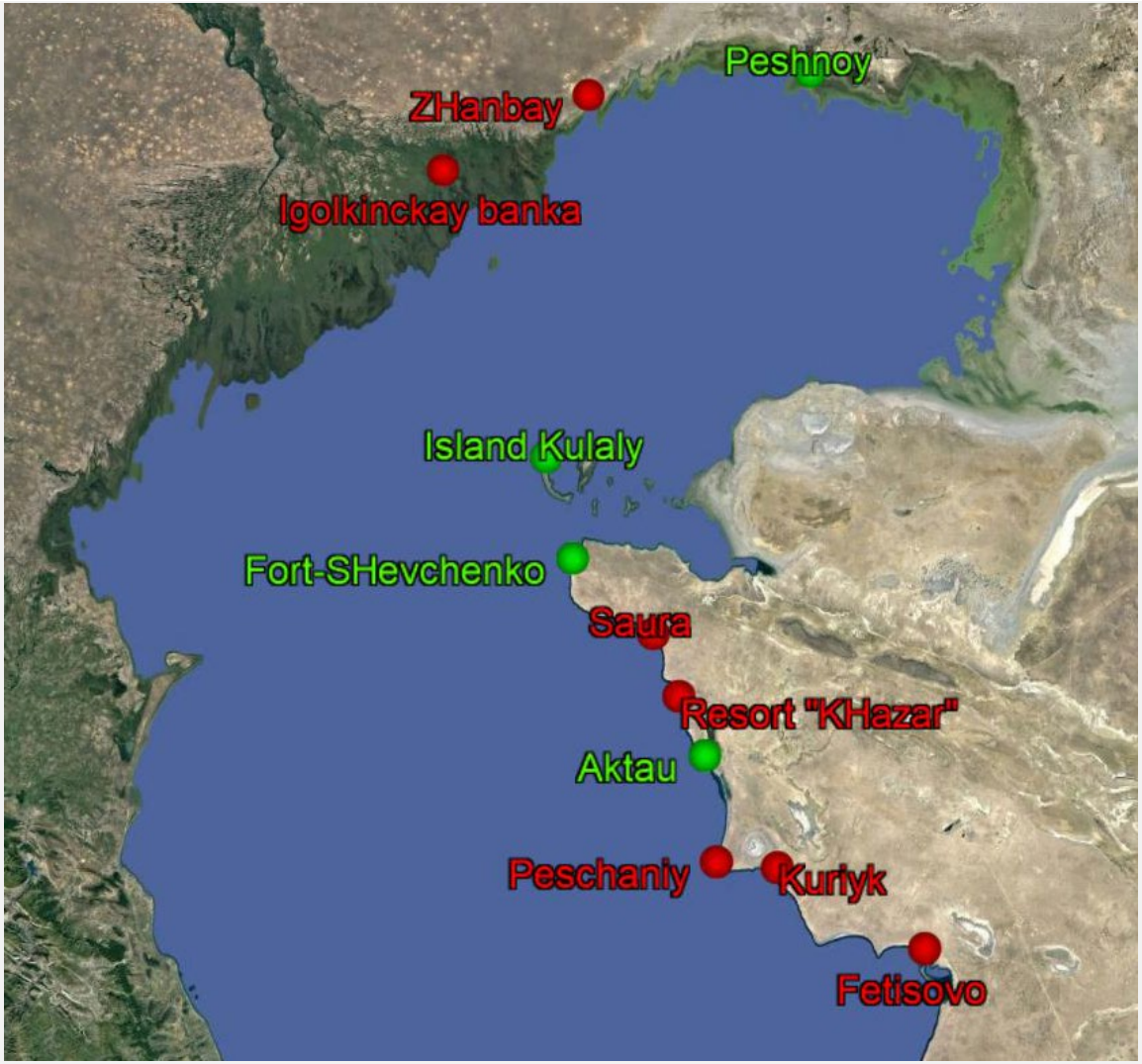
Ministry of Energy of the Republic of Kazakhstan

Republic State Enterprise “Kazhydromet”

ACTIVITY OF NATIONAL HYDROMETEOROLOGICAL SERVIES OF THE KAZAKHSTAN IN THE CASPIAN SEA REGION D 2017 - 2018

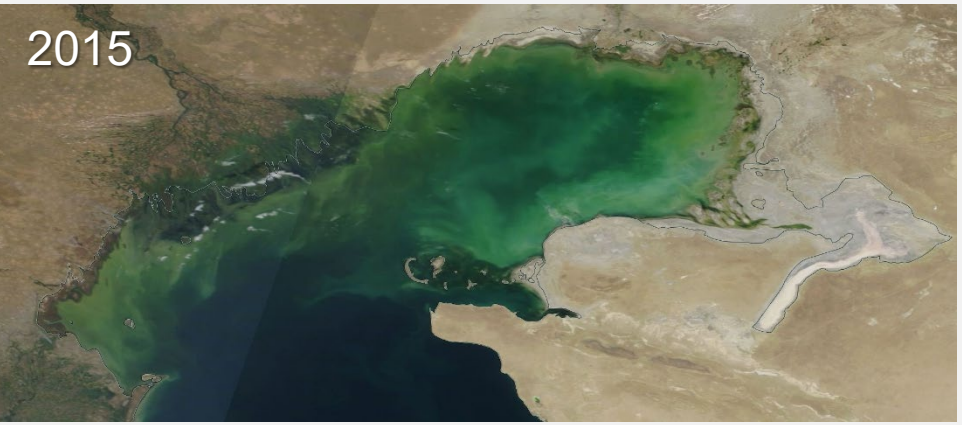
3-th (23) Session CASPCOM,
Ashgabat 30-31 October 2018

