MISIS Final Meeting
24-26 June, Danube-Delta

MSFD Guiding Improvements in the Black Sea Integrated Monitoring System

PA3 - Contribution to existing database systems (national, Black Sea Commission, WISE-MARINE) as far as marine/coastal environment monitoring is concerned

Activities

3.1 -**Overview of the gaps in data reporting** of the beneficiary countries to EEA and BSC measured against the availability of data in the national systems of the countries;

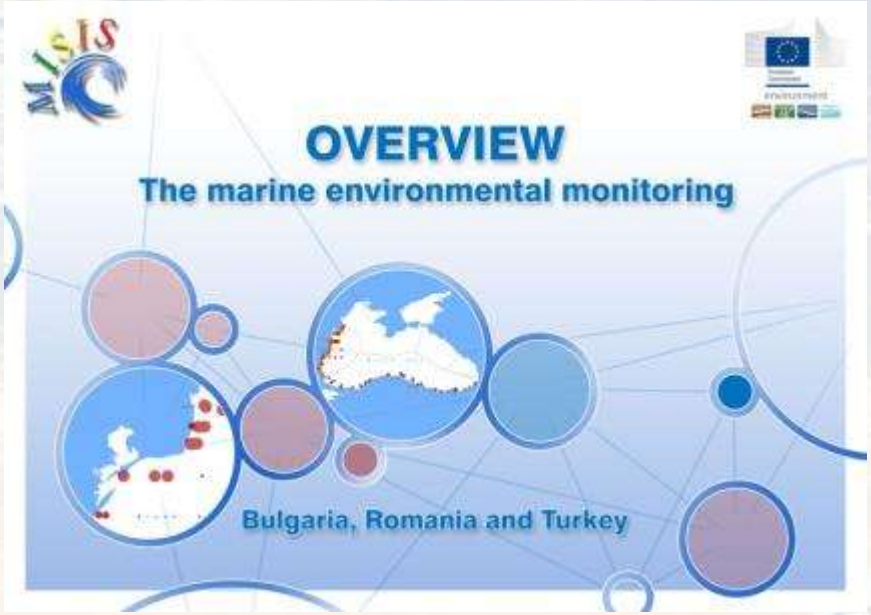
3.2 - **Recommendations on** strengthening the **reporting to the BSC**

3.3 - **Recommendations on** strengthening the **reporting to Wise-Marine**

3.4 - **Cooperation** with the EMBLAS Project, and other relevant projects (Perseus, Coconet, Irirs-Ses); Facilitation of the data infrastructure developments planned and avoiding of overlapping of activities.

3.1 -Overview of the gaps in data reporting

- An overview of the marine environmental monitoring in Bulgaria, Romania and Turkey have been produced and gaps in data reporting to BSC and EEA have been identified for the period 2006-2012.



Gaps identified in data reported to BSC

	2006			2007			2008			2009			2010			2011			2012		
	RO	BG	TR	RO	BG	TR	RO	BG	TR	RO	BG	TR	RO	BG	TR	RO	BG	TR	RO	BG	TR
phytoplankton	66	8	0	0	0	0	59	0	0	30	8	0	46	28	0	51	12	0	0	0	0
Chlorophyll a	0	0	0	0	0	0	0	0	0	24	0	0	45	28	0	39	0	0	0	0	0
zooplankton	30	5	0	0	0	0	58	0	0	76	12	0	33	24	0	46	12	0	0	0	0
macrophytes	6	0	0	0	0	0	0	0	0	41	4	0	44	0	0	14	0	0	0	0	0
zoobenthos	35	10	0	0	0	0	31	0	0	52	15	0	33	13	0	25	15	0	0	0	0

Gaps identified in data reported to BSC

	2006			2007			2008			2009			2010			2011		
chemistry	RO	BG	TR	RO	BG	TR	RO	BG	TR	RO	BG	TR	RO	BG	TR	RO	BG	TR
nutrients+other	1531	0	0	2893	69	6918	3778	29	17215	2846	0	13908	3173	0	7721	2883	326	7622
bottom sediments	667	0	0	1111	0	620	898	0	699	1844	0	488	2013	0	307	2004	0	0
biota contamination	24	0	0	96	0	80	60	0	1318	111	0	13	9	0	20	63	0	0

Gaps identified in data reported to EEA

chlorophyll *a*

	2006	2007	2008	2009	2010	2011	2012
BG	0	0	0	0	28	0	108
RO	0	100	60	53	32	0	0
TR	0	0	0	0	0	0	0

nutrients

	2006	2007	2008	2009	2010	2011	2012
	0	0	0	0	0	0	0
BG	96	36	10	0	0	84	756
RO	436	1352	716	532	222	432	0
TR	0	0	27	135	75	0	0

hazardous substances in seawater

	2006	2007	2008	2009	2010	2011	2012
BG	0	0	0	0	0	248	48
RO	649	1100	1553	1172	1014	804	0
TR	0	0	0	0	0	0	0

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environment

Gaps identified in data reported to EEA

hazardous substances in sediment

	2006	2007	2008	2009	2010	2011	2012
BG	0	0	6	3	0	0	0
RO	568	816	751	1263	884	756	0
TR	0	0	18	36	0	0	0

hazardous substances in biota

	2006	2007	2008	2009	2010	2011	2012
BG	0	0	0	0	0	0	0
RO	112	84	60	111	9	63	0
TR	0	0	0	0	0	0	0

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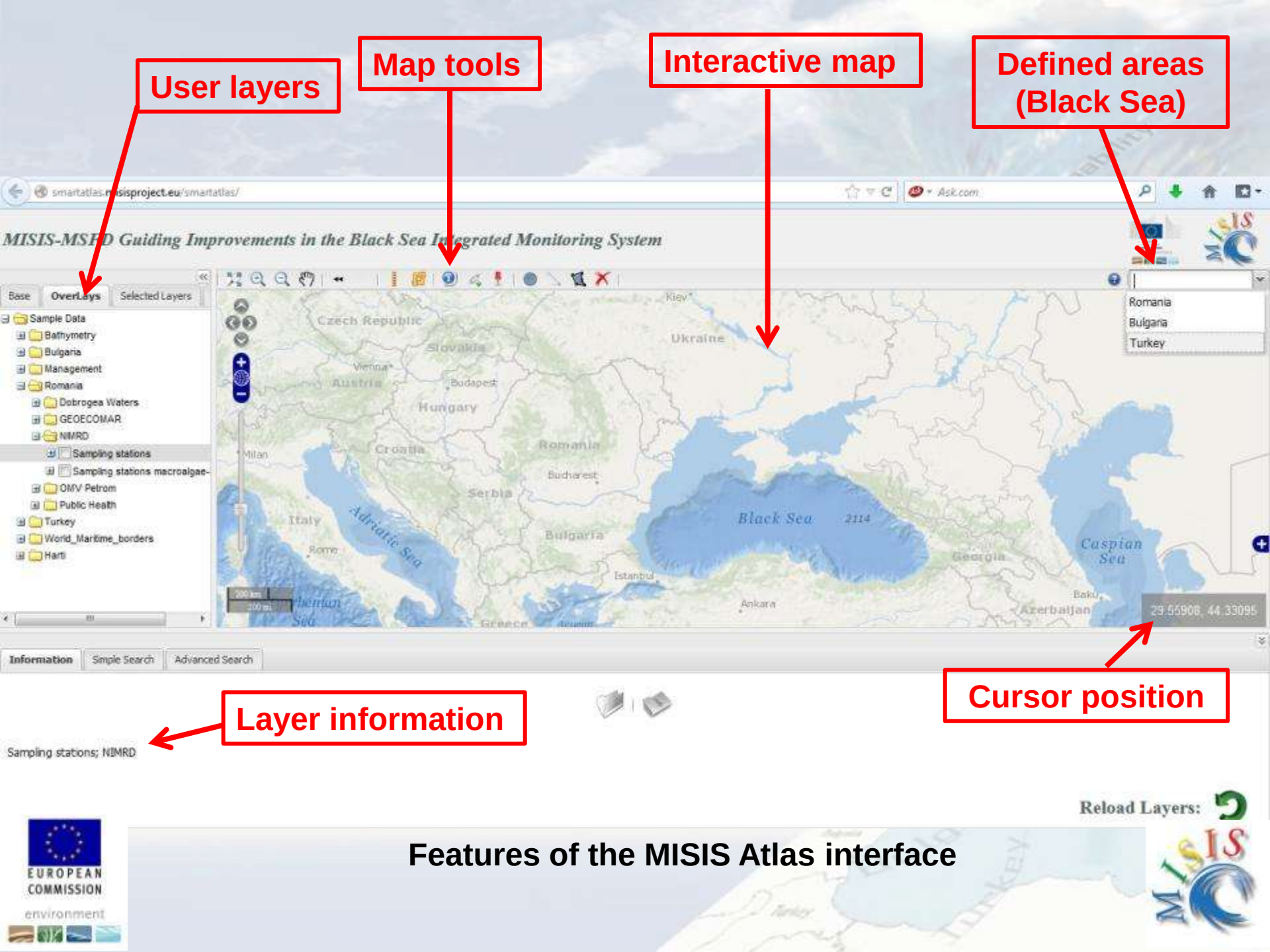
3.1 -Overview of the gaps in data reporting

