



Development of the environment for work with data of ecological supervision

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The purpose of the work

Development of technologies of collecting and the analysis of periodic measurements of parameters of the atmosphere pollution received during the long periods of time on posts of supervision of Kazakhstan lies.

The purpose of the information environment

This information environment is designed to automate environmental monitoring of air quality in the Republic of Kazakhstan.

It provides:

- The collection of information about the state of air basin in the observation points on the basis of air samples and meteorological observations;
- The processing of observational data and the formation of accounting documentation by choosing the right algorithms and analyzing the results of treatment.

The tasks in developing the information environment

- To centralize the accounting data of the air;
 - To automate the calculations based on air pollution;
 - To reduce the processing time of incoming information from the monitoring sites;
 - To improve performance of information exchange with external objects
- Hydrometeorological Monitoring of the environment (observation posts).

The requirements for the structure and functioning of

The system should:

- be available via the Internet;
- unite and organize the experimental, heterogeneous bibliographic data and Internet resources;
- support different ways of rendering the original data and calculations;
- be easily extensible;
- ensure the integration of the transformation to a common data storage format.

Existing archives of meteorological data

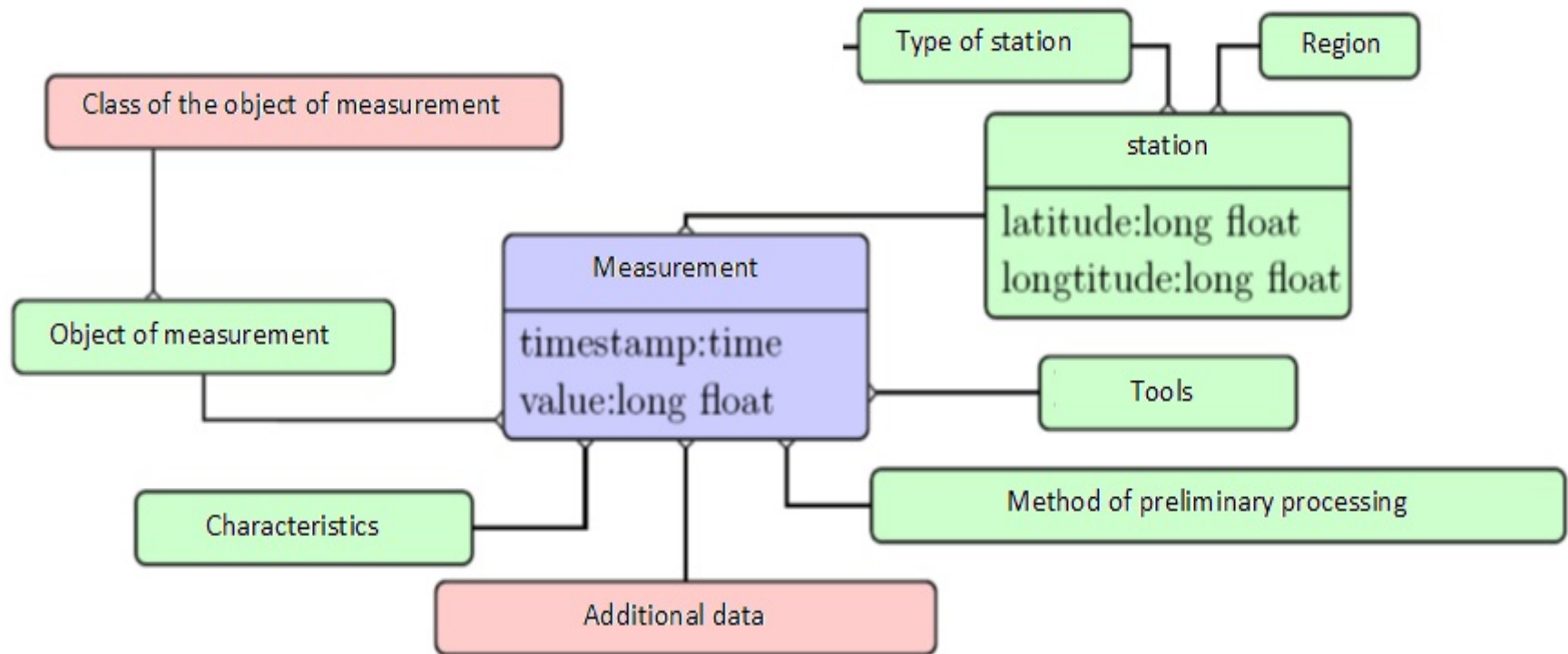
<i>The name of the dataset</i>	<i>organization</i>	<i>Period of data</i>	<i>Resolution of data</i>	<i>The method of data assimilation</i>	<i>The format of data files</i>
9092c Global Synoptic Network	RIHMI-WDC	~1881~2001	8 h.(up to 1935) 6 h.(up to 1965) 3 h. (since 1966)	-	ASCII
Special array of daily temperature and precipitation	RIHMI-WDC	~1881~2010	2095 / 223 stations (former Soviet Union)	-	ASCII
NCEP/NCAR	NCEP/NCAR	1951-2001	12 h., 2,5°×2,5°	3D-Var	GRIB
NCEP/DOE AMIP II	NCEP/DOE	1973-2003	6 h., 2,5°×2,5°	3D-Var	NetCDF
ECMWF ERA-40	ECMWF	1957.9-2002.8	6 h., 2,5°×2,5°	3D-Var	NetCDF
ECMWF ERA INTERIM	ECMWF	1979-2010	6 h., 1,5°×1,5°	4D-Var	NetCDF
APHRODITE JMA	JMA	1951-2007	1 h. 0,25°×0,25°	interpolation	NetCDF