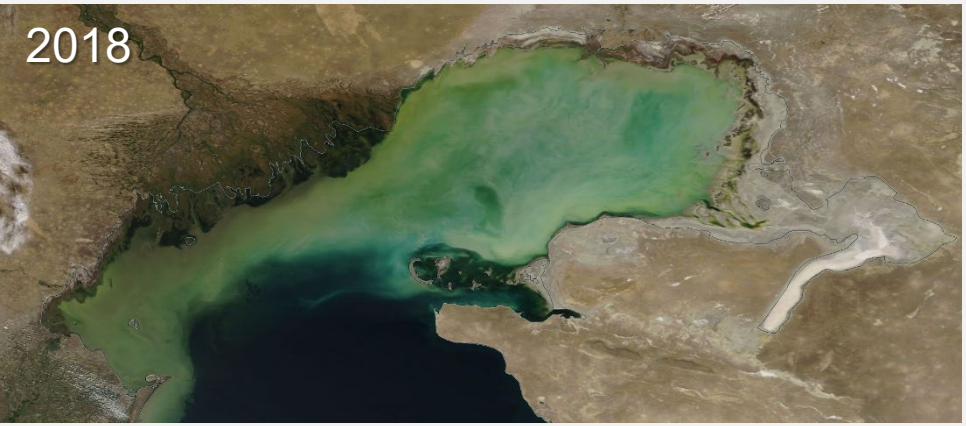
Hydrometeorological monitoring

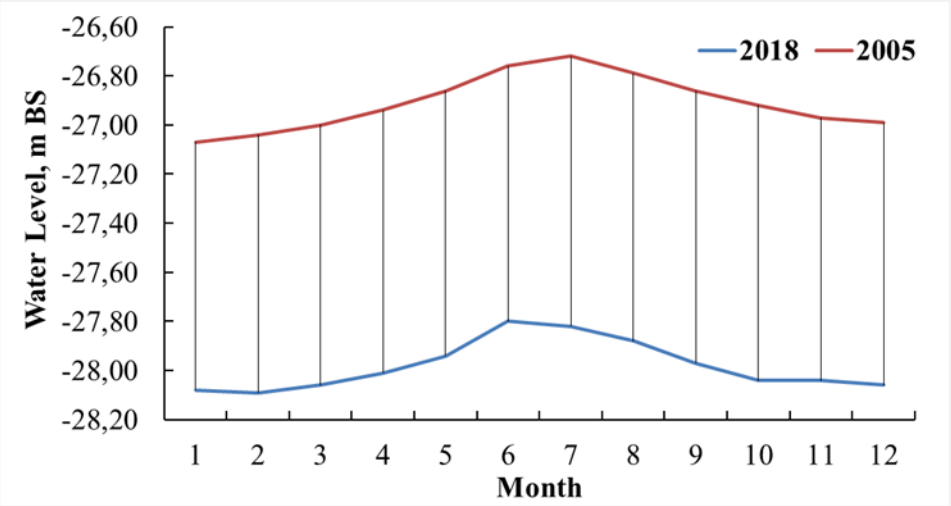


Marine observations at four sea hydrometeorological stations are made: Peshnoy, Island Kulaly, Fort -Shevchenko, Aktau and six sea hydrological posts: Zhanbay, Igolkinskay banka, Fetisovo, Kuriyk, Saura and Peschaniy.

Hydrometeorological monitoring







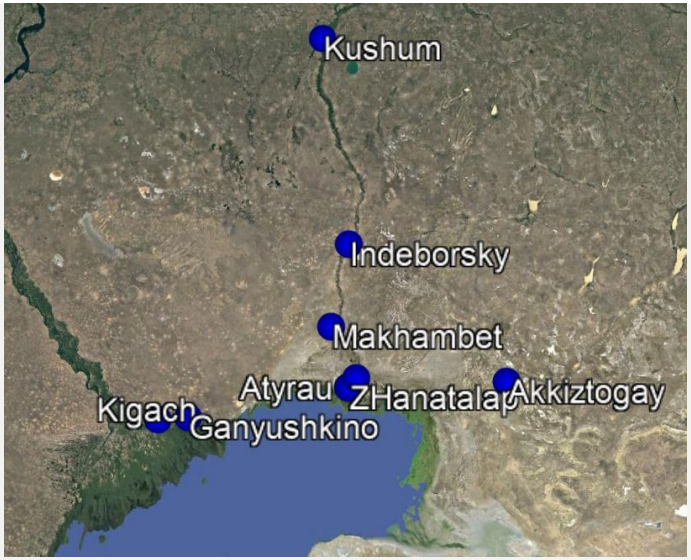
Hydrometeorological monitoring

N	Name	Water level	Wave	Water temperature	Salinity	Ice phenomena		Visual observations of water pollution	Air temperature	Atmospheric phenomenon	Precipitation	Snow cover
						Ice condition	Thickness of ice and height of snow on ice					
1	Fetisovo	+	+	+	+			+	+	+		
2	Saura	+	+	+	+			+	+	+		
3	Peschaniy	+	+	+				+	+	+		
4	Kuriyk	+	+	+				+	+	+		
5	Zhambay	+		+	+	+	+	+	+	+		
6	Igolkinskya banka	+		+	+	+	+	+	+	+	+	+
7	Peshnoy	+		+	+	+	+	+			+	+
8	Aktau	+	+	+	+			+				
9	Fort-Shevchenko	+	+	+	+	+	+	+				
10	Island Kulaly	+	+	+	+	+	+	+				

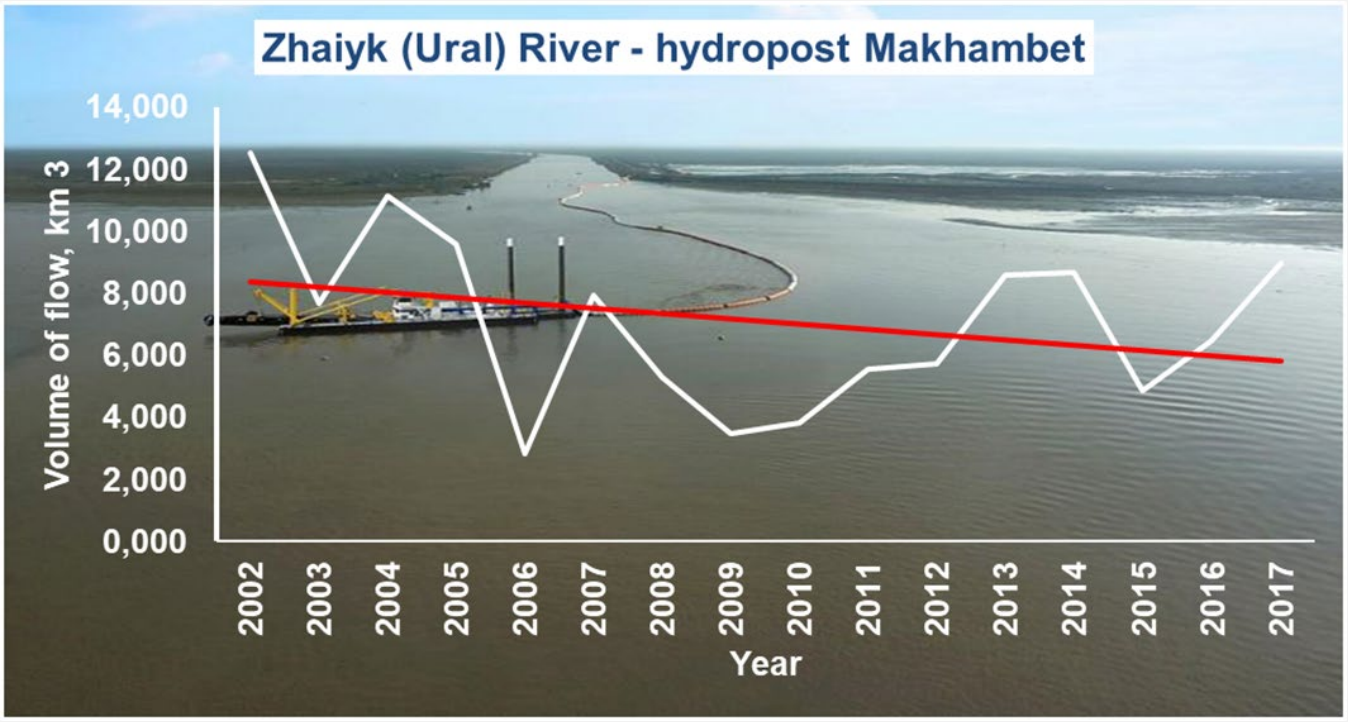
Storm surges on the Caspian Sea (2017 – September, 2018)