- An inventory of data bases at national level was prepared based on the information provided by the stakeholders in the MISIS Questionnaire.
- Reporting obligations of beneficiary countries to different organizations have been overviewed in the Diagnostic Report II.
- In order to further develop information management tools in support of decision-making, a WebGIS application *(*http://smartatlas.misisproject.eu/smartatlas/*)* with data/information related to the MSFD was created

MISIS ATLAS:

- **MapServer** is an application ***which incorporate vector and raster data and can access external data*** also through a Web Map Service.
- The application **Smart Atlas** was used as the ***interface*** to MapServer


User layers
Map tools
Interactive map
Defined areas (Black Sea)
MISIS-MSFD Guiding Improvements in the Black Sea Integrated Monitoring System
Base
OverLays
Selected Layers
Sample Data
Bathymetry
Bulgaria
Management
Romania
Dobrogea Waters
GEOECOMAR
NIMRD
Sampling stations
Sampling stations macroalgae-
OMV Petrom
Public Health
Turkey
World_Maritime_borders
Harti
Romania
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Information
Simple Search
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Layer information
Sampling stations; NIMRD
Reload Layers:
Features of the MISIS Atlas interface
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Biological parameters

- the biological parameters

Number of station reported in the period 2006-2012

Biological parameters	Bulgaria	Romania	Turkey
Chlorophyll a	30	57	**81**
Phytoplankton	30	57	**31**
Zooplankton	27	56	**23**
Zoobenthos	24	55	**13**
Phytobenthos	**27**	**27**	**ND**

- The number of monitoring stations is not permanently fixed, and in some of the countries observations do not take place at the same stations each and every year;

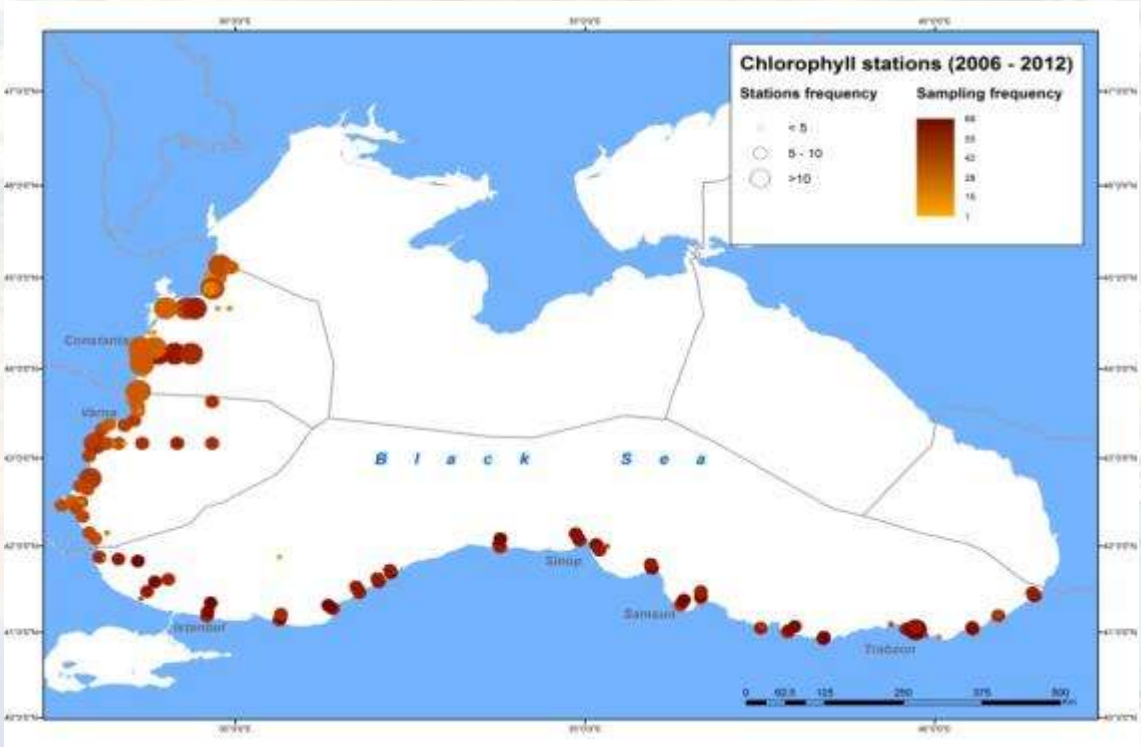
- in open-sea there are no stations in most of the countries, and also reference stations are mainly missing.

Chlorophyll a

- a total of 168 stations were reported to be monitored by the partners Turkey (81 stations), meaning 1.4 and 2.7 higher than Romania (57 stations) and Bulgaria (30 stations) respectively; however, Turkey reported no station between 2010 and 2012.

Chlorophyll-a	2006	2007	2008	2009	2010	2011	2012
RO	96	↘ 89	↘ 85	↗ 234	↘ 88	↗ 138	↘ 57
BG	30	↘ 16	17	.....	↗ 71	↗ 120	↗ 582
TR	434	↘ 430	↗ 1057	↘ 760	.....	.....	.....

Number of chlorophyll-a data reported



Phytobentos

- phytobenthos has been reported to be monitored at coastal stations only by Romania and Bulgaria, but not every year.;
- 2012, each of the two countries reported the same number of stations (27),
- the smaller number reported pertained to Bulgaria (5 stations in 2006). There are two (Romania) and three (Bulgaria) years without reporting.
- During the seven years of reporting, altogether **304 data** were reported by the two countries, out of which 234 were made by Romania.

Number of phytobenthos data reported

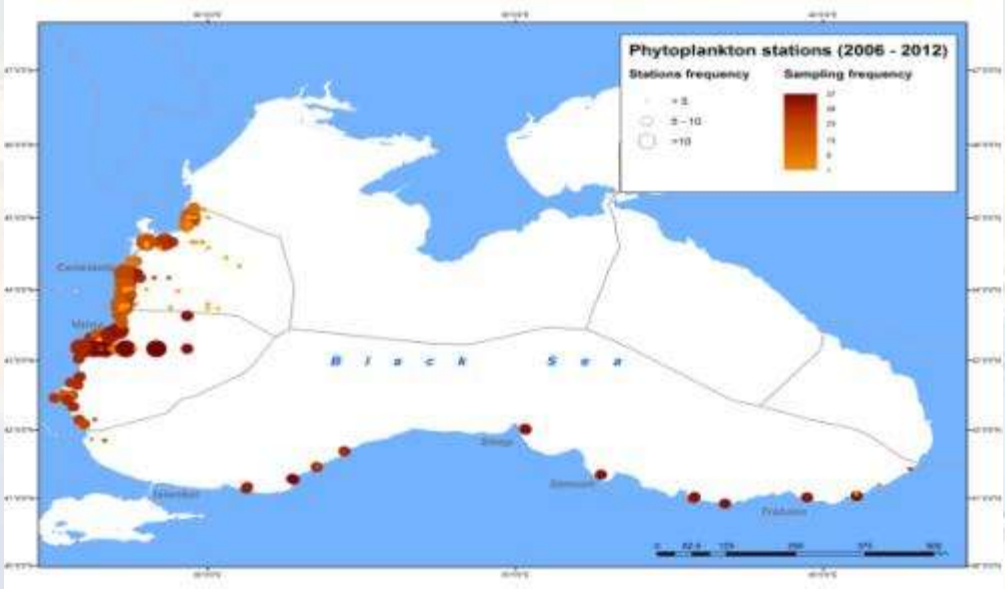
Phytobenthos	2006	2007	2008	2009	2010	2011	2012
RO	29	.....	.....	↗ 38	↗ 44	↘ 42	↗ 81
BG	5	↗ 18	↘ 15	.....	.....	.....	↗ 32
TR	.....	.....	.....	.....	.....	.....	.....

