

# Black Sea Insight

Sea Exploration and Science Adventure Magazine for Education

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Greetings for the World Water Day!

## OCEANOGRAPHIC MISSION "NEPTUNE" IN ACTION IO-BAS, BULGARIA and its oceanographic ship "Academic" puts to sea for a new SESAME investigation cruise in the Black Sea

The fourth oceanographic mission of the scientific team from the Institute for Oceanology from the Bulgarian Academy of Sciences is in action. RV Academic is one of the ten oceanographic vessels that conduct SESAME cruises along selected transects. Major field-activities of the mission include gathering of high quality *in situ* data, the analysis of samples and the preparation of datasets to feed the SESAME databases.

The Scientific Task Programme of this mission includes CTD casts and seawater sampling for current data collection by routine measurements of standard SESAME hydrographical, chemical and biological parameters at seven sampling stations, e. g. temperature, salinity, water turbidity, dissolved inorganic P, N, Si, dissolved O<sub>2</sub>, pH, hydrogen sulphide, total alkalinity, DOP and DON as difference calculated between Total dissolved P (N) and Dissolved Inorganic P (N), POC, PON and POP; mezozooplankton (taxonomical identification, abundance and biomass), phytoplankton, Chlorophyll a. The CTD and bottle water sampling strategy follows the preliminary defined standard depths but also additional sampling depths for the Black Sea. Quality control and Quality assurance (QC/QA) for chemical data as well as biological data analysis will be routinely employed within the Institute's laboratories. Depth strata for zooplankton net sampling will also be executed by preliminary defined standard depths.

SESAME intercalibrated data will be reported according to data reporting formats of the project to feed the databases which will be processed by SESAME mathematical models for ecosystem prediction.

A special task of this mission will be to recover the sediment trap from station S-BG00-07 (Lat - N Deg. Dec 42.51'; Long - E Deg. Dec 29.22') at 2200 m depth.

The cruise is part of the international interdisciplinary collaboration activities of SESAME that will contribute to the achievement the project goals.

Bon voyage and good luck!



Black Sea Sunset

## What is SESAME

SESAME is an international project aiming to assess and predict changes in the Mediterranean and Black Sea ecosystems and in their ability to provide goods and services to the future generations.

The innovative approach of SESAME is based on the close merging of economic and natural sciences to study the changes in both seas as an interconnected large system from 50 years in the past to 50 years in the future. The project involves 48 partner multidisciplinary scientific teams from 21 countries in close cooperation. Thus it focuses not only on scientific but also on issues of social importance like tourism, fisheries, ecosystem stability through conservation of biodiversity and mitigation of climate change. Multidisciplinary, multiship oceanographic cruises in the Mediterranean and the Black Sea will provide new data to be added to existing datasets. Validated and upgraded mathematical models will be used to predict ecosystem reactions to changes in climate and anthropogenic pressure during the next five decades.

In addition the project provides a platform for training, education and outreach in an integrated manner, which will ensure that the excitement of scientific results will be translated to all levels of the society.



RV Academic

## Content

### Page 2

Sampling in action  
Let's talk about  
plankton  
Photo of the day

### Page 3

Meet a scientist  
Found in a bottle  
In 50 years – black or white?

### Page 4

Can you believe it?  
Breaking news  
Chef's offer  
Weather forecast  
References

## Sampling in action

### Gathering zooplankton samples during the cruises

The objective is to collect new temporal and spatial data on zooplankton abundance ( $\text{ind}/\text{m}^3$ ) and zooplankton biomass ( $\text{mg}/\text{m}^3$ ).

Sampling is conducted at the seven stations along the selected transect.

The sampling depths depend on the *in situ* CTD profile. Depths are selected after CTD DOWN cast (but sampling depths are controlled during UP cast). Preliminary defined standard depths for zooplankton net sampling are: 0-25, 25-200. Two standard hauls are sampled from 0-25 m – the surface homogeneous layer and the upper mixed layer above the thermocline; and another two - from 25 to the bottom (or 200 m) - from the top of oxycline (usually at 200 m), at the thermocline and to its lower boundary. When the depth of the sampling station is less than 10 m one vertical haul is done.