Point	2017		2018 (1-9)		Total
	Wind setup	Wind setdown	Wind setup	Wind setdown	
Zhambay	0	1	0	0	1
Peshnoy	13	19	20	17	69
Island Kulaly	0	1	1	2	4
Fort-Shevchenko	7	14	3	2	26
Saura	7	11	9	10	37
Peschany	1	2	0	0	3
Aktau	2	3	2	3	10
Fetisovo	3	16	1	5	25
Total	33	67	36	39	175

Hydrological monitoring

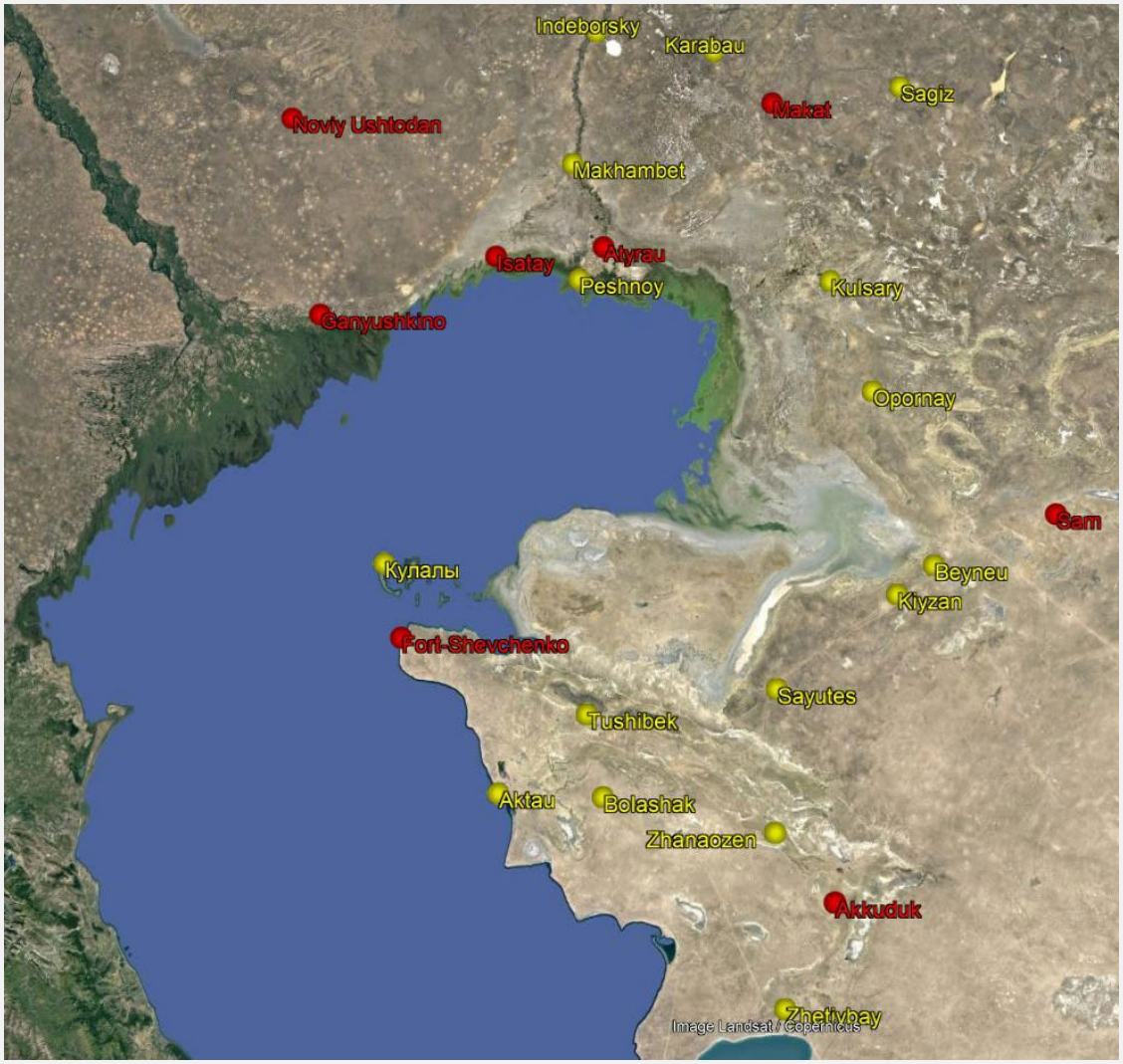


Hydrological network: Zhaiyk River – post Kushum, Zhaiyk River – post Indeborsky, Zhaiyk River – post Makhambet, Zhaiyk River – post Atyrau; Yaik Channel – post Erkenkala, Zolotoy rukav Channel – post Zhanatalap, Kigach Channel – post Kotyaevka, Sharonovka Channel – post Ganyushkino, Emba River – post Akkiztogay.



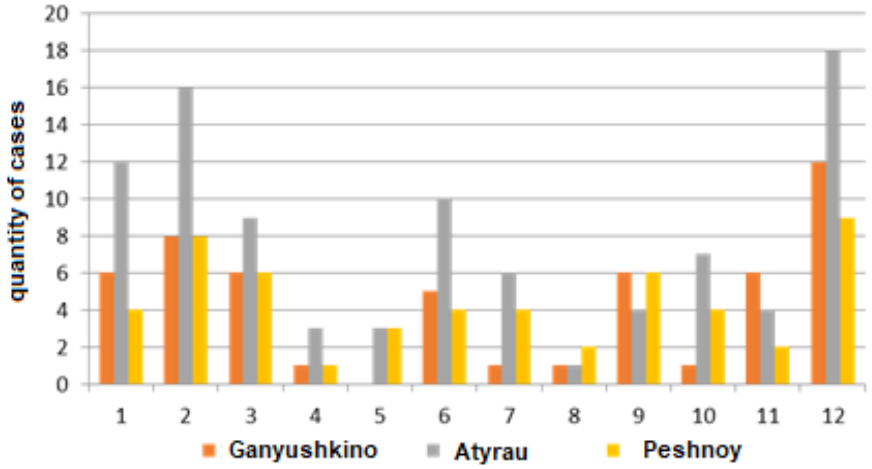
Meteorological monitoring

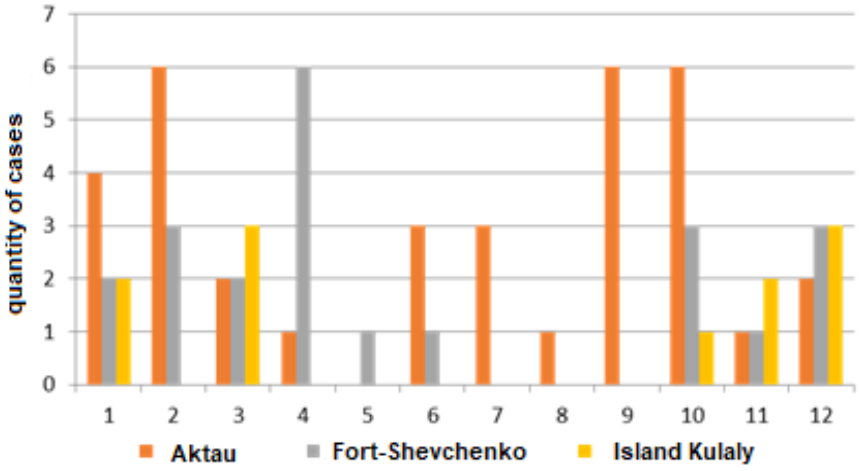
The meteorological network in the Caspian Region consists of 24 meteorological stations, 8 of which are stations of the international exchange (Atyrau, Noviy Ushtogan, Ganyushkino, Makat, Isatay, Sam, Fort- Shevchenko, Akkuduk).