Phytoplankton

- 118 sampling stations were reported for phytoplankton, NIMRD (Romania) monitored the highest number stations (57), with 27 and 26 stations respectively higher than Bulgaria and Turkey;
- NIMRD performed continually monitoring the phytoplankton, while Bulgaria and Turkey interrupted it for one or two years.
- the highest number of reported data (779) pertained to Turkey, almost the same number was reported by Bulgaria (712); Romania reported only 431 data.

Table - Number of phytoplankton data reported

Phytoplankton	2006	2007	2008	2009	2010	2011	2012
RO	70	↗ 92	↘ 70	↘ 35	↗ 46	↗ 58	↗ 60
BG	26	↘ 16	·····	↘ 12	↗ 71	↗ 131	↗ 456
TR	199	↘ 164	168	168	·····	↘ 80	·····

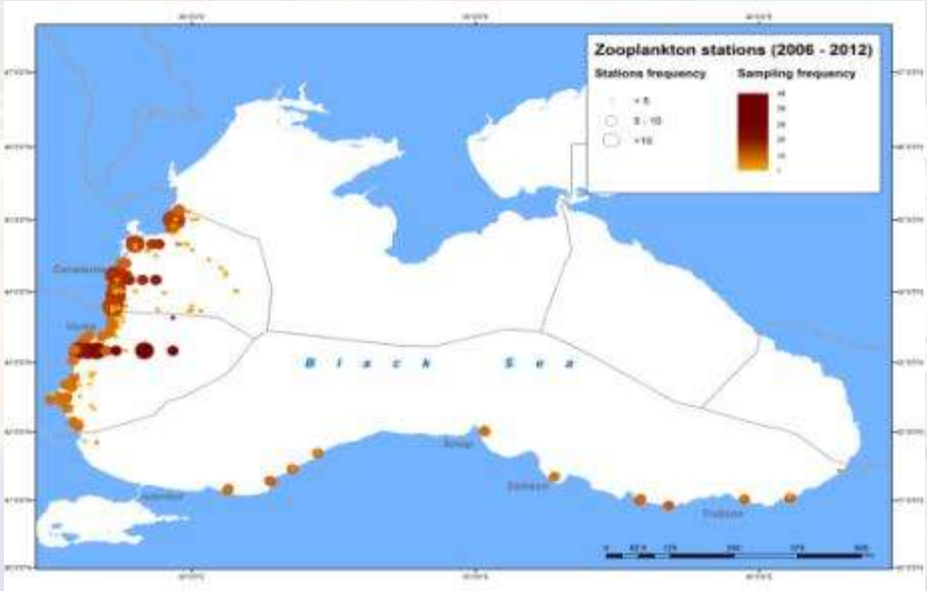


Zooplankton

- the zooplankton monitoring is reported to be carried out at 106 sites, settled on the whole Romanian, Bulgarian and Turkey coasts.
- are visible differences in the geographical coverage of the stations, while Romania reported a high number of stations 56, the Bulgarian and Turkey coasts were poor covered, only 27 and 23 stations respectively.
- Bulgaria reported 338 data, Romania 293, and Turkey only 154. Both Romania and Turkey reported almost the same number of data reported each year.

Table - Number of zooplankton data reported

Zooplankton	2006	2007	2008	2009	2010	2011	2012
RO	32	↗ 47	↗ 61	.....	↘ 41	↗ 57	↘ 55
BG	5	↗ 12	↗ 17	↘ 12	↗ 24	↘ 12	↗ 256
TR	22	21	↗ 44	42	↘ 10	15	.....

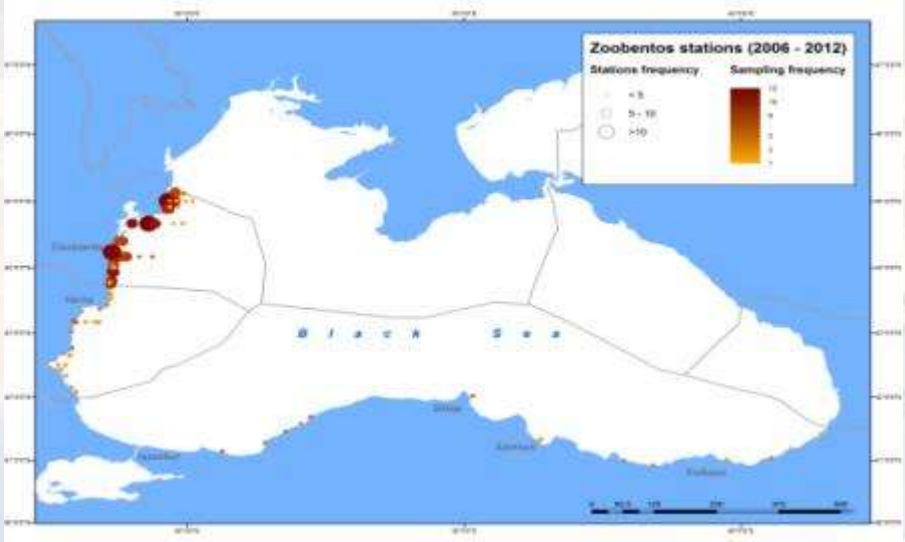


Zoobenthos

- the number of reported monitoring stations for zoobenthos was 92, Romania reported the highest number of stations (55); a number of 2.3 times lower was reported by Bulgaria (24) and 4.2 by Turkey (13 stations).
- the highest number of data reported pertained to Romania (268), only 77 data were reported by Bulgaria and 47 by Turkey.
- Only Romania monitored the zoobenthos every year, Bulgaria and Turkey ceased the monitoring two or three years respectively.

Table - Number of zoobenthos data reported

Zoobenthos	2006	2007	2008	2009	2010	2011	2012
RO	35	↘ 24	↗ 33	↘ 24	↗ 41	↗ 56	55
BG	10	8	.....	.....	↗ 13	↗ 21	↗ 25
TR	10	.....	↗ 15	↘ 9	↗ 13	.....	.....



Nutrients

The three MISIS partner countries have reported the following nutrients parameters:

- Ammonium nitrogen (NH4)
- Nitrate nitrogen (NO3)
- Nitrite nitrogen (NO2)
- Phosphate phosphorus (PO4)
- Silicate (SiO4)
- Total nitrogen (TN)
- Total Phosphorus (TP)
- Total Organic Carbon (TOC)

During period 2006-2012, there was a good coverage of the nutrient monitoring in the Black Sea. There are some gaps in all parameters, for example Turkey monitored only 6 parameters comparatively with Romania and Bulgaria, which monitored 8 and 9 parameters respectively. There are no NH4 and TN monitored stations in Turkish waters.

Table 2 - Number of reported stations

Nutrients	Bulgaria (IO-BAS)	Romania (NIMRD)	Turkey (TUBITAK)
N (NH4)	30	61	
N (NO3)	30	61	81
N (NO2)	30	61	81
P (PO4)	30	61	81
SiO4	30	61	81
TN	19	16	
TP	21	60	81
TOC [mg/L]	19	35	81

Ammonium nitrogen (NH4)

- Only Romania and Bulgaria reported ammonium nitrogen (NH_4) stations, Romania made reporting each year.
- 61 and 30 stations respectively were reported by the two countries. Bulgaria reported stations only in 2008 and 2012.
- The highest number of ammonium nitrogen data pertained to Romania (1,738), and the number was ranging between a minimum value (139), in 2012, and a maximum one, in 2006 (373).
- Bulgaria reported a number of data almost three times lower (599), but the great majority of them were reported in 2012 (582).