The logical data model

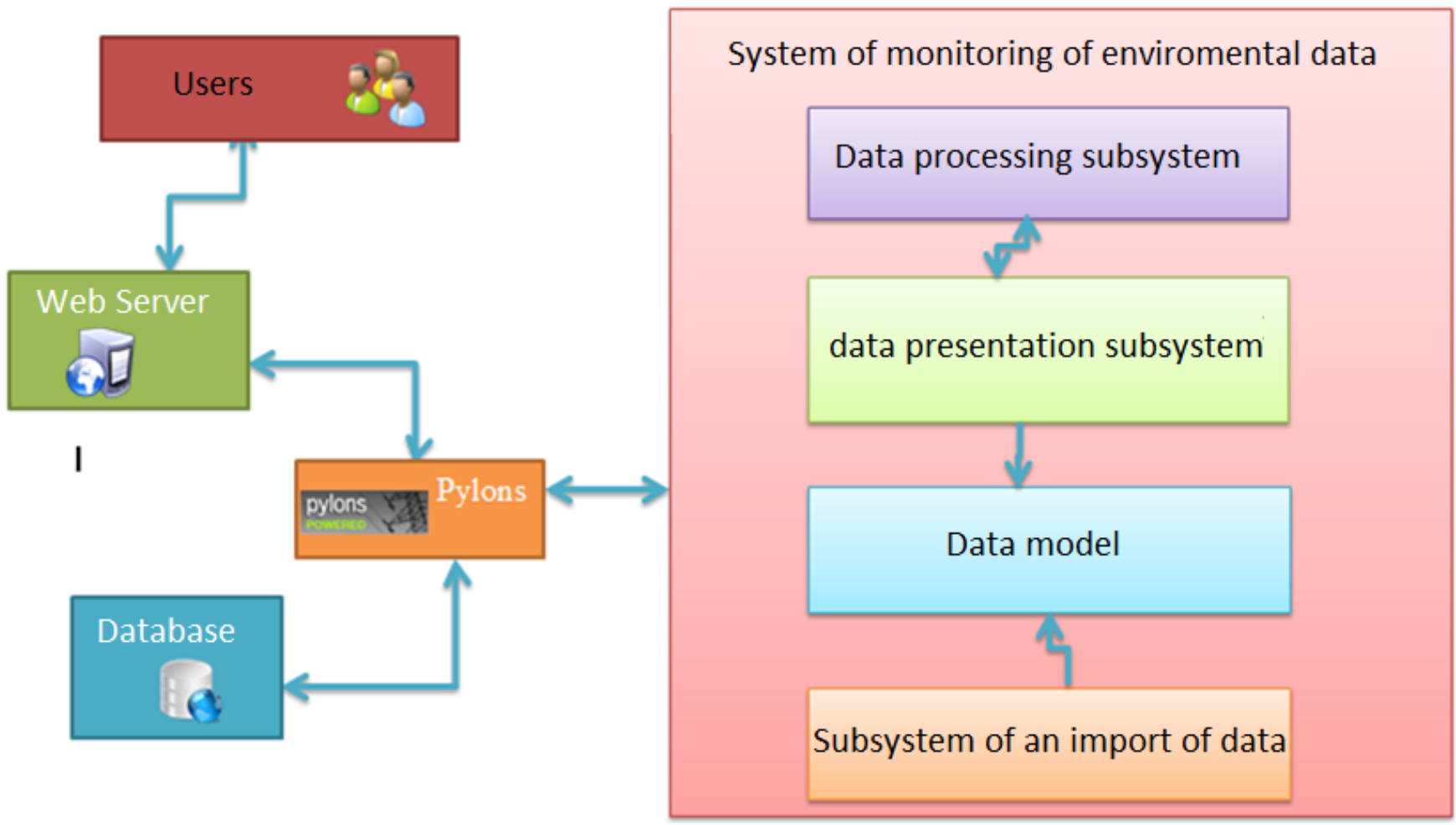
The structure of the metadata

1. Date and time of measurement;
2. The result of measurement;
3. The station, which was measured
 - geographic coordinates.
 - station type (mobile, fixed ...).
4. The object of measurement (air, dust, wind, chemical element ...).
5. Measured response (the impurity concentration, air temperature, wind direction and speed ...).
6. The tool, which was measured.
7. A method of processing raw data.

Diagram logical data model



The ICS architecture of Environmental data monitoring



Examples of statistical analysis

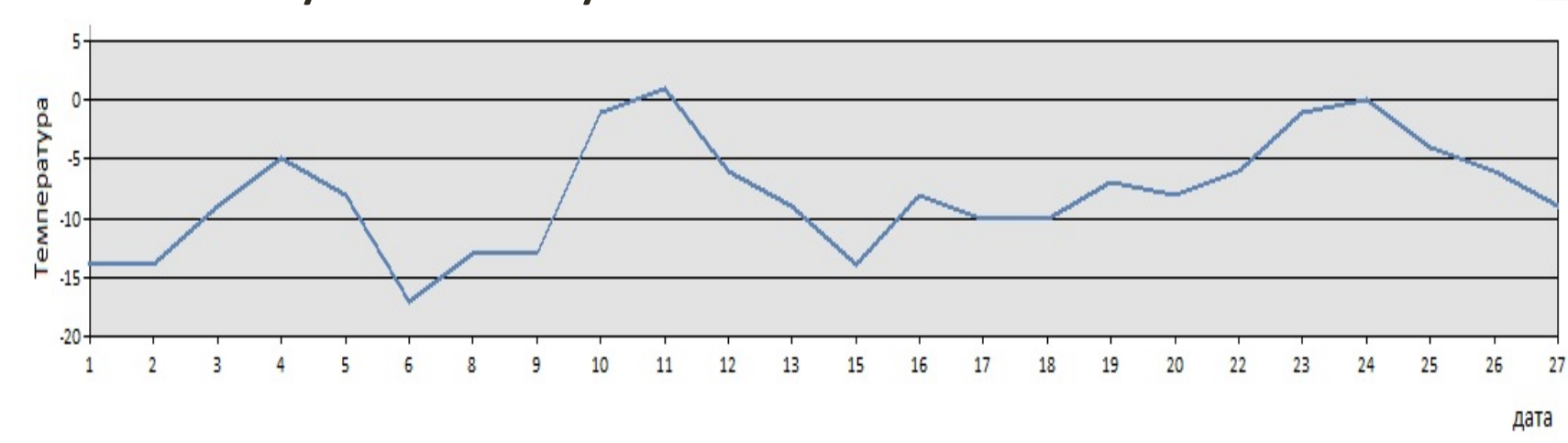
Примесь	Измерения	Средняя к.	Повт. ПДК	Повт. 5ПДК	Превышения ПДК	Превышения 5ПДК	Превышения 10ПДК	ИЗА
Взвеш.в-ва	910	0,0774	1,2088	-	11	-	-	0,5158
Диоксид серы	910	0,0052	-	-	-	-	-	0,1042
Сульфаты	910	0,0091	-	-	-	-	-	-
Углерода окси	912	0,8147	0,6579	-	6	-	-	0,3302
Азота диоксид	910	0,0146	0,3297	-	3	-	-	0,2707
Сероводород	910	0,0101	0,5495	0,11	5	1	1	-
Фенол	910	0,002	2,3077	-	21	-	-	0,5735
Водород хлор	910	0,0378	0,5495	-	5	-	-	0,282