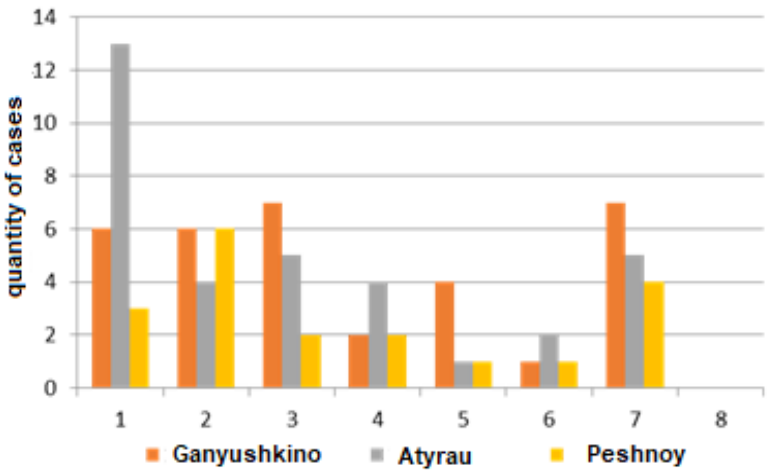
Frequency of a dangerous meteorological events (2017 - August, 2018)

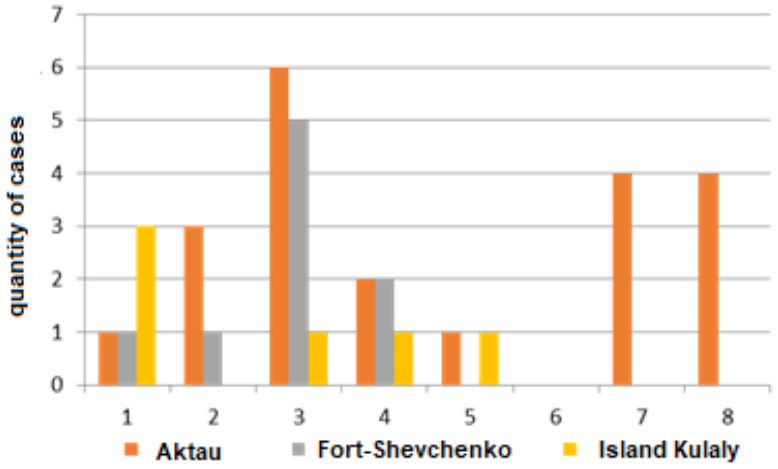
2017



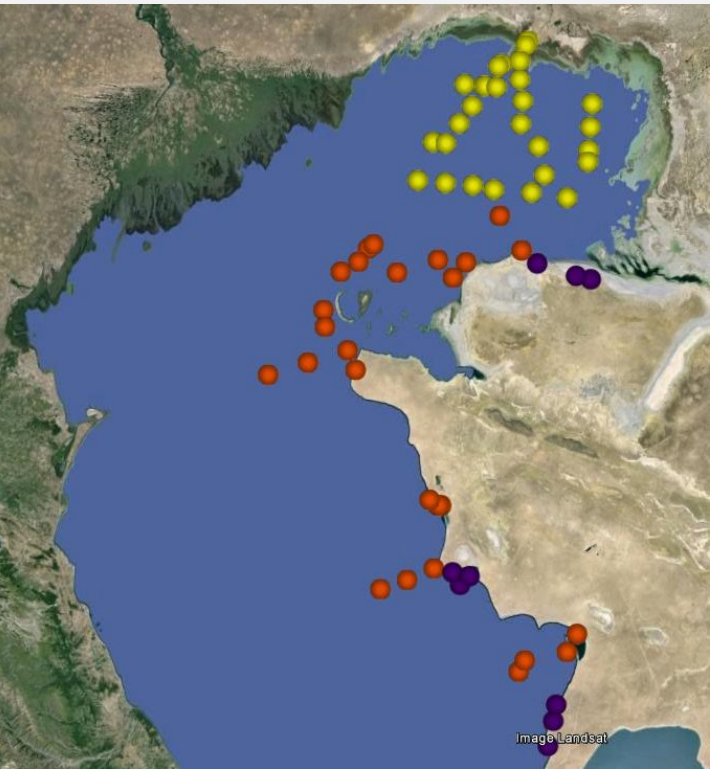


2018





Sea water and sediment monitoring



Sampling points of sea waters in the territory of "Seaport of Aktau"

Water Quality is observed in 31 points.

Water quality is determined by 46 indicators:

Temperature, Turbidity, Alkalinity, pH, Conductivity, Suspended matters, solid residue, Chemical Oxygen Demand, Water hardness, Dissolved oxygen, % oxygen saturation, Chlorides, Sulfates, Hydrocarbonates, Carbonates, Calcium, Magnesium, Sum of ions, BOD_5, Ammonium Salt, Nitrite nitrogen, Nitrate nitrogen, Sum of nitrogen, Phosphates, Total Phosphorus, Total Iron, Silicon, Phenol, Sodium, Potassium, Oil products, Anionic active agents, Lead, Copper, Zinc, Total Chrome, Chrome (6+), Chrome (3+), Fluorides, Boron, Mercury, Cobalt, Nickel, Manganese, Hydrogen sulfide, Cadmium.

Sediment Monitoring is observed 2 times per year (in the spring and autumn) in 37 points.

Is defined the following indicators: Oil products, Copper, Chrome (6+), Cadmium, Nickel, Manganese, Lead, Zinc.

Results of water Quality monitoring in 2017

Name of object	Index of impurity of water and water quality	Pollutant content		
		Quality indicators	Average concentration, mg/dm^3	Кратность превышения
Caspian Sea	8,7 (normative clean water)	Dissolved oxygen	8,7	
	2,95 (normative clean water)	BOD_5	2,95	
	0,00 (normative clean water)			

Water temperature – 2,0…24,7°C, hydrogen ion exponent – 7,95, dissolved oxygen – 8,7 mg/dm^3, BOD_5 – 2,95 mg/dm3. Increase of MPC isn't revealed. In comparison with 2016 the water quality hasn't changed.