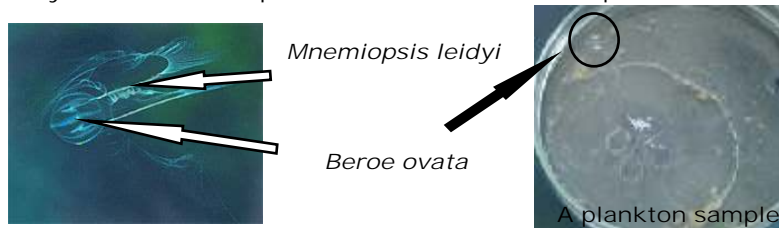
Mesozooplankton is sampled by a Juday net - a biconical net with non-filtrated upper part and filtrated lower part with open mouth diameter 36 cm and of 150  $\mu\text{m}$  nylon mesh size. The net is hauled vertically with a speed less than 1  $\text{m}\cdot\text{s}^{-1}$ . Egg net with 300  $\mu\text{m}$  mesh size is used for macrozooplankton. After sampling the net is always rinsed with a gentle flow of sea water with the open cod-end up. Strong flow is unacceptable. When jelly-fish appear in the sample, it is recommended to discard the sample and take a new one. After each sampling the sample jars are labelled with station, data, time, depth of haul, and number of hauls.

Then samples are preserved in 4% formaldehyde solution (1 part 40% formaldehyde solution and 9 parts water-sample). As some species can not be preserved (like *Aurelia aurita*, *Mnemiopsis leidyi*, *Beroe ovata* and *Pleobranchia pileus*), they are removed, rinsed, measured and counted at board laboratory.

Later in Institute's biolaboratory sub-sampling and microscopy analysis is conducted for taxonomical identification (species, genera, families, more high level taxons and different developmental stages of organisms, copepods, other invertebrates and fish, incl.) and for determination of zooplankton species abundance (Dimov's improved quantitative method), and biomass (estimated by using individual standard weights).

Other project teams process samples for parameters for which IO-BAS lacks expertise or equipment.

Sampling and statistical treatment of zooplankton abundance, community structure, biomass, size spectrum, interannual variability, possible shifts in the timing of seasonal cycles, changes in the boundaries of species distribution and the assessment of production rates and of species population dynamics produce data which is reported according to data reporting formats of SESAME. It contributes for assessing trends and regime shifts, for identifying large-scale geographic variations in zooplankton diversity. All the data will also be used for the mathematical models of the Black Sea ecosystem and for the prediction of its future development.



The photo to the right is a memory of SESAME collaboration in action: in Oct. 2007 Bulgarian RV Academic and Greek RV Aegeo met in the Black Sea to coordinate procedures for mooring and recovering sediment traps and to calibrate SESAME sampling and sample analysis. Both scientific crews are happy to meet after perfect work done.



## Let's talk about plankton

The plankton world is like a fairy tale where creatures are not always what they seem to be. They are often invisible but you can feel them there, out at sea and in shallow waters. As if bewitched the sea looks at times dressed in a mantle that changes colours. Plankton is almost always the wizard. Phytoplankton gives the green, but it also can paint the water in brown, yellow or even violet. The most exciting is that actually Man directs the motley sea parade with a magic wand without being conscious of His deed. Feeding the sea with nutrients from farms and factories, adding to them detergents and organics from households, Man makes the world for plankton. It flourishes happily and invades the water surface, thus depriving other creatures of light and oxygen. These are the weapons for defeating over plants and fish thousand times bigger than plankton. The battle field is merciless. Hundreds of thousands of fish can die in anoxia. The most cruel part is that the most food for plankton-feeding fish, the most danger for its survival.

The same fairy tells also about the life-and-death struggle between different plankton tribes. In the Black Sea kingdom the alien *Mnemiopsis* tribe which reigned unworried for almost 20 years is dethroned by new aliens, the *Beroe* tribe. Though each *Mnemiopsis* can bring out more than a thousand of new soldiers to the battlefield, *Beroe* is happy to meet them for lunch.

The tale of the plankton world is open ended. The sad thing about it is that Man still plays the role of the evil spectator that changes the roles and the characters. He holds the magic bat for giving life and death to the sea. Each of us, Earth people can enter this tale actively and write its happy end moral – in the name of Common Good.