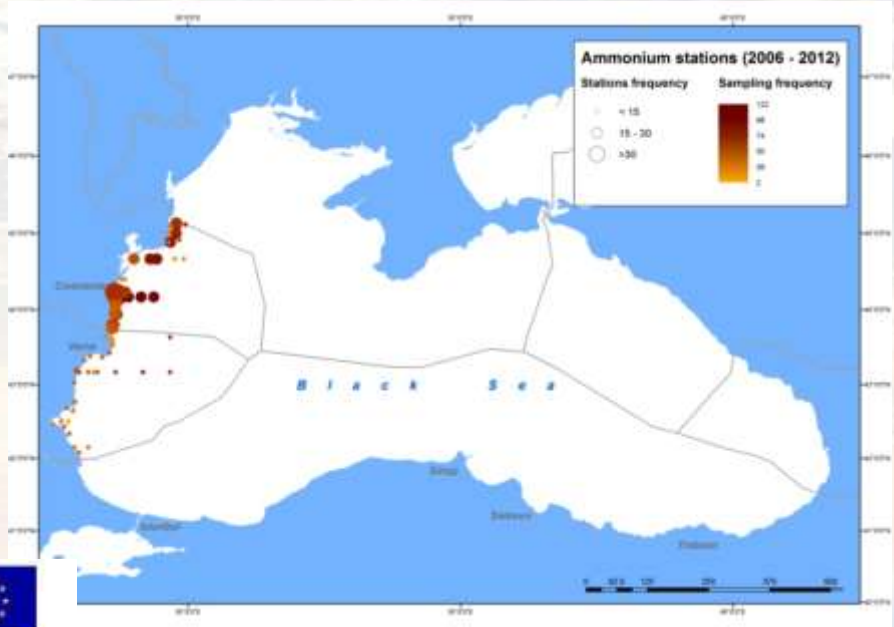


Table - Number of NH_4 data reported

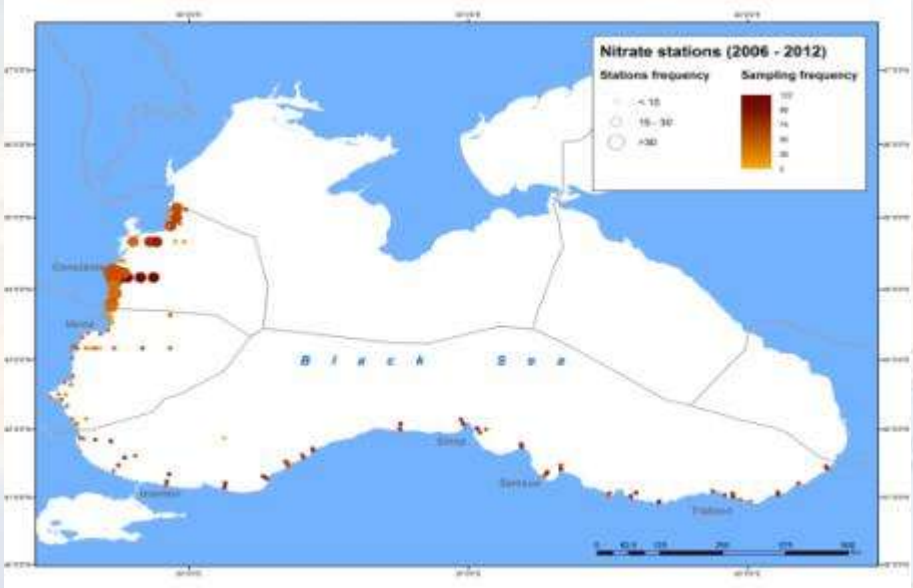
NH_4	2006	2007	2008	2009	2010	2011	2012
BG	.....	.....	17	.....	.....	.....	582
RO	373	↘ 294	↘ 198	↗ 357	↘ 208	↘ 169	↘ 139
TR	.....	.....	.....	.....	.....	.....	.....

Nitrate and nitrite nitrogen (NO3 – NO2)

- 344 stations and there is a good geographical coverage in the whole Black Sea..
- every year in Romanian waters, the exception is a number of stations along the Bulgarian and Turkey coasts, which ceased to monitor in one (2009) or two years (2010 and 2011) respectively.
- a total of 11,550 data being reported in the whole period of reference.
- Turkey reported the highest number of nitrate (3201) and nitrite (3201) data, followed by Romania with 1738; Bulgaria reported the lowest number, only 836.

Table - Number of NO_3 - NO_2 data reported

NO_3 - NO_2	2006	2007	2008	2009	2010	2011	2012
RO	373	↘ 294	↘ 198	↗ 357	↘ 208	↘ 169	↘ 139
BG	30	↘ 16	17	.....	↗ 71	↗ 120	↗ 582
TR	865	↘ 387	↗ 1167	↘ 782	.....	.....	.....

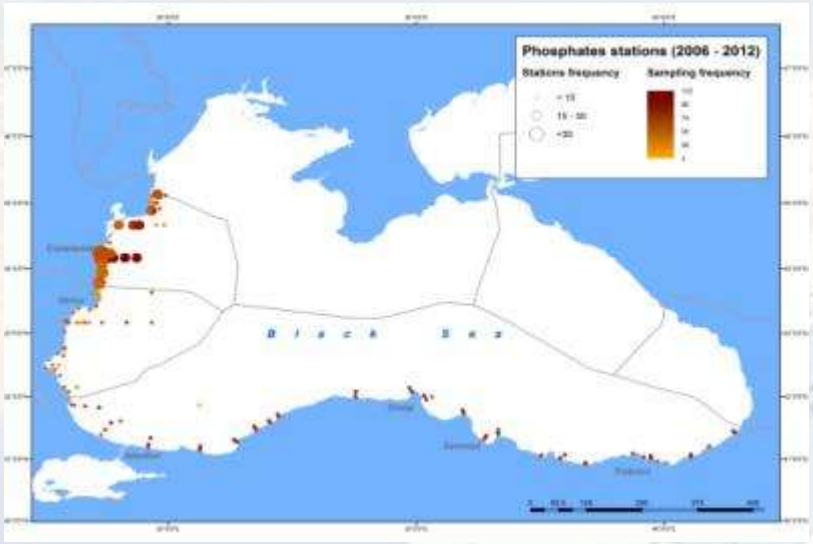


Phosphate phosphorus (PO4)

- 172 reported monitoring stations for phosphate phosphorus (PO4) in the Black Sea resulting in a good geographical coverage;
- the highest number of stations is sampled at the Turkish littoral (81), followed by Romania with 61 stations.
- The exception is the Bulgarian coast, were sampling is done only in 30 stations.
- A total of 5,615 data were reported by the three countries, most of them (3,074) being reported by Turkey, 1,705 data, Romania and Bulgaria (836);

Table - Number of phosphat phosphorus (PO_4) data reported

PO_4	2006	2007	2008	2009	2010	2011	2012
RO	354	↘ 291	↘ 191	↗ 357	↘ 209	↘ 169	↘ 134
BG	30	↘ 16	17	.....	↗ 71	↗ 120	↗ 582
TR	836	↘ 426	↗ 960	↘ 852	.....	.....	.....