Results of water Quality monitoring in the first half of the year 2018

Name of object	Index of impurity of water and water quality	Pollutant content		
		Quality indicators	Average concentration, mg/dm^3	Кратность превышения
Caspian Sea	9,94 (normative clean water)	Dissolved oxygen	9,94	
	2,22 (normative clean water)	BOD_5	2,22	
	0,00 (normative clean water)			

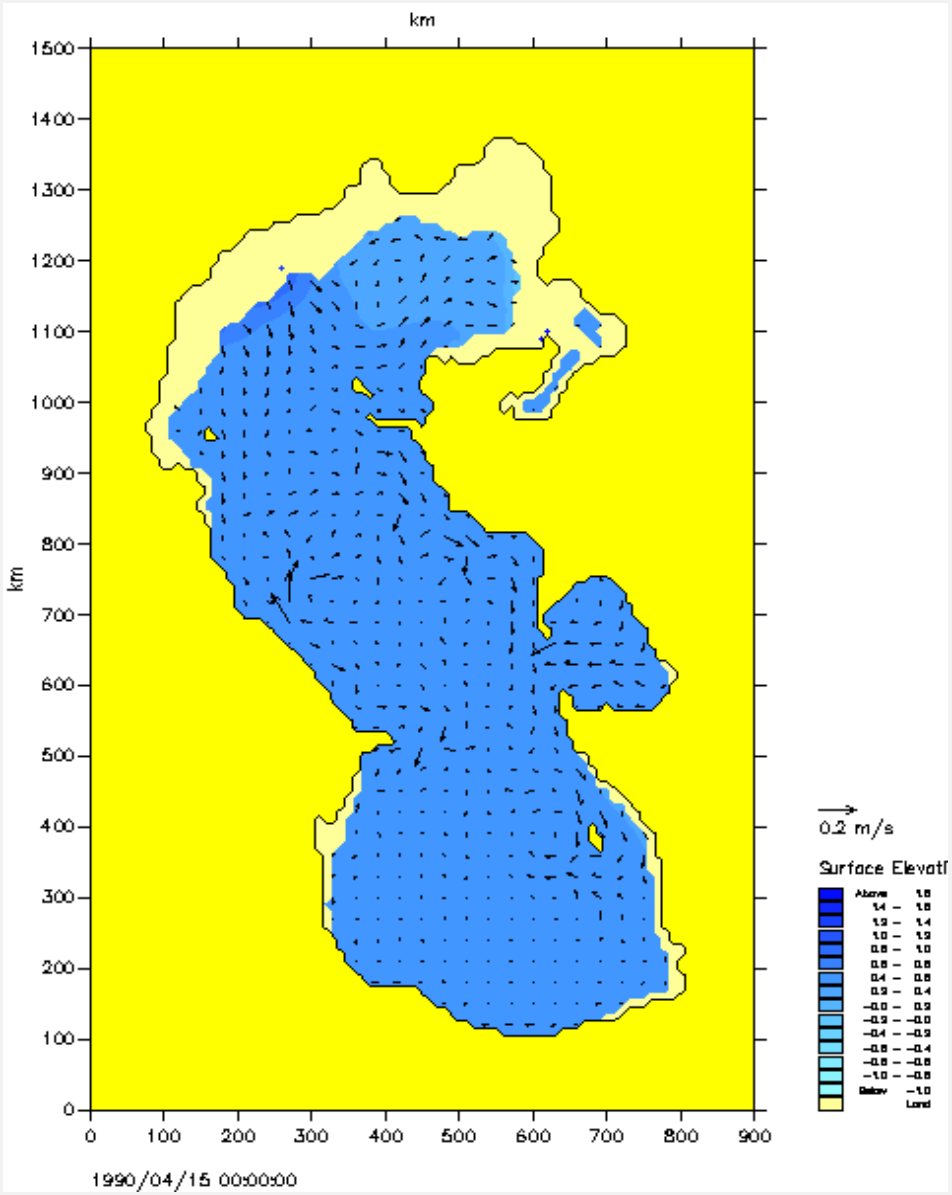
Water temperature – 2,0…23,5°C, hydrogen ion exponent – 8,3, dissolved oxygen – 9,94 mg/dm^3, BOD_5 – 2,22 mg/dm3. Increase of MPC isn't revealed. In comparison with first half of the year 2017 the water quality hasn't changed.

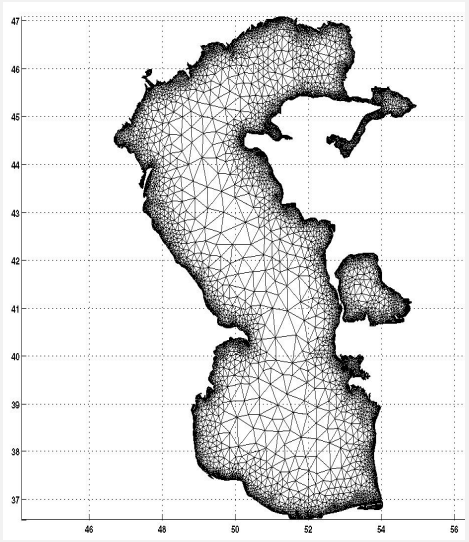
Warming system of the storm surges on the Caspian Sea

Information of Kazakhstan's stations and posts by e-mail 2 times per day

Information of ECMWF by ftp-channel

Advance time	PUV
0 hour (analysis)	
+6 hour	
+120 hour	





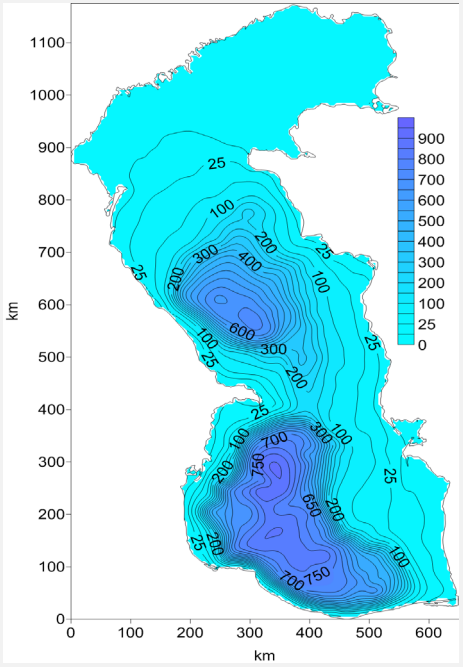
SWAN (Simulation Waves Nearshor) been developed by the Delphic Institute of technologies (Netherlands).

Input data:

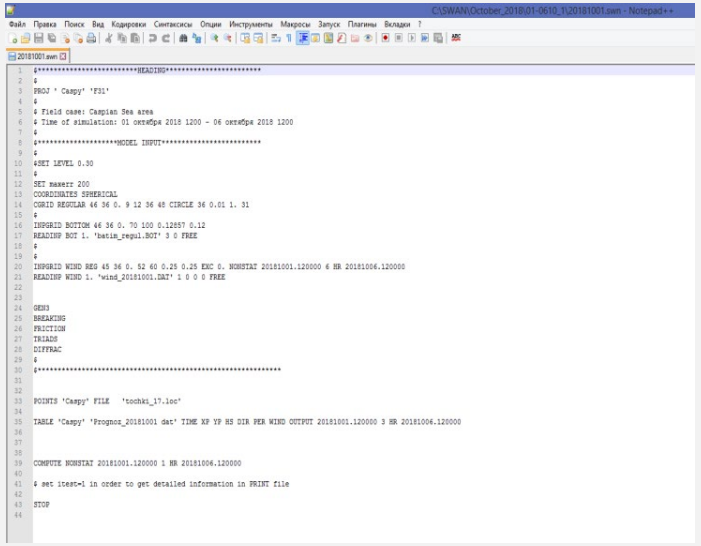
- points of regular or triangularly grid;
- Caspian Sea bathymetry model;
- Wind speed and wind direction.

Выходные данные:

- Wave height and wave direction, wave period, Wind speed and wind direction in the selected points.



