treatment plants, being closely linked to the environmental monitoring. The aim of this monitoring is to track the degree of compliance with the Romanian legislation.

This work presents the quality parameters of the treated wastewater which are evacuated from the waste water treatment plants in the Black Sea, Romania.

In the elaboration of this paper, are used the results of the physical and chemical analyses made by “Romanian Waters” National Administration, “Dobrogea – Litoral” Branch.

Based on these analyses, made in the period 2011 - 2013, the charts were drawn up with the variation of some indicators in time and compared the analyzed indicators of the effluent water to the maximum values establishes by the current legislation.

Keywords: waste water, waste water treatment plants (WWTP), monitoring, quality indicators.

**ON ATLANTIC WATER INFLOW TO ARCTIC OCEAN:
UNIQUE ARGO BUOY TRIP ACROSS ATLANTIC AND BARENTS SEA**

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ABSTRACT

There is a case study of ARGO buoys possibilities for Arctic Ocean scientific investigations with innovative ocean technologies on the base of geospatial measurement and information systems that are part of decision support systems. The compiled data base of some ARGO buoys (DB ARGO) penetrated into arctic and subarctic waters from Atlantic (DB ARGO ATL) developed. It is intended to research the patterns of Atlantic Waters penetration into the Arctic Ocean. One of these buoys had unique long Odyssey from warm waters near southern coast of Nova Scotia to high latitude arctic area near northern cap of Novaya Zemlya. This trip began 2008 summer and lasted near five years. Over 180 vertical profiles of temperature and salinity provided with 10 days interval and transferred to ARGO Data Center. Over year this buoy moved inside depth of Barents Sea dragged by Atlantic Waters. It crossed area of Stockman gas-oil field in 2012 and then came to northern cap of Novaya Zemlya where ended functioning at 2013 early spring. Till now it is the only ARGO buoy trip in the Barents Sea. The measurement results obtained during this drift indicated a significant inflow of atypically warm Atlantic Waters into high latitude area between Franz Josef Land and Novaya Zemlya. It was accompanied by later dates of ice appearance in this area. This case study clearly demonstrates the ARGO buoys resources for Arctic Ocean scientific investigations including patterns and scenarios of climate change for Arctic with Atlantic Waters engagements. Resources of internet platform https://www.researchgate.net/profile/Valery_Abramov2/?ev=hdr_xprf were used for wide preliminary discussion and data exchange in the frame of this research. Here we used data that was collected and made freely available by the International Argo Project <http://www.argo.net> and national initiatives that contribute to it. Argo is a pilot programme of the Global Ocean Observing System. The Ministry of education and science of Russia provided financial support for this research with the state order 2014/166 and state contract 14.515.11.0002.

Keywords: ocean technologies, ARGO buoys, Atlantic water inflow, Arctic Ocean, decision support systems

**PREDICTION OF THE TOWING FORCE GENERATED BY A KITE
ATTACHED TO A KVLCC2 TANKER MODEL**

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ABSTRACT

The naval industry is oriented towards a greener operation for the ships; this goal can be achieved by implementing green technology onboard vessels, even if we are not dealing with new constructions, but rather with ships that are the subject of retrofitting. By implementing during the retrofitting period technologies that aims Renewable Energy Sources, the overall efficiency of the propulsion system will be surely increased.

In this paper there are carried out transient RANS – VOF simulations for the flow around a KVLCC2 tanker model which has attached a towing kite to its bow, in order to determine the additional power that becomes available when using the high altitude towing kite which is designed to decrease considerably to operating costs of a ship, by lowering the consumption rates by 10% to 35% average winds. This concept was developed to act as a supplementary power source in addition to ship's main engine. The simulation is carried by using Ansys CFX simulation package. Attention will be given to the discretization of the convective term and the modelling of turbulence.