Шифр	Наименование	Максимально Разовая ПДК	Количество измерений Превышающих ПДК	Число Дней Превышения ПДК
1	Взвеш.в-ва	0,5	67	54
4	Углерода оксид	5	15	13
5	Азота диоксид	0,085	77	67
8	Сероводород	0,008	10	9
10	Фенол	0,01	87	80
15	Водород хлорист	0,2	86	70

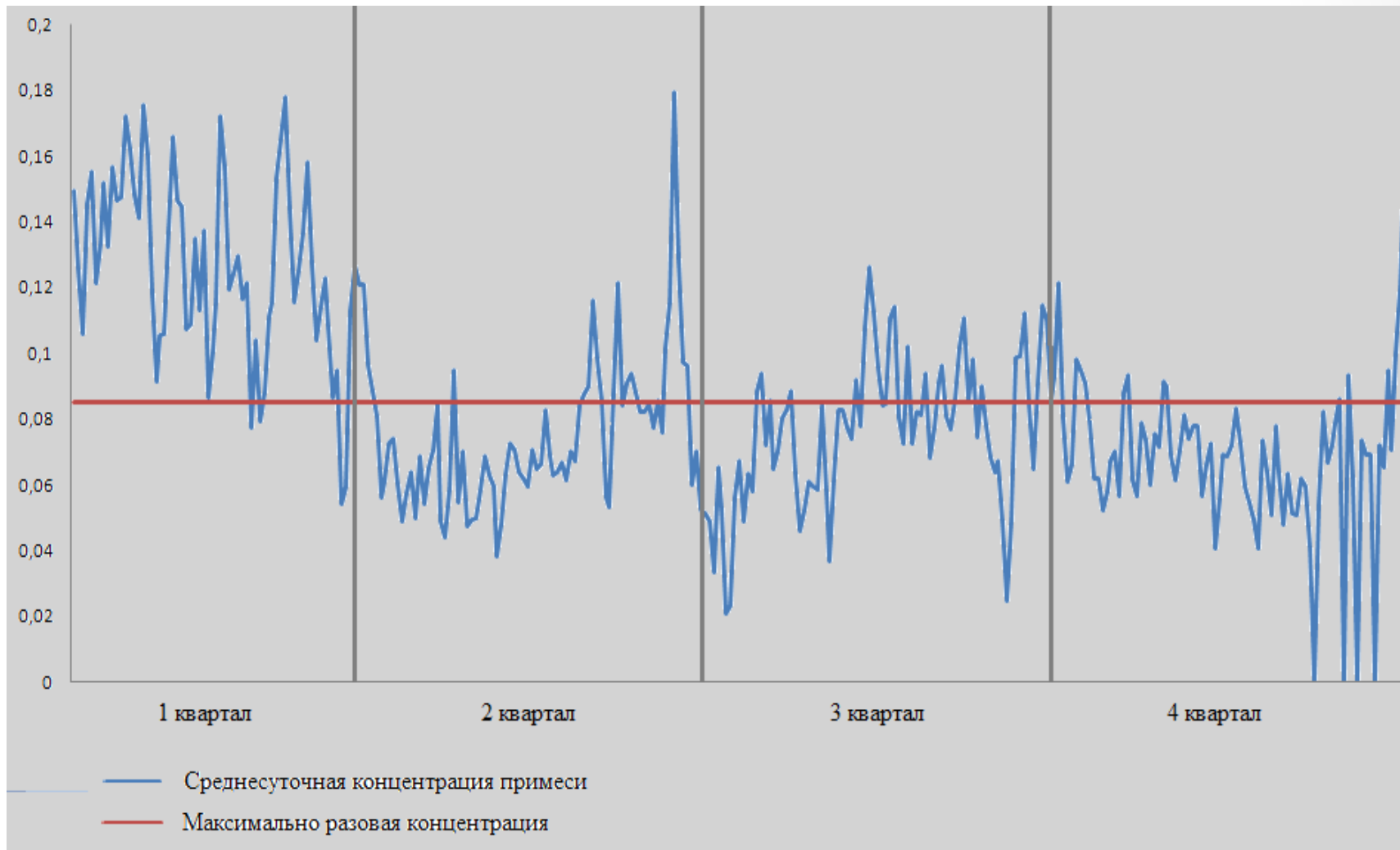
Brief description of air pollution per year in Pavlodar