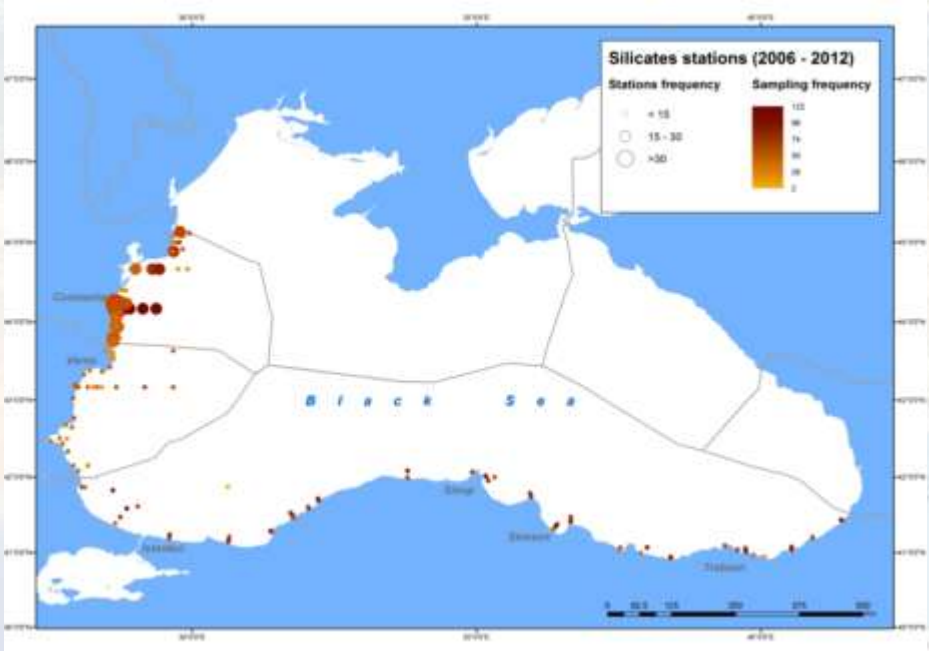


Silicate (SiO_4)

- 172 stations were reported by the three countries during the seven years.
- every year in Romania waters, the exception is a number of stations along the Bulgarian and Turkey coasts which ceased to monitor in one (2009) or two years (2010 and 2011) respectively.
- 5,943 data was reported in the period 2006-2012: Turkey - 3,369 data, followed by Romania 1,738 data and Bulgaria 836.

Table - Number of SiO_4 data reported

SiO_4	2006	2007	2008	2009	2010	2011	2012
RO	373	↘ 294	↘ 198	↗ 357	↘ 209	↘ 169	↘ 138
BG	30	↘ 16	17	.....	↗ 71	↗ 120	↗ 582
TR	865	↘ 431	↗ 1193	↘ 880	.....	.....	.....

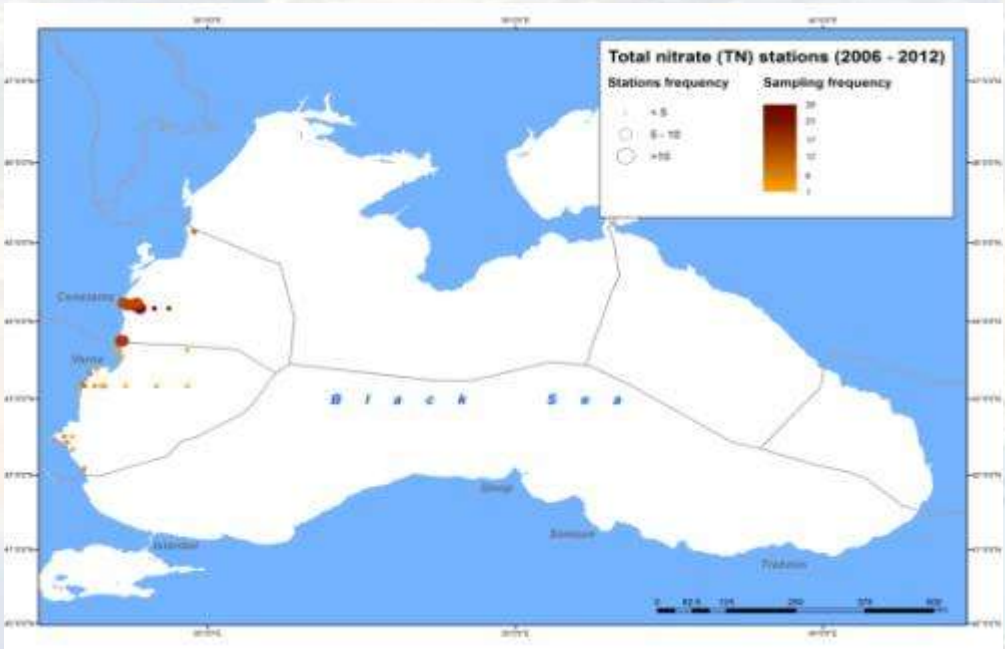


Total nitrogen (TN)

- 16 and 19 stations were reported by the Romania and Bulgaria, but while Romania made reporting in the first three years, Bulgaria made reporting only in 2011.
- TN data is much more reduced, only 185 data in Romania and 38 in Bulgaria.

Table - Number of total nitrogen data reported

TN	2006	2007	2008	2009	2010	2011	2012
RO	56	↗ 100	↘ 29	.....	.....	.....	.....
BG	.....	.....	.....	.....	.....	38	.....
TR	.....	.....	.....	.....	.....	.....	.....

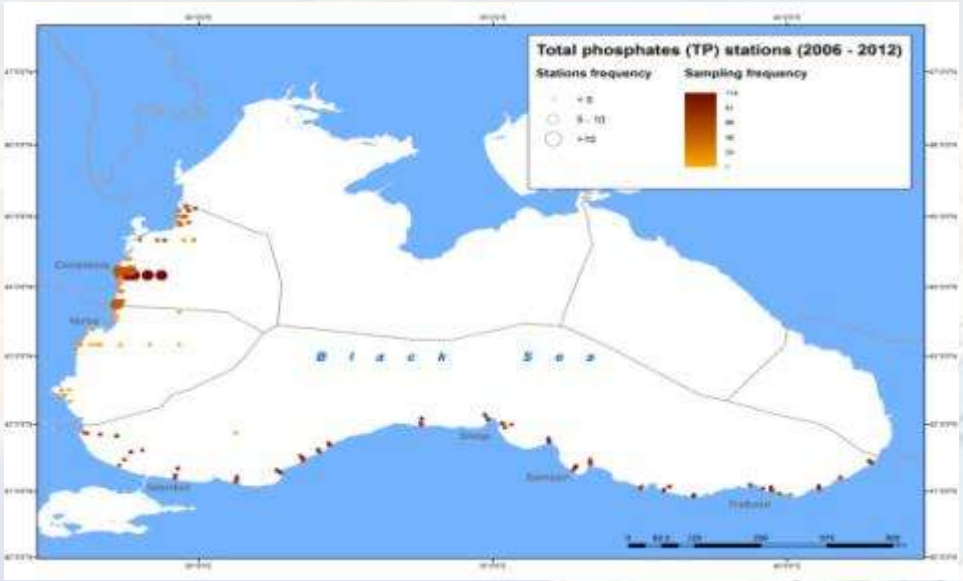


Total phosphorus (TP)

- total phosphorus (TP) is reported being monitored at 162 stations, good geographical coverage in the whole Black Sea.
- Turkey reported the highest number of stations (81); Romania reported 60 stations. Bulgaria reported only 21 stations and only in 2011.
- 1,275 reported data, Romania made reporting almost every year, excepting 2012. Although Turkey has no reporting in the last three years (2010-2012), it reported the highest number of data (3,393); Bulgaria reported 42