SWAN
Simulating WAves Nearshore



```
$*************************HEADING*************************
$
PROJ ' Caspy' 'F31'
$
$ Field case: Caspian Sea area
$ Time of simulation: 01 октября 2018 1200 - 06 октября 2018 1200
$
$*******************MODEL INPUT************************
$
$SET LEVEL 0.30
$
SET maxerr 200
COORDINATES SPHERICAL
CGRID REGULAR 46 36 0. 9 12 36 48 CIRCLE 36 0.01 1. 31
$
INPGRID BOTTOM 46 36 0. 70 100 0.12657 0.12
READINP BOT 1. 'batim_regul.BOT' 3 0 FREE
$
$
INPGRID WIND REG 45 36 0. 52 60 0.25 0.25 EXC 0. NONSTAT 20181001.120000 6 HR 20181006.120000
READINP WIND 1. 'wind_20181001.DAT' 1 0 0 0 FREE


GEN3
BREAKING
FRICTION
TRIADS
DIFFRAC
$
$*************************************************************


POINTS 'Caspy' FILE   'tochki_17.loc'

TABLE 'Caspy' 'Prognoz_20181001 dat' TIME XP YP HS DIR PER WIND OUTPUT 20181001.120000 3 HR 20181006.120000


COMPUTE NONSTAT 20181001.120000 1 HR 20181006.120000

$ set itest=1 in order to get detailed information in PRINT file

STOP
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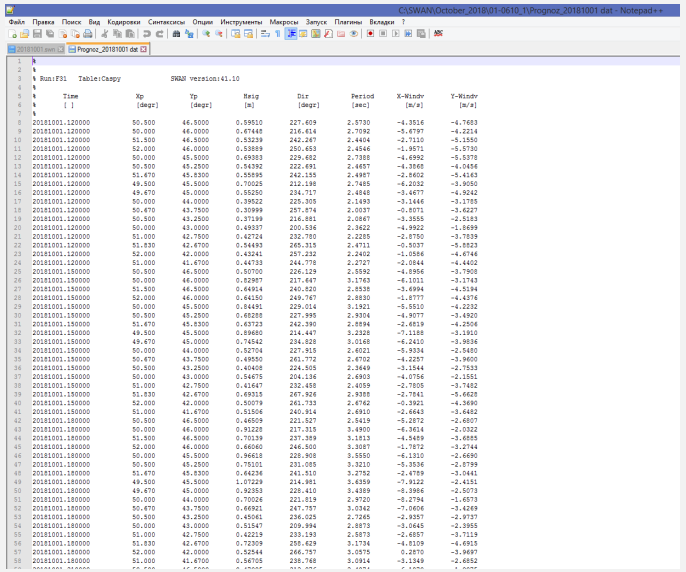