## Photo of the day

### Science meets partners out at sea



## In 50 years ... Black or white?

We love to watch the sea. It is always amusing as change and shift are its other name... Entering the time machine you can fly over 50 years ahead in the future...

What do you see?

The seashore looks like a storehouse for garbage in the ruins of once beautiful restaurants. The strongly polluted dangerously toxic sea water has driven tourists away long ago as well as local people that used to relax at the beach. It's summer again and I can't stay long in the open air – it is extremely hot, about 50°C in the shade. Standing high above the sea I try to avoid the breeze winds dispersing the awkward smell of dead birds and fish. I rarely go out of the range of air-conditioners but today I try to remember the white and black swans that used to visit the bay when I was young. I can still hear the happy laughter of my friends feeding them. It's sad that my grandchildren have never lied in the warm sun on the beach. Now the sands are resting place only for homeless dogs and snakes and it looks like a desert. Sour tear drops roll hopelessly down my wrinkled cheeks...

What shall we do to find the right way?

The seashore looks like Eden. Trees spread their shade at the border of the beach. I sit on the golden sand in the warm sunshine and my grandchildren noisily play around me. Sea water sparkles on their healthy bronze bodies like the happiness in their bright eyes. Listening to bird songs I think over the lunch menu – fish with seaweeds or shrimps and muscles. We'll have to take the underground to go to my favourite restaurant in the city. Once it was a chemical factory for washing powder right behind my kindergarten but now everything has changed - green and fresh in the breeze. Back in my memories sweet tears of happiness roll down my ruddy cheeks...



## Found in a bottle

at S-BG00-03 (Lat - 43.130 N Deg.Dec; Long - 29.214 E Deg.Dec)

### A message from youngsters on land to the scientists at sea

Dear Madames and Sirs,

Listen to the voice of the sea and its inhabitants! We believe you can hear and comprehend it most clearly. Bring to us the appeal of the Black Sea and help us understand its beauty, wisdom and grieves. Translate for us its secrets and bravely lead us in the battle for keeping it save and sound in stormy days of economical crisis as well as in sunny days of prosperity.

Thank you for your efforts to find the truth about what happens to our sea now and what is its future destiny. We care for and about it and we will always be ready to follow your wise advice for the sake of its sustainable future. Let us be your



The interview

## Meet a scientist

*Kremena Stefanova – biologist,*

*IO-BAS, Varna, participant in Bulgarian SESAME cruises*  
Please, list three things to define the Sesame project from your professional point of view?

K.S.: New different sampling and analysis methods, multifocal assessment of the marine ecosystem, answers to number of questions about its future development.

What are your investigation tasks in the project work of the Bulgarian scientific team?

K.S.: I am part of the scientific crew on seasonal cruise expeditions on RV Academic (September-October, 2008 last). For less than a week I gather mezozooplankton samples. Monthly sampling is conducted at monitoring stations at the shore. Daily work in the laboratory fills my time in between.

What changes in the Black Sea ecosystem do you notice during the last years and can we treat plankton as an indicator for its condition?

K.S.: The changes concern the main zooplankton components (copepods and cladoceras, incl.) as well as the dynamics of their dominancy. An important change came with the introduction of invasive species like *Mnemiopsis leidyi* first and *Beroe ovata* later, for example. Now we still watch the processes and analyze the result of their influence and interaction as they form a prey-predator interconnection. It is very important to constantly monitor the ecosystem and compare current data to old datasets. Only thus we can determine the changes occurring. As for the second question, zooplankton is mostly an indicator of climate change because different species need specific temperature ranges, so their distribution and abundance may indicate the environmental changes.

What was the most exciting event during your SESAME cruises?

K.S.: Every day on board is very exciting. Though I know what to expect, samples still excite me. Probably the most exciting, meaning the most extraordinary, event was to see the sediments recovered with the sediment trap from one of the deepest parts of the sea bed - a 15-20 cm column of bottom sediments that had been formed for quite a long time is really moving.



At IO-BAS



Sea bottom sediments

## Can you believe it?

I have a dream...