Table - Number of total phosphorus data reported

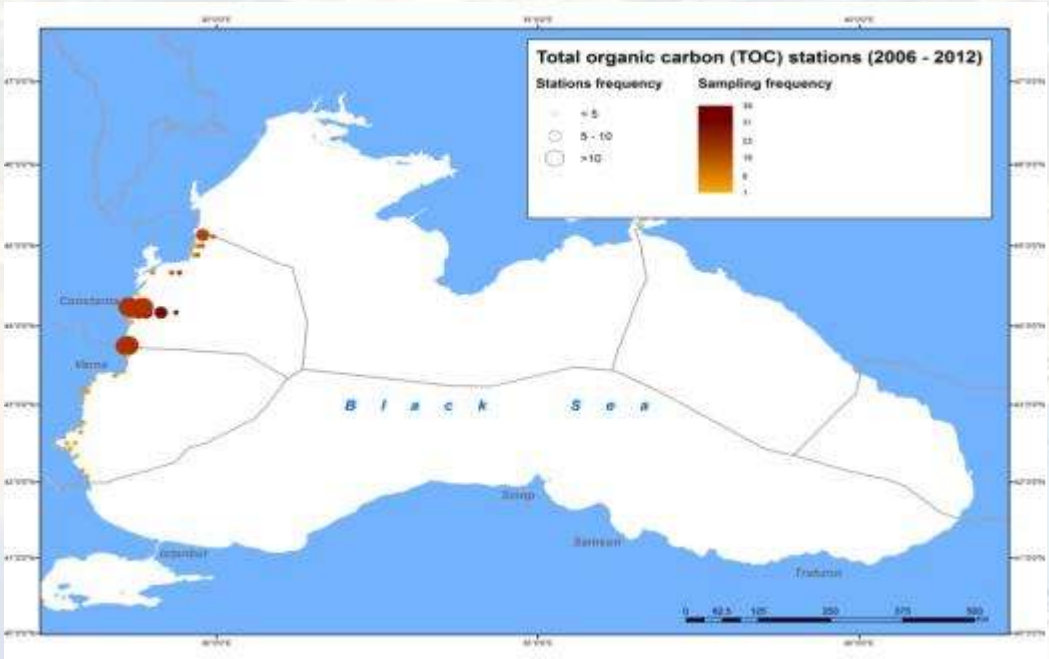
TP	2006	2007	2008	2009	2010	2011	2012
RO	259	↘ 204	↘ 149	↗ 352	↘ 142	↗ 169	.....
BG	.....	.....	.....	.....	.....	42	.....
TR	865	↘ 435	↗ 1211	↘ 882	.....	.....	.....



Total organic Carbon (TOC)

Table - Number of TOC (in water)data reported

TOC	2006	2007	2008	2009	2010	2011	2012
RO	35	↗ 74	↗ 114	↘ 64	↗ 87	.....	.....
BG	.....	.....	.....	.....	.....	.....	.....
TR	.....	.....	.....	.....	.....	.....	.....

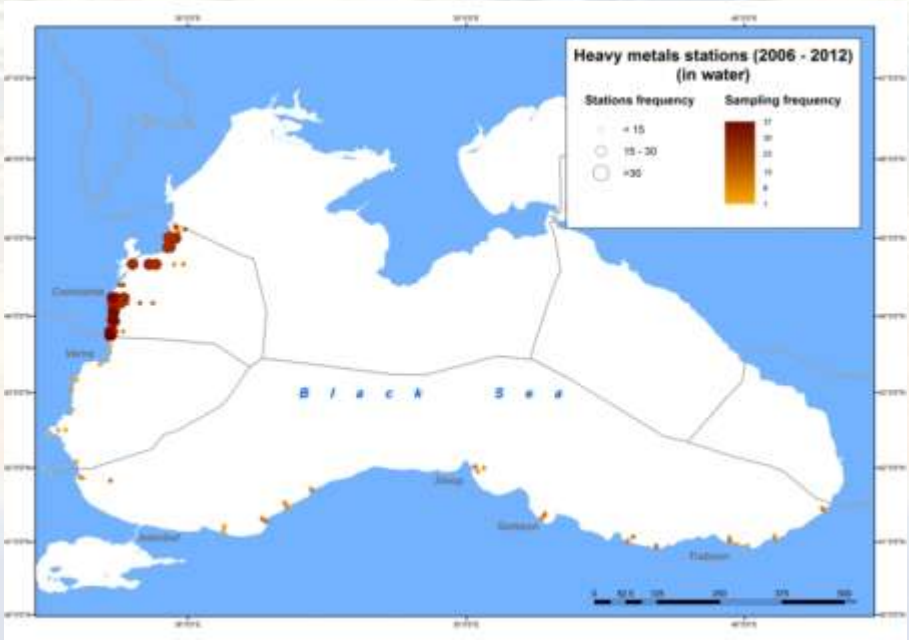


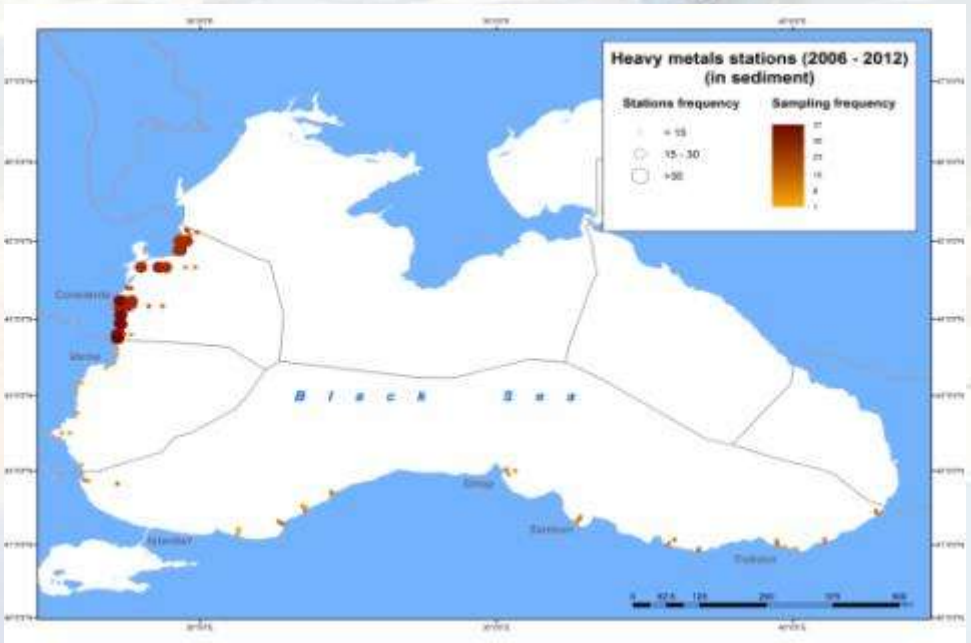
Heavy metals (HM)

Tabel - Number of trace metals (in water) data reported

Trace metals	Romania (NIMRD)	Bulgaria (IO-BAS)	Turkey (TUBITAK)
Fe_2O_3, %		40	
MnO, %		40	
Mn, µg/l			590
Fe, µg/l			606
Hg, µg/l		22	482
Zn, µg/l		22	
Ni, µg/l	598	28	
Cr, µg/l	598		452
Co, µg/l		20	
Pb, µg/l	598	22	571
Cu, µg/l	598	22	607
Cd, µg/l	598	36	605
As, µg/l		20	
Al, µg/l		20	

- At the **Romanian** littoral - 5 heavy metals were analyzed (Ni, Cr, Pb, Cu and Cd) in water in sediments, all stations are reported being monitored every year, 25 reported water stations and 598 data.
- IO-BAS (**Bulgaria**) carried out a monitoring of the heavy metals only in 2011, and only for water, in a number of 10 stationsfor 11 compounds (Fe_2O_3, MnO, Hg, Zn, Ni, Co, Pb, Cu, Cd, As, Al).
- From 2006 till 2009, TUBITAK (**Turkey**) analyzed 7 heavy metals (Mn, Fe, Hg, Cr, Pb, Cu, Cd) from water samples collected in 32- 41 stations.





Total petroleum hydrocarbons (TPHs)

Romania:

- The organic pollutants were analyzed in 28 stations. The monitoring of water samples covers the tipologies included in Water Directive Framework and MSFD, for transitional, coastal and marine waters.
- 676 data were reported, the maximum in 2012 (159), and the minimum one in 2010 (42).
- For sediments the sampling for TPHs, was performed in 22 stations; 413 data were reported,

Bulgaria:

- No data are collected from the **Bulgarian** waters or sediments related to this parameter - total petroleum hydrocarbons.

Turkey:

- TUBITAK made also reporting for TPHs, both for water and sediments, during 2006-2010. 305 data were reported for sediments, the samples obtained from a number of 55-70 stations.