SHIPHR	Наименование	Количество измерений	Максимальная концентрация	Средняя концентрация -	Максимальн	Среднесут	Кратность к ПДКmax	Кратность к ПДКss
1	Взвеш.в-ва	1819	2,1	0,1201	0,5	0,15	4,2	0,8008
2	Диоксид серы	1819	0,104	0,0057	0,5	0,05	0,208	0,1149
3	Сульфаты	910	0,08	0,0091	9	0	0,0089	-
4	Углерода оксид	1824	17	0,7593	5	3	3,4	0,2531
5	Азота диоксид	1819	0,42	0,0206	0,085	0,04	4,9412	0,5162
8	Сероводород	1819	8	0,0062	0,008	0	1000	-
10	Фенол	1819	0,033	0,0021	0,01	0,003	3,3	0,6896
14	Хлор	909	1	0,0058	0,1	0,03	10	0,1944
15	Водород хлористый	1819	0,78	0,0439	0,2	0,1	3,9	0,4389

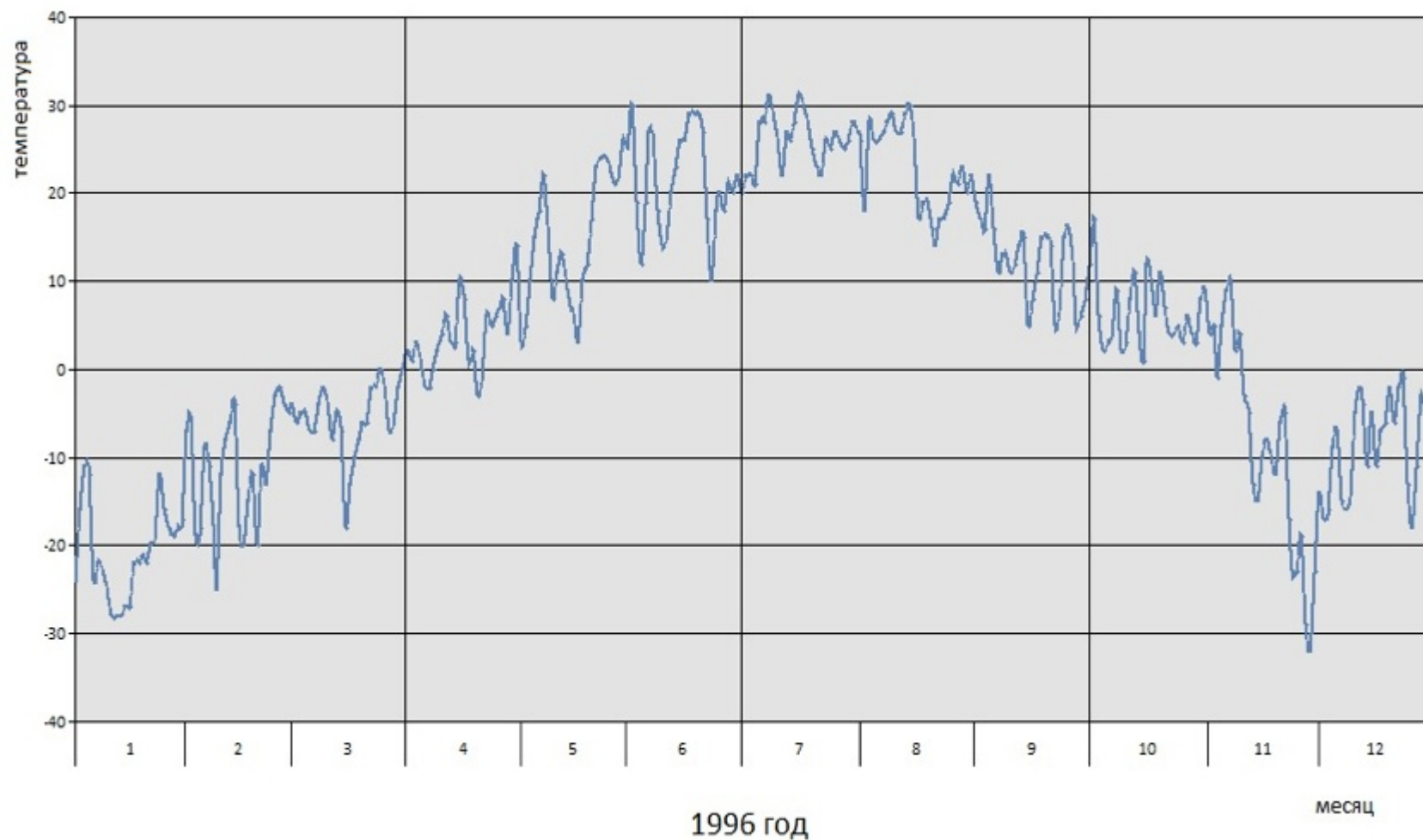
Graph of daily average temperature for the month of February in Almaty



The average concentration of nitrogen dioxide (Ust-Kamenogorsk, data for 1998)