Keywords: towing, kite, tanker, renewable, KVLCC2

SCENARIOS FOR THE NAVIGATION ROUTES IN THE BLACK SEA CONSIDERING THE SEAKEEPING SAFETY CRITERIA

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ABSTRACT

Having as target the basin of the Black Sea, the main objective of the present work is to perform an analysis for some shipping routes between various destinations, taking into account the seakeeping safety criteria. The identification of the navigating conditions was done based on scenarios considering two navigation routes for a 800 TEU container ship. Rough sea situations were considered when extreme conditions can be achieved both in terms of amplitudes and accelerations on the three degrees of freedom (vertical, pitch and roll). The scenarios for the navigation routes include eight points in the Black Sea area (denoted as P1, P2 ... P8). The satisfaction survey of the seakeeping safety criteria is achieved for the period between 03.02.2005-04.02.2005, with three-hour records, when extreme sea state conditions occur. The study concluded that for the ship service speed of 18 knots, the proposed routes have some navigation restrictions, mainly due to the oscillation amplitude roll.

Keywords: seakeeping criteria, navigation restrictions, extreme sea conditions, navigation scenarios

SEA WATER HYDROSTATIC PRESSURE INFLUENCE ON THE DIVER'S COMFORT. AERODYNAMIC ASPECTS

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ABSTRACT

Dynamics of the air flow through the system comprising the breathing apparatus and the human breathing ways affects the easiness the diver is breathing with and, subsequently his underwater comfort. Experimental investigation on eight divers in a wet hyperbaric simulator allowed us to collect data regarding the breathing flow rate and frequency, and to estimate the breathing consumed power at different depth level. In order to eliminate the metabolic influence, the results are obtained in terms of a new proposed amount: the added consumed power due to an increased breathing aerodynamic resistance.

Keywords: man beneath the sea, gas dynamics, aerodynamic resistance.

**STREAMS OF ENERGY FACTORS METHOD DETERMINING THE
ELEMENT VALIDITY IN THE OILY WATER PURIFICATION SYSTEM IN
THE VESSEL GYM**

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ABSTRACT

During the operation of complex technical systems it is often required to identify the element or device that plays the most important part in the system. This also applies to marine oily water purification systems. In order to determine accurately the degree of validity of the elements in the system, the so called elements validity measurements have been constructed. Selection of an appropriate measurement for a specific practical application largely depends on the fact, what aspect of the element validity is in this case most important. The following measures are considered: Birnbaum reliability measurement, Birnbaum structural measurement, Vesely-Fussell validity measurement, the critical measurement, potential for improving the reliability, measures of validity independent of time, the Barlow and Proschan measurement, Lambert measurement. The author proposes using a method based on the evaluation of the amount of streams of energy factors flow through individual elements (devices) in the functional structure of the technical system. The validity and importance of the element in the system is evaluated based on the amount of streams of energy factors that flow to and from the element. The greater the number of these streams, the more responsible the element for the operation of the system in this state is. The validity of an element in the structure is described by the total sum of streams of energy factors (*the stream measurement*), which flows to and from the element.

Keywords: validity measurement, element validity in the

**WATER EXCHANGE BETWEEN THE PACIFIC AND THE BERING SEA
WITH IMPACT ON CLIMATE CHANGE IN THE ARCTIC AND SUBARCTIC**

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ABSTRACT

Scientific investigation of essential patterns and scenarios of water exchange between the Pacific and deep water part of the Subarctic Bering Sea were done. In the research our compiled sub database “DB ARGO Bering” was used. It contains data of all the ARGO buoys have ever found in the Bering Sea including entered through Aleutian Straits from the Pacific. The research illustrates the ARGO buoys resources for the Arctic Ocean investigations and innovative ocean technologies based on geoinformation system as the part of intellectual decision support system. Here we used data that was collected and made freely available by the International Argo Project <http://www.argo.net> and national initiatives that contribute to it. Argo is a pilot programme of the Global Ocean Observing System. Convenient instrument https://www.researchgate.net/profile/Valery_Abramov2/?ev=hdr_xprf gave excellent opportunities to preliminary discussion and data exchange in the framework of this research. Financial support provided by The Ministry of Education and Science of Russian Federation for this research with the state order 2014/166 and state contract 14.515.11.0002.

Keywords: ARGO buoys, Pacific, Bering Sea, ocean technologies, decision support systems