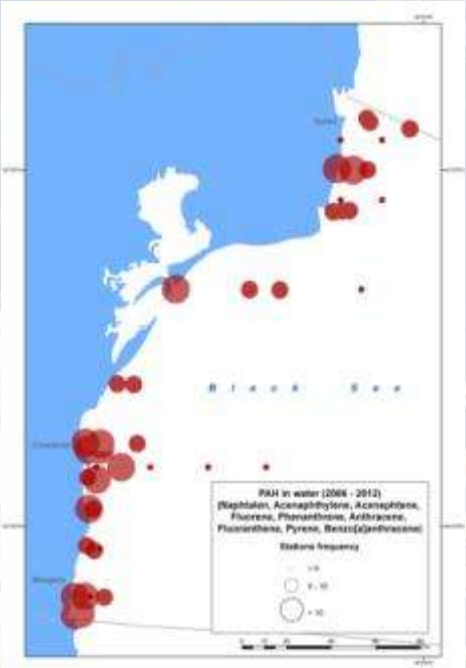
Polinuclear aromatic hydrocarbons (PAHs)

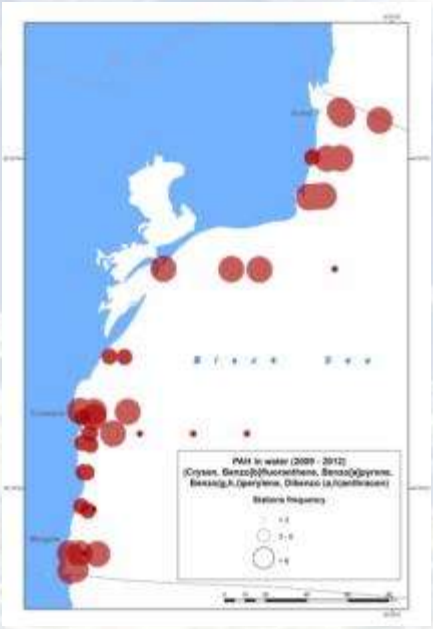
Romanian littoral (NIMRD):
- water and sediment samples.
- 15 organic contaminants - prioritary dangerous substances (naphtalene, acenaphthylene, acenaphthen, fluorene, phenanthrene, anthracene, fluoranthene, pyrene, benzo[a]anthracen, crysene, benzo[b]fluoranthene, benzo[k]fluoranthene, benzo[a]pyrene, benzo(g,h,i)perylene, dibenzo(a,h)anthracene) were identified.
- The number of reported stations and data was almost the same for each of the analyzed contaminants (minimum 25, maximum 32). Thus, naphthalene (398), fluoren (329) and phenanthren (312) were the most present contaminants in the Romanian samples.

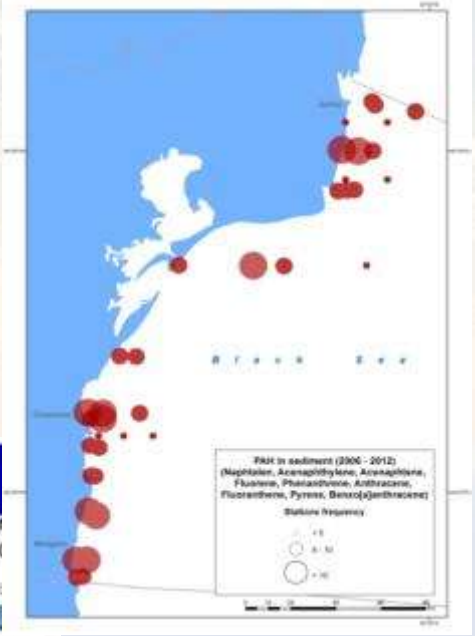
Bulgaria (IO-BAS):
- analyzed 11 PAH compounds only in one year (2006) (4-tert-octilphenol, naphtalene, anthracene, fluoranthrene, benzo(b)fluoranthren, benzo(k)fluoranthrene, benzo(a)pyrene, ideno(1,2,3-c,d)pyrene, benzo(g,h)perylene, pentachlorbenzene, hexachlorbenzene), from a netwrok of 11 stations.
- 16 to 22 data were reported for each compound.

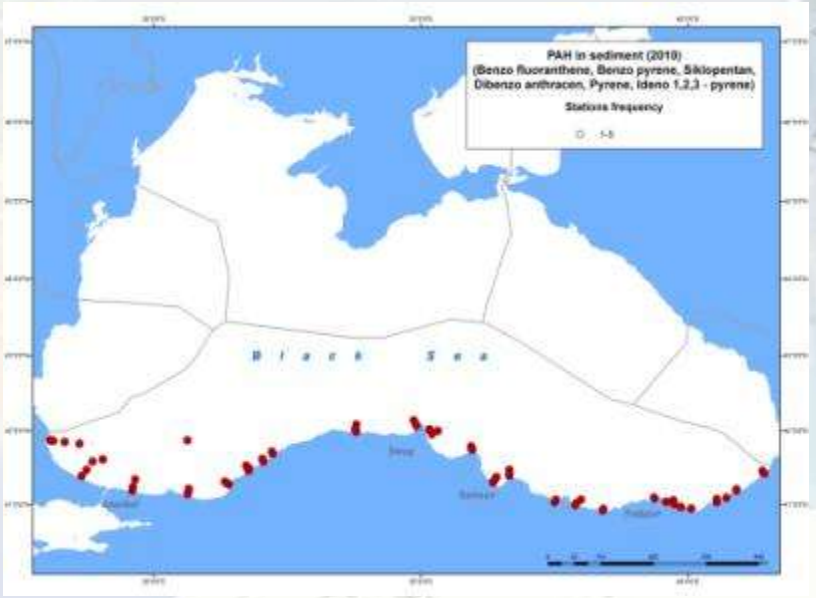
Turkey (TUBITAK):
- reported a number varying among 4 and 25 data of 6 PAHs (benzo-fluoranthene, benzo pyrene, siklopentan, dibenzo anthracene, pyrene , Ideno 1,2,3 – pyrene), for only one year (2010); sampling was carried out in a number of 4-25 stations.

Polinuclear aromatic hydrocarbons (PAHs)