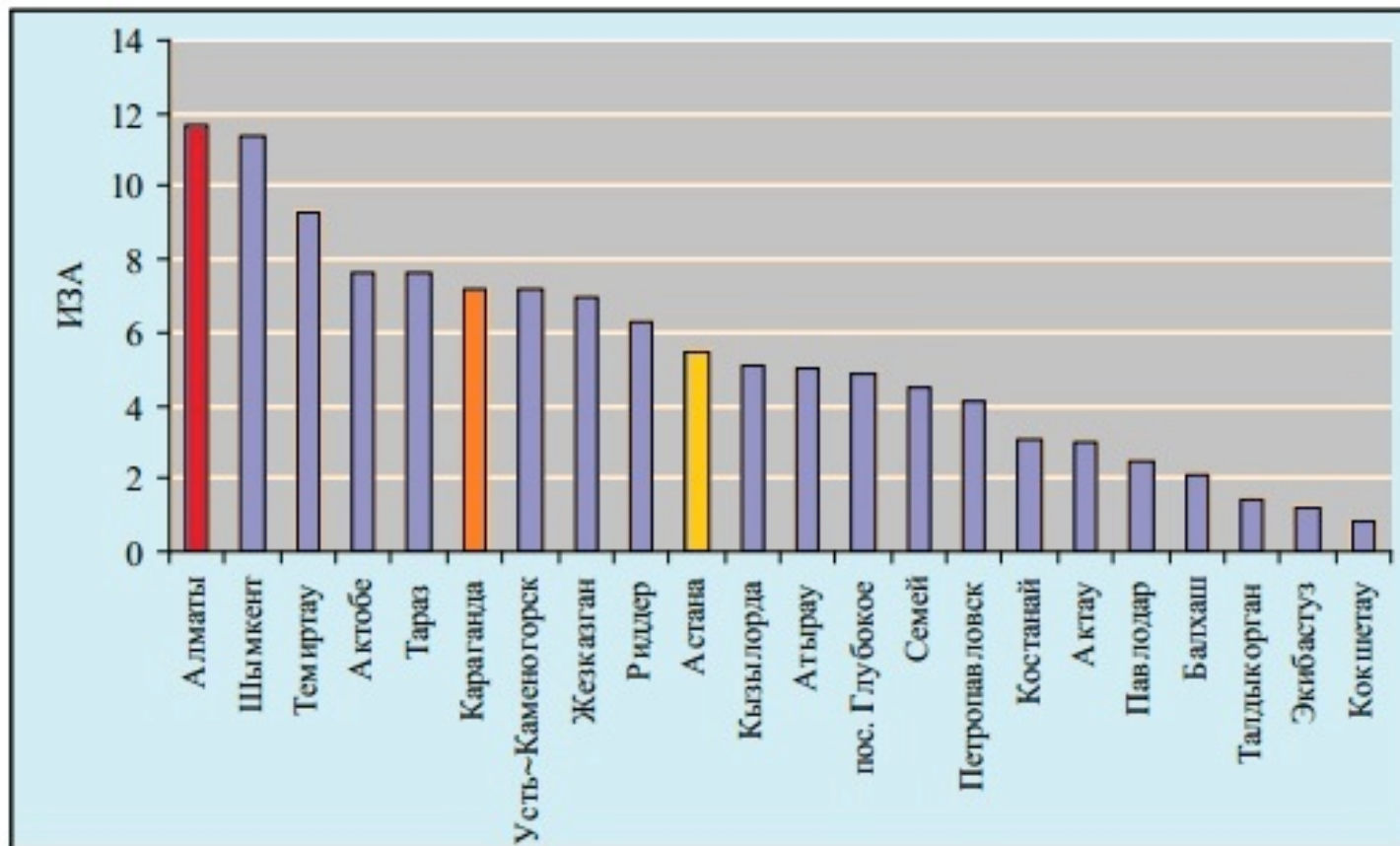


Average daily temperature (Almaty)



Statistical analysis of the pollution in some cities of Kazakhstan

The index of the air pollution in the cities of Kazakhstan (2007)



Statistics of the population and causes of the pollution

- Almaty - 1,857,781 people;
 - combined heat and power;
 - vehicles (about 700 thousand cars);
- Astana - 737,651 people;
 - Transport;
 - combined heat and power;
- Karaganda - 475,267 people;
 - Mechanical Engineering;
 - minerals industry
 - combined heat and power.

The maximum permissible concentrations (2007)

Алма-Ата

Примесь ▾	Измерения ▾	Средняя_концентрация ▾	Повт_ПДК ▾	Повт_5ПДК ▾	Превышения_ПДК ▾	Превышения_5ПДК ▾	Превышения_10ПДК ▾	ИЗА ▾
Взвеш.в-ва	918	0,0315	0,1089	-	1	-	-	0,2099
Диоксид серы	452	0,004	-	-	-	-	-	0,08
Сульфаты	918	0,008	-	-	-	-	-	-
Азота диоксид	452	0,0262	4,4248	-	20	-	-	0,5774
Фтористый во	452	0,0034	3,9823	-	18	-	-	0,5976

Астана

Примесь ▾	Измерения ▾	Средняя_концентрация ▾	Повт_ПДК ▾	Повт_5ПДК ▾	Превышения_ПДК ▾	Превышения_5ПДК ▾	Превышения_10ПДК ▾	ИЗА ▾
Взвеш.в-ва	1215	0,1299	0,4115	-	5	-	-	0,8658
Диоксид серы	1215	0,0124	-	-	-	-	-	0,2475
Углерода окс	1215	2,07	2,8807	-	35	-	-	0,7295
Азота диоксид	1215	0,0334	5,9259	-	72	-	-	0,79

Караганда

Примесь ▾	Измерения ▾	Средняя_концентрация ▾	Повт_ПДК ▾	Повт_5ПДК ▾	Превышения_ПДК ▾	Превышения_5ПДК ▾	Превышения_10ПДК ▾	ИЗА ▾
Диоксид серы	1163	0,0055	-	-	-	-	-	0,109
Углерода окс	1216	0,7771	-	-	-	-	-	0,3172
Азота диоксид	1163	0,0117	0,172	-	2	-	-	0,2025
Фенол	1163	0,0011	0,086	-	1	-	-	0,2729

Brief description of the air pollution in 2007

Астана

Примесь	Максималь..	Среднее	ПДКр	ПДКсс	Кратность к ПДКтах
Азота диоксид	0,13	0,0183582	0,085	0,04	1,5294
Взвеш.в-ва	0,4	0,0141732	0,5	0,15	0,8
Диоксид серы	0,036	0,0034598	0,5	0,05	0,072
Сульфаты	0,1	0,0069991	9	0	0,0111
Фтористый во	0,15	0,0046046	0,02	0,005	7,5