```
%
%
% Run:F31   Table:Caspy                SWAN version:41.10
%
%       Time                Xp          Yp          Hsig        Dir         Period      X-Windv     Y-Windv
%       [ ]                 [degr]      [degr]      [m]         [degr]      [sec]       [m/s]       [m/s]
%
 20181001.120000          50.500      46.5000     0.59510     227.609     2.5730     -4.3516     -4.7603
 20181001.120000          50.000      46.0000     0.67448     216.614     2.7092     -5.6797     -4.2214
 20181001.120000          51.500      46.5000     0.53239     242.267     2.4404     -2.7110     -5.1550
 20181001.120000          52.000      46.0000     0.53889     250.653     2.4546     -1.9571     -5.5730
 20181001.120000          50.000      45.5000     0.69383     229.682     2.7388     -4.6992     -5.5078
 20181001.120000          50.500      45.2500     0.54392     222.691     2.4657     -4.3868     -4.0456
 20181001.120000          51.670      45.8300     0.55895     242.155     2.4987     -2.8602     -5.4163
 20181001.120000          49.500      45.5000     0.70025     212.198     2.7485     -6.2032     -3.9050
 20181001.120000          49.670      45.0000     0.55250     234.717     2.4848     -3.4677     -4.9242
 20181001.120000          50.000      44.0000     0.39522     225.309     2.1493     -3.1446     -3.1785
 20181001.120000          50.670      43.7500     0.30999     257.674     2.0037     -0.8071     -3.6227
 20181001.120000          50.500      43.2500     0.37199     216.881     2.0867     -3.3555     -2.5183
 20181001.120000          50.000      45.0000     0.49337     200.536     2.3622     -4.9922     -1.0699
 20181001.120000          51.000      42.7500     0.42724     232.780     2.2285     -2.6750     -3.7039
 20181001.120000          51.830      42.6700     0.54493     265.315     2.4711     -0.5037     -5.8823
 20181001.120000          52.000      42.0000     0.43241     257.232     2.2402     -1.0586     -4.6746
 20181001.120000          51.000      41.6700     0.44733     244.778     2.2727     -2.0844     -4.4402
 20181001.150000          50.500      46.5000     0.50700     226.129     2.5592     -4.8956     -3.7908
 20181001.150000          50.000      46.0000     0.82987     217.447     3.1763     -6.1011     -3.1743
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 20181001.150000          50.500      43.2500     0.40408     224.505     2.3649     -3.1544     -2.7533
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 20181001.150000          51.830      42.6700     0.69315     267.926     2.9388     -2.7841     -5.6628
 20181001.150000          52.000      42.0000     0.50079     261.733     2.6762     -0.3921     -4.3690
 20181001.150000          51.000      41.6700     0.51506     240.914     2.6910     -2.6643     -3.6482
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 20181001.180000          50.000      46.0000     0.91228     217.315     3.4900     -6.3614     -2.0322
 20181001.180000          51.500      46.5000     0.70139     237.359     3.1813     -4.5489     -4.5655
 20181001.180000          52.000      46.0000     0.66060     246.500     3.3087     -1.7872     -3.2744
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 20181001.180000          50.500      45.2500     0.75101     231.085     3.3210     -5.3936     -2.8799