The main sport practiced all around the Black Sea is "Free riding". This statement sounds extremely strange but everybody that lives around the sea will well agree with it. Community and industrial waste water is poured into the Black Sea tank. Dealing with oil spills is a common news. Solid wastes are still dropped and dipped. Over-fishing is a question of skill and intelligence between fishermen, not to speak about the damages caused by inevitable river flow or alien species introduced through shipping.

The big question is "Who orders, who eats the pie and who will pay?". Can governments pay for everything when those who get profits are not paying? Do they want to pay? The only reasonable answer is "NO". What then?

The Strategic Action plan for Rehabilitation and Protection of the Black Sea and national plans follow the best strategy: control pollution and fishing, encourage environmentally friendly industries and services using end-of-pipe technology, manage and reduce waste disposal, etc. Nevertheless, the question put is still standing?

I have a dream ... to live by a Pontus hospitable.

People my age see the light of hope in full control. Then let the profiteer pay. At first sight it sounds too much alike Orwell or Big Brother Eye. Pessimists will argue the total control policy with dangers of corruption and non-democracy. Realists will add that full control is impossible. Even though people that hold the same views as ours think that control at all levels, strong civil society and education put together can be efficient if not sufficient. More power for the public and especially for young people in policy-design and in decision-making can make a change.

Do you think it is only a dream?

*/If you are interested, Stoyan from our team will explain the idea in details /*



### Breakfast:

BANITZA – baked white wheat leaves with spinach and white cheese stuffing served with Bulgarian goat yogurt or boza.

COFFEE OR TEA and apple biscuits.

### FRUITS

### Lunch:

SMASHED PEA AND BARLEY SOUP - hearty split pea with barley, carrots, onions and savory herbs, garnished with chopped scallions (All vegetarian).

FRIED TURBOT - served with sesame-noodles and saffron-sauce.

SESAME CHICKEN SALAD - thinly sliced Chinese cabbage with grilled, marinated breast of chicken, toasted almonds, crisp wontons, red bell peppers, green onions, mandarin oranges, sesame seeds and sweet sesame dressing.

KEY LIME PIE - Key limes in a Graham cracker crust, served with real whipped cream.

### Dinner:

MEDITERRANIAN starter - grilled mushrooms, grilled eggplant, sun-dried tomatoes, caramelized onions, Mozzarella and Parmesan cheeses, served with sun-dried tomato marinara.

OPEN FACED OMELETTE - tomato, mozzarella, pesto & rocket.

LETTUCE SALAD - various dressings.  
APPLE CRISP - Granny Smith apples, slow-baked with a crispy brown sugar and butter topping, served warm or a la mode.

Bon appetite!

## Chef's Offer:



## Marine Weather: Shipping Forecast

1100 AM PDT MON July 30 2009

**Wind:** Backing N to NW and W - Northerly 5 or 6 knots, but variable 3 or 4 knots in west.

**Sea State:** Smooth to Slight - Wave period: 20 sec; Wave height: 0.8 m. Gale and hurricane force – later: not expected within next 12 hours. Ground-sea-swells expected at 1430 till 1630.

**Weather:** Fair - Sunny weather with medium cloudiness. From 1100 to 1600: sunny hot tickling hours. Showers not expected.

**Visibility:** Good - 32 n miles.

**Air Pressure:** 1015 hPa

**Movement of pressure systems:** Slowly - Moving at less than 15 knots

**Air Temperature:** 12°C / 18°C.

**Sea Temperature:** 10°C /13°C

**Special warnings:** excellent weather for sun and sea bathing. Use of sun protection cream



## Braking News

### New island in the Black Sea

At 3 p. m. a new island was detected in the Black Sea 128 n miles East of Varna.

The relevant Black Sea Commission authorities were informed. A cleaner-ship has already been sent to collect the rubbish in quick response.

### Danger announced

Last night the helmsman noticed blond hairs, magnifying blue eyes, sparkling silver skin around. Captain announced alert of danger from mermaids. In any case the helmsman was inflicted penalty for sleeping on duty and a greeting message was sent to his girlfriend.

### At the forefront of science everything is calm

All equipment is in perfect condition and the scientific crew is happy to follow the cruise plan. All other rumours are denied. The chef is still on board.

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