Алма-Ата

Примесь	Максималь..	Среднее	ПДКр	ПДКсс	Кратность к ПДКтах
Азота диоксид	0,2	0,0408852	0,085	0,04	2,3529
Взвеш.в-ва	2	0,1245082	0,5	0,15	4
Диоксид серы	0,08	0,0151770	0,5	0,05	0,16
Углерода окси	10	2,5163934	5	3	2

Караганда

Примесь	Максималь..	Среднее	ПДКр	ПДКсс	Кратность к ПДКтах
Азота диоксид	0,09	0,0161026	0,085	0,04	1,0588
Диоксид серы	0,09	0,0109632	0,5	0,05	0,18
Углерода окси	5	0,9860656	5	3	1
Фенол	0,025	0,0028154	0,01	0,003	2,5

Number of days exceeding the MCL

Караганда

Шифр	Наименование	Максимально Разовая ПДК	Количество измерений Превышающих ПДК	Число Дней Превышения ПДК
1	Взвеш.в-ва	0,5	17	16
4	Углерода оксид	5	104	79
5	Азота диоксид	0,085	244	157
22	Формальдегид	0,035	1	1

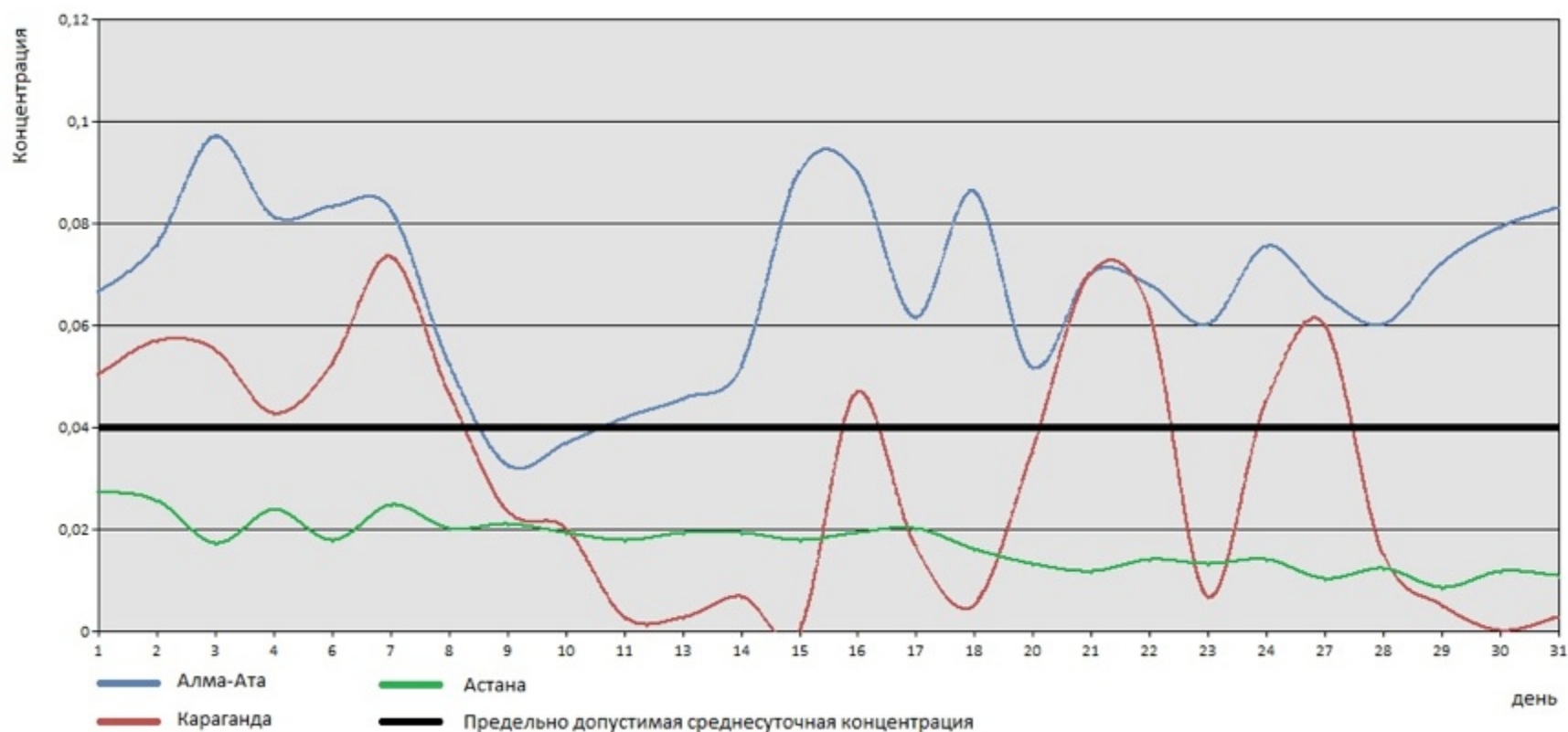
Алма-Ата

Шифр	Наименование	Максимально Разовая ПДК	Количество_измерений Превышающих ПДК	Число Дней Превышения ПДК
1	Взвеш.в-ва	0,5	3	3
4	Углерода оксид	5	324	178
5	Азота диоксид	0,085	64	37
10	Фенол	0,01	90	63

Астана

Шифр	Наименование	Максимально Разовая ПДК	Количество измерений Превышающих ПДК	Число Дней Превышения ПДК
1	Взвеш.в-ва	0,5	6	6
5	Азота диоксид	0,085	7	5
13	Фтористый водор	0,02	14	11
79	Хром	0,0015	3	3

Average daily concentrations of sulfur dioxide in 2007



The average concentration of phenol in 2007



The conclusion

The modular architecture for creation of websites is offered.

At this moment:

- The module, allowing to form reports on stored data for any period is at present created:
- Possibilities for mathematical processing of stored data, and creations of other components of the system are provided;
- As demonstration of possibilities of API of processing modules of creation of schedules and export of reports to XML are realized.