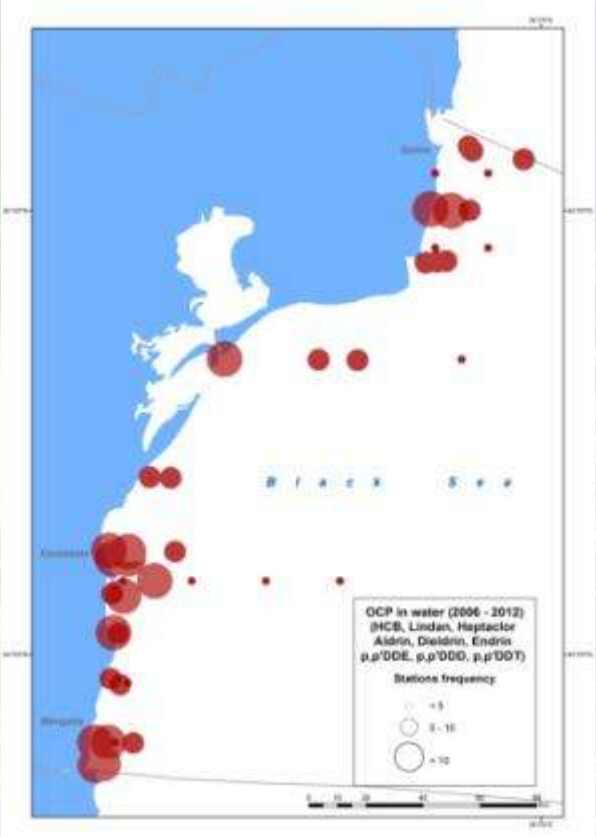


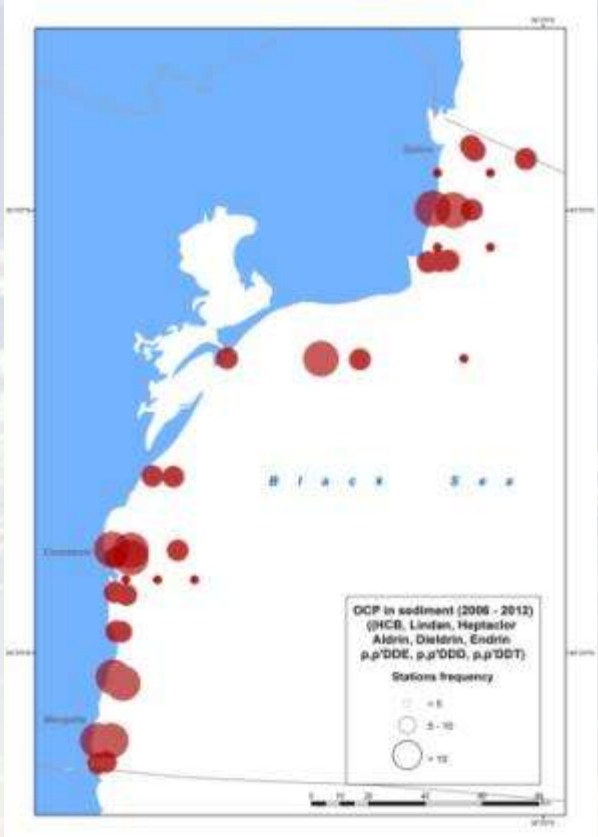


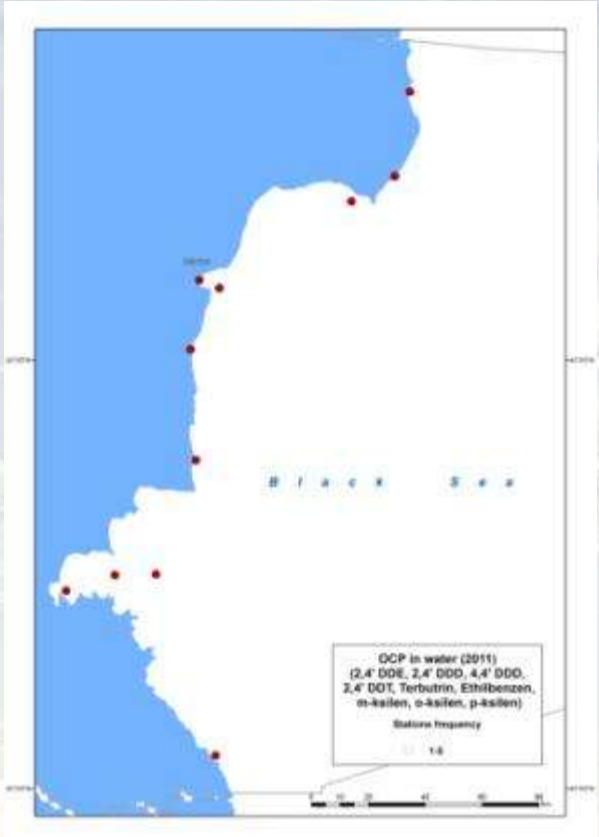




Organo Chlorine Pesticides (OCPs)





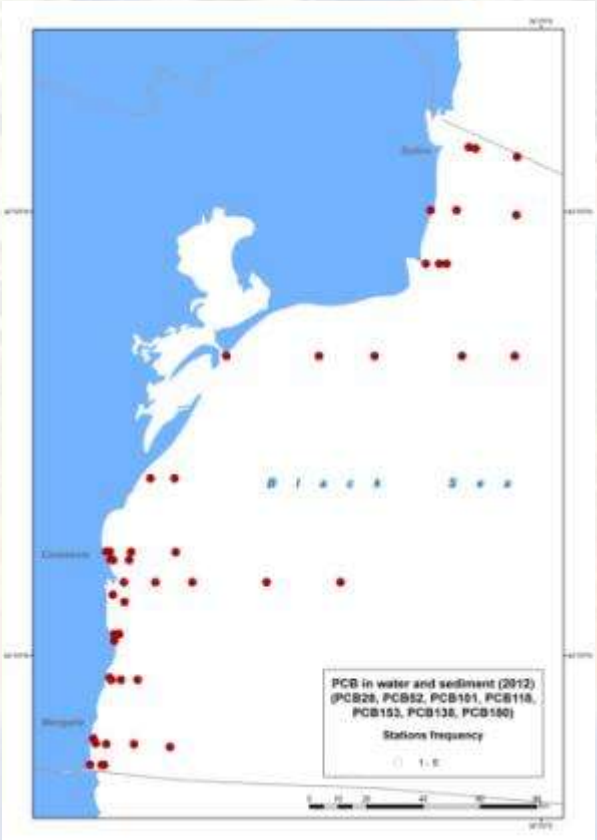


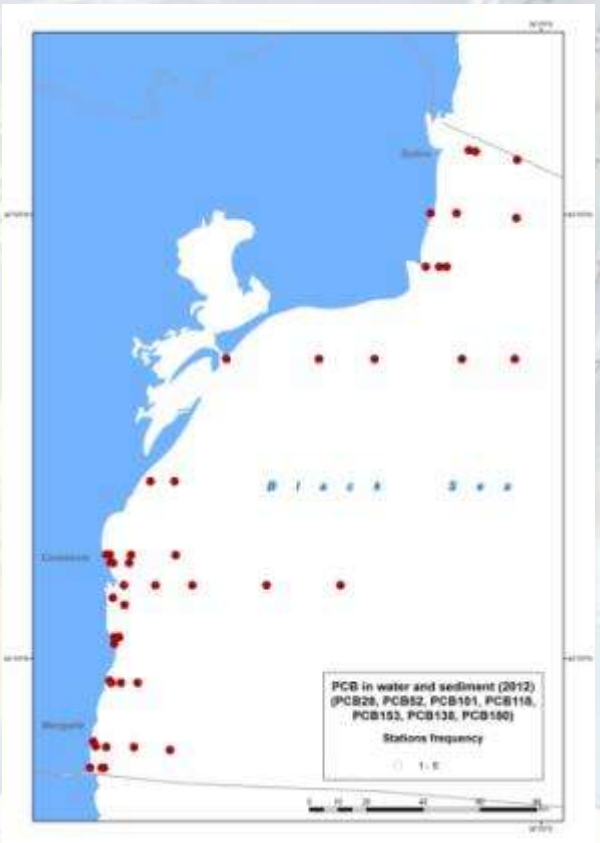
Bulgaria reported data for OPCs, and only for 2011- 9 OCP compounds (2,4' DDE2, 4' DDD4, 4' DDD, 2,4' DDT, terbutrine, ethilbenzene, m-ksilen, o-ksilen, p-ksilen) were identified in the Bulgarian waters sampled in the 11 stations; 11-22 data were reported.

Romania – 9 compounds (HCB, Lindan, Heptaclor, Aldrin, Dieldrin, Endrin, p,p'DDE, p.p'DDT) – same distribution with PAH

Polychlorinated biphenyl (PCBs)

Romania started to analyse PCBs in water and sediment with 2012, the number of data being 48 for each substances (PCB28, PCB52, PCB101, PCB118, PCB153, PCB138, PCB180) collected from 17 stations.
Bulgaria reported data for 9 compounds of PCBs water samples in 2011. A number of 11 stations and 12-20 data were reported.
Turkey has no data for PCBs.





3.2/3.3 - Recommendations

- Recommendations on strengthening the reporting to the BSC / Wise-Marine
  - Report in a web-based format, not excel files
  - Used a common format with Emodnet – SeaDataNet infrastructure
  - Show how the reported data are used therafter to justify the need in improvements of data reported

3.4 - Cooperation with the EuropeAid Project (EMBLAS), and other relevant projects;

Facilitation of the data infrastructure developments planned and avoiding of overlapping of activities (e.g. contribution to the ‘Analysis of the exact scope of the Database’, exchange mechanisms, nourishing of the data base, etc.)

MISIS - EMBLAS

- *Revision of the UBSS (Upgrade BS Scene) project DQC Manuals in cooperation with the EMBLAS Project, promotion at the regional level and publication on the web page of the BSC*
- Development of the web-based Black Sea Water Quality Database prototype
- Support the further development of Black Sea regional databases (Phytoplankton DataBase, Mnemiopsis DataBase)
- Recommendations on strengthening the reporting to Wise-Marine

- **PERSEUS - MISIS**

➢ Common understanding of GES ; Classification scheme

➢ Participating in PERSEUS summer course

➢ Organise the stakeholder meeting

- **CoCoNet - MISIS**

➢ Participating in MPA virtual workshops

➢ Revision the Black Sea MPA Guideline

Thank you for your attention!