The European Environment Agency (EEA) ~~Data collection:~~

Austria, Belgium, Bulgaria, Great Britain, Hungary, Germany, Greece, Denmark, Iceland, Ireland, Spain, Italy, Cyprus, Latvia, Liechtenstein, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Turkey, Finland, France, Czech Republic, Switzerland, Sweden and Estonia

Applications: NoiseWatch, WaterWatch, AirWatch, Agricultural Areas, Natura 2000, Marine Diversity and Protection, Total Nitrogen, Nitrogen biofixation, GlobalOzone

Some pictures:

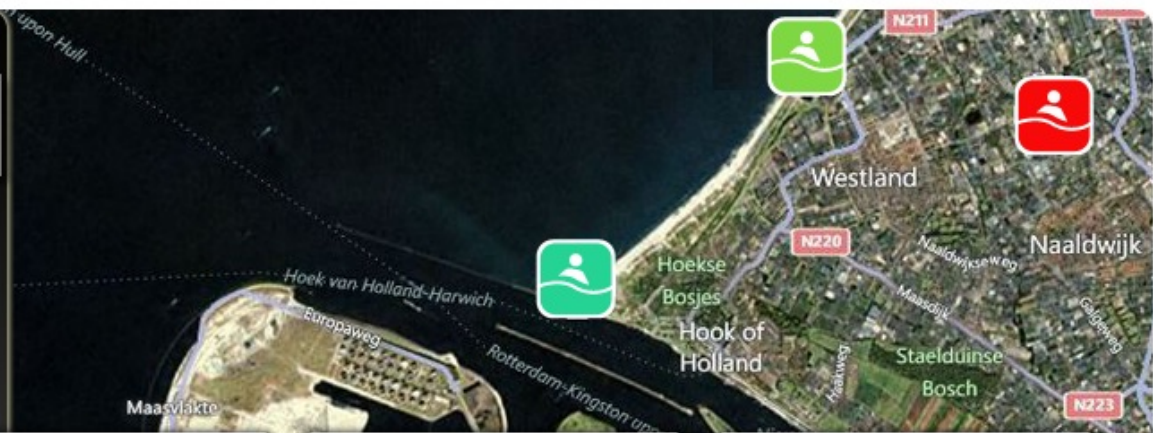
Домашняя страница ГАЛЕРЕЯ КАРТА ГРУППЫ Мои ресурсы Поиск карт, приложений и др. ...

EYEonEARTH

NETWORK

Welcome!

Eye on Earth is a global public information service.



USA Landcover 2001

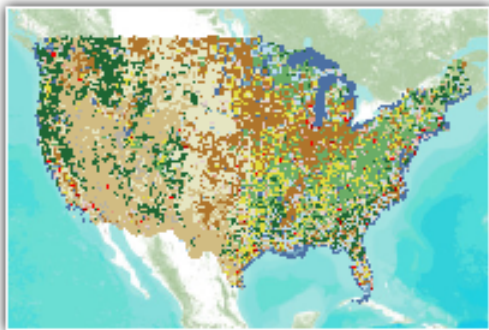
Total Nitrogen from all sources

Natura 2000 Public map viewer

GlobalOzone

Eye on Earth is the result of a public-private partnership joining expertise from industry and public organisations.

Gallery of Eye On Earth:



USA Landcover 2001



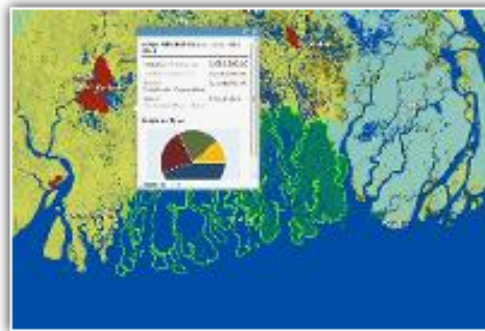
Daily Ocean Temperature Forecasts



Total Nitrogen from all sources



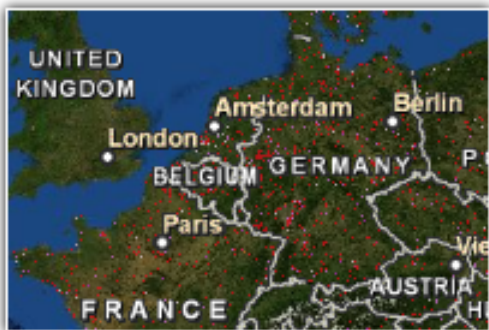
Forests in Europe



Bengal Bay Tiger-Human Inundation Study



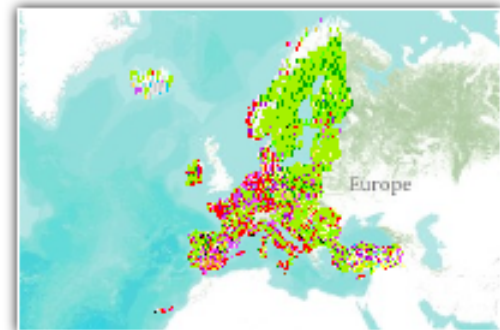
Life projects in Europe



Artificial Surfaces in Europe



Agricultural Areas in Europe



Corine Landcover changes 2000-2006

Gallery of Eye On Earth:



Biogeographic Regions in Europe



Marine Diversity and Protection - Abu Dhabi



Total Nitrogen from all sources



Nitrogen from grazer manure



Nitrogen from manure fertilisers



Nitrogen from atmospheric deposition



Nitrogen biofixation

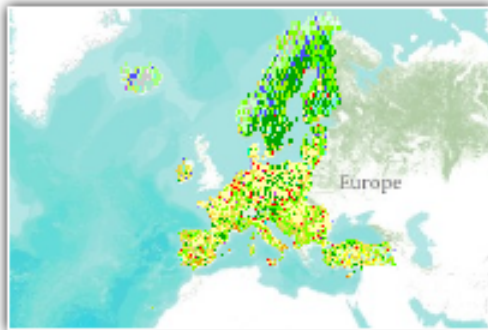


Nitrogen from mineral fertilisers

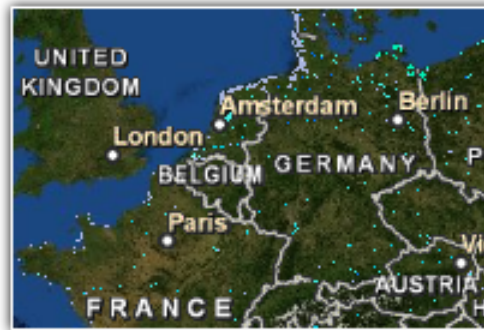


Nitrogen from all fertilisers

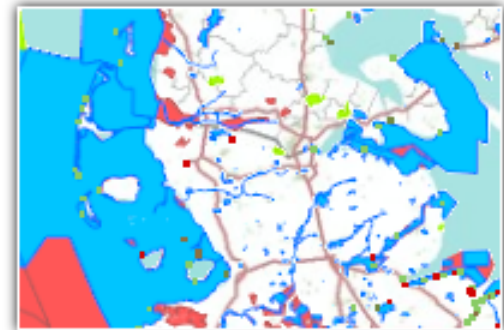
Gallery of Eye On Earth:



Corine LandCover 2006



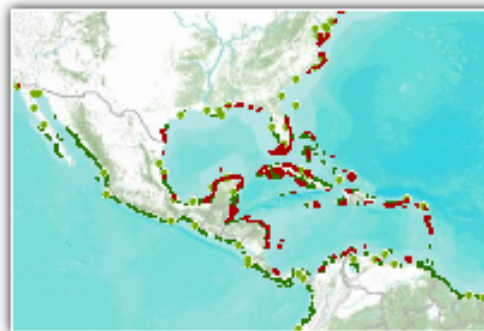
Wetlands and Waterbodies in Europe



Water Watch and Protected sites



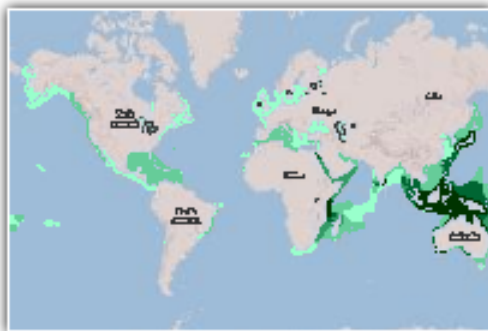
Global Distribution of Coral Reefs (2010)



Blue Carbon Coastal Ecosystems



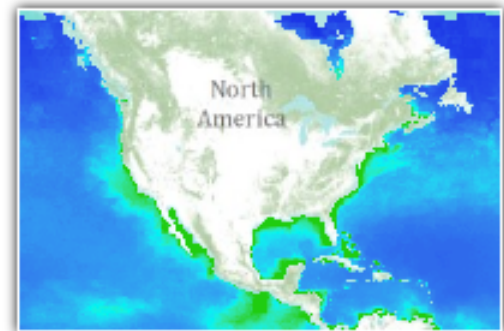
Global Distribution of Seagrasses-Points Dataset



Global Seagrass Species Richness (2003)

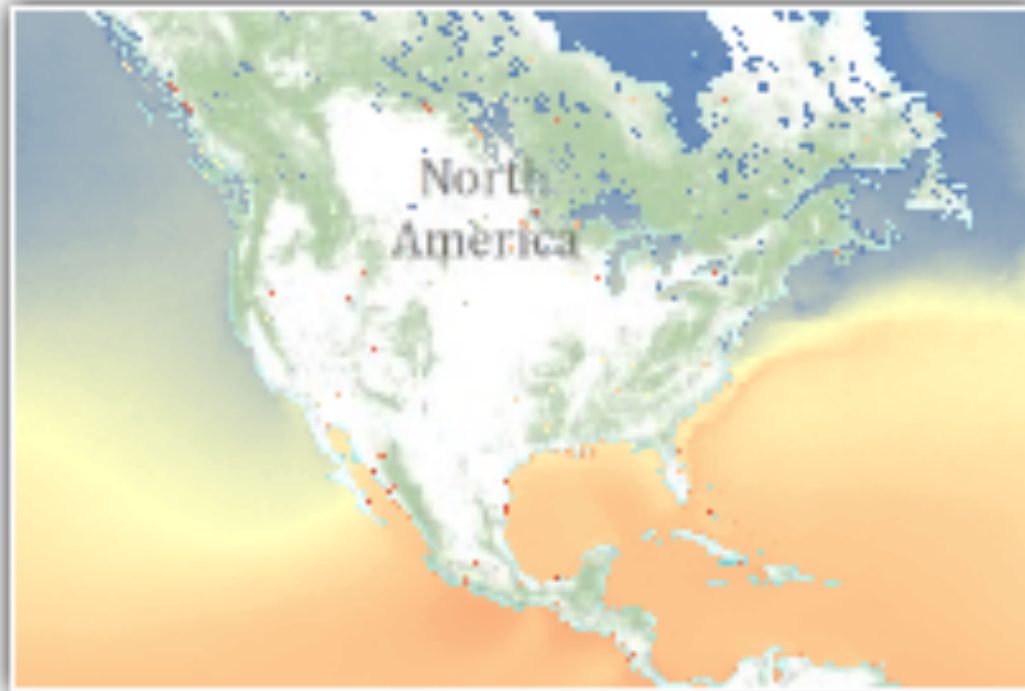


Global Distribution of Coral Reefs 1Km data (2003)



Mean Sea Surface Productivity December 2003-2007 (2008)

Gallery of Eye On Earth:



Mean Sea Surface Temperature
2003-2007 (2008)

Thank you for your attention!