 20181001.180000          51.670      45.8300     0.64236     241.510     3.2752     -2.4789     -3.0441
 20181001.180000          49.500      45.5000     1.07229     214.981     3.6359     -7.9122     -2.4151
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 20181001.180000          52.000      42.0000     0.52544     266.757     3.0575      0.2870     -3.9697
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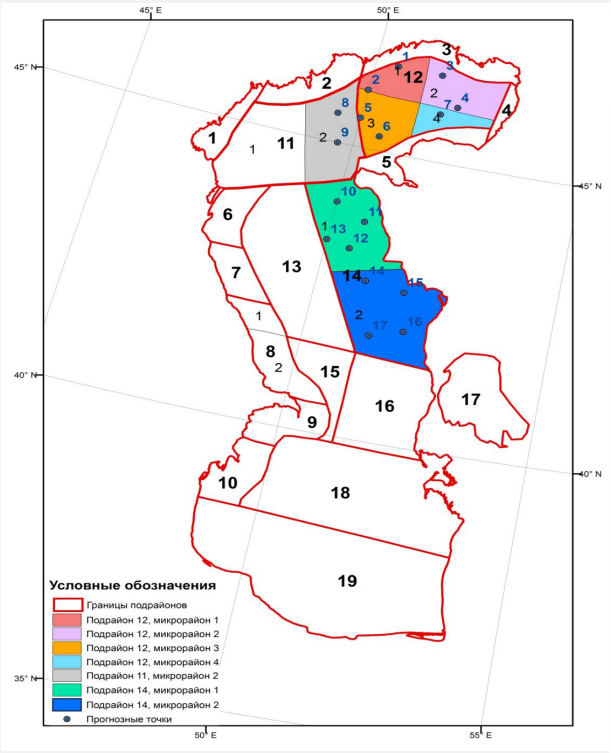
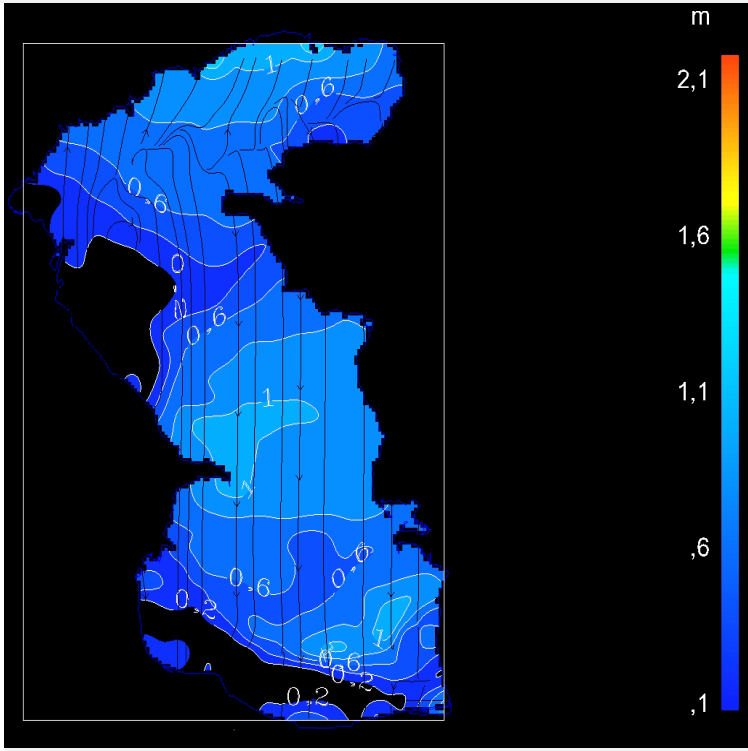
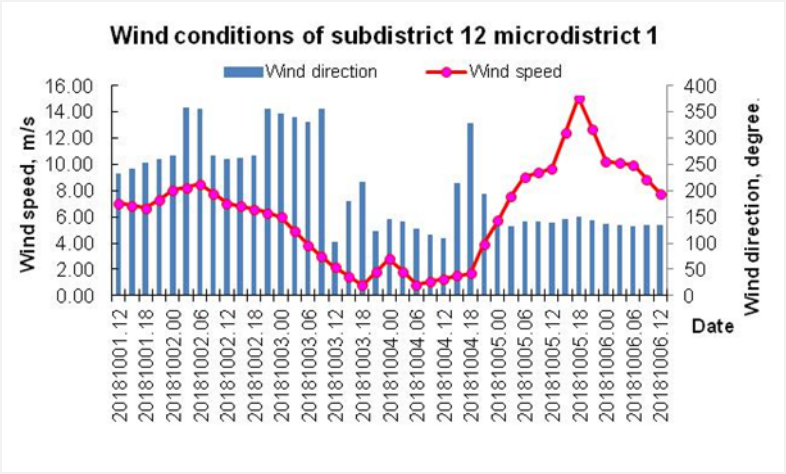
```

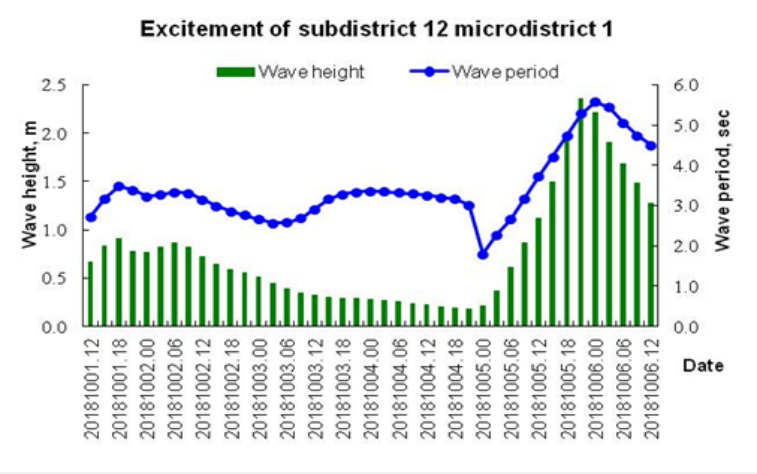
Scheme of the forecast with SWAN model



Date / time	subdistrict 12, microdistrict 1				
	Wave height	Wave direction	Wave period	Wind speed	Wind direction
	m	rumba	sec	m/s	rumba
20181001.12	0.67	ЮЗ	2.7	7.08	ЮЗ
20181001.15	0.83	ЮЗ	3.2	6.88	ЮЗ
20181001.18	0.91	ЮЗ	3.5	6.68	З
20181001.21	0.78	ЮЗ	3.4	7.36	З
20181002.00	0.77	Ю	3.2	8.04	З
20181002.03	0.82	Ю	3.3	8.26	С
20181002.06	0.87	Ю	3.3	8.49	С
20181002.09	0.83	Ю	3.3	7.76	З
20181002.12	0.73	Ю	3.1	7.03	З
20181002.15	0.65	Ю	3.0	6.82	З
20181002.18	0.60	Ю	2.9	6.61	З
20181002.21	0.56	Ю	2.8	6.31	С
20181003.00	0.51	Ю	2.7	6.01	С
20181003.03	0.45	Ю	2.6	4.92	С
20181003.06	0.39	ЮВ	2.6	3.83	СЗ
20181003.09	0.35	ЮВ	2.7	3.00	С
20181003.12	0.33	ЮВ	2.9	2.17	В
20181003.15	0.31	ЮВ	3.2	1.48	Ю
20181003.18	0.30	ЮВ	3.3	0.80	ЮЗ
20181003.21	0.29	ЮВ	3.3	1.81	ЮВ
20181004.00	0.28	ЮВ	3.4	2.82	ЮВ
20181004.03	0.27	В	3.4	1.82	ЮВ
20181004.06	0.26	ЮВ	3.3	0.82	ЮВ
20181004.09	0.24	ЮВ	3.3	1.07	ЮВ
20181004.12	0.23	ЮВ	3.3	1.32	В
20181004.15	0.21	ЮВ	3.2	1.52	ЮЗ
20181004.18	0.20	ЮВ	3.2	1.72	СЗ
20181004.21	0.18	ЮВ	3.0	3.92	Ю
20181005.00	0.21	С	1.8	5.72	ЮВ
20181005.03	0.37	СЗ	2.3	7.59	ЮВ
20181005.06	0.61	СЗ	2.7	9.07	ЮВ
20181005.09	0.87	СЗ	3.2	9.37	ЮВ
20181005.12	1.13	СЗ	3.7	9.68	ЮВ
20181005.15	1.50	СЗ	4.2	12.40	ЮВ
20181005.18	1.99	СЗ	4.7	15.12	ЮВ
20181005.21	2.36	СЗ	5.3	12.67	ЮВ
20181006.00	2.22	СЗ	5.6	10.22	ЮВ
20181006.03	1.91	СЗ	5.4	10.11	ЮВ
20181006.06	1.69	СЗ	5.1	10.00	ЮВ
20181006.09	1.49	СЗ	4.7	8.89	ЮВ
20181006.12	1.27	СЗ	4.5	7.78	ЮВ

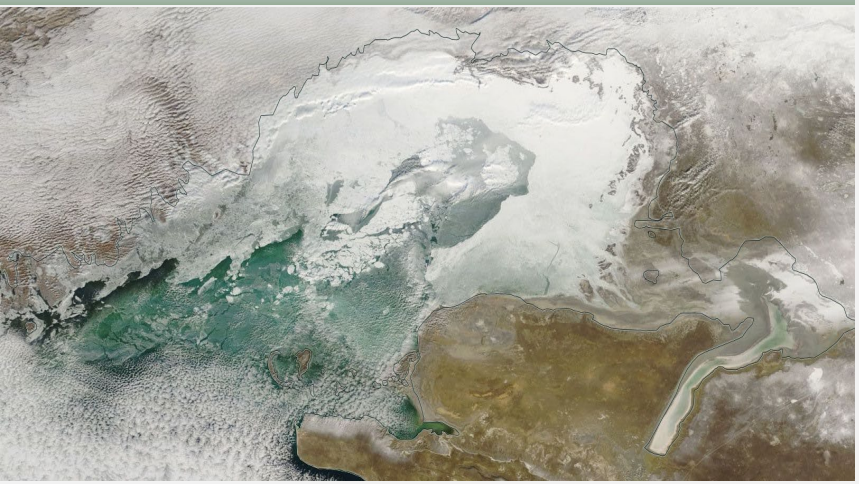






Ice Monitoring

Analysis of satellite images (satellites NOAA, MODIS Terra, MODIS Aqua …).



The analysis of instrumental observations of water temperature, ice thickness and height of snow on ice.

Visual control of ice formation and ice sheets, types and forms of ice.

МИНИСТЕРСТВО ЭНЕРГЕТИКИ РЕСПУБЛИКИ КАЗАХСТАН
РГП «КАЗГИДРОМЕТ»

НАУЧНО-ИССЛЕДОВАТЕЛЬСКИЙ ЦЕНТР

ОБЗОР ЛЕДОВОЙ ОБСТАНОВКИ В РАЙОНЕ СЕВЕРНОГО КАСПИЯ
ЗА 23 января 2018г.

Космический снимок Каспийского моря, 17 января 2018 г.
«MODIS Rapid Response Project at NAGA/GSFC»

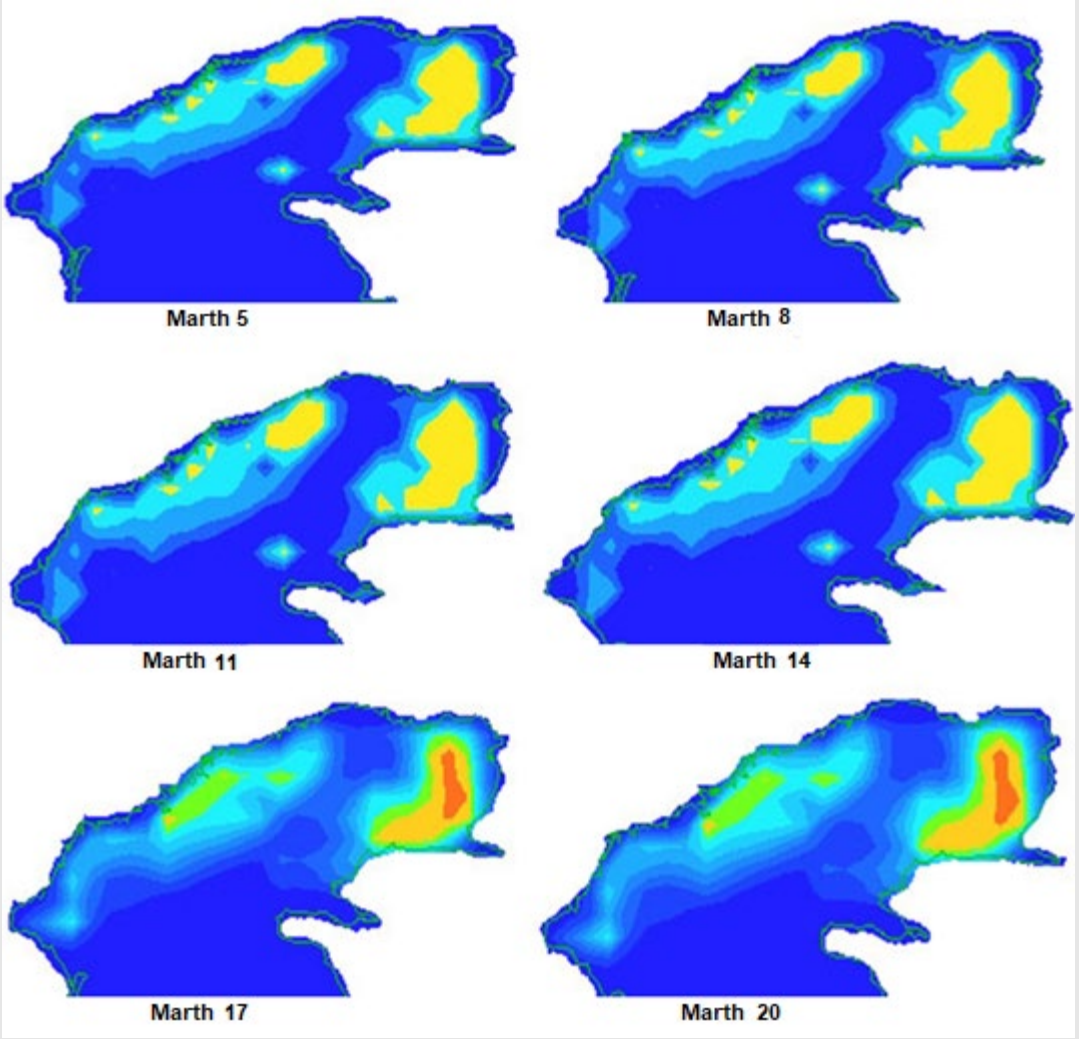
Таблица – Основные элементы ледового режима Каспийского моря на 23.01.2018 г. по оперативным данным морских станций и постов

Пункт	Ширина припая, км	Толщина льда, см	Высота снега на льду, см	Количество неподвижного льда, баллы	Количество чистой воды, баллы	Дрейф льда, баллы	Сплочённость льда, баллы
Морские станции и посты Казгидромета							
МГП Жанбай	>0,1	34		10	0	9	нб
М Пешной	0,5-1,0	10		10		9	нб
МГП Лагань	>0,1	9		10	0	11	10
МГП Иголкинская Банка	>0,1	12		10			

нс – сведений нет
нб – явление не наблюдалось

Составила вед.инженер УГМИКМ Васенина Е.И.
Управление гидрометеорологических исследований Каспийского моря, РГП «Казгидромет»:
Тел. (727) 2 55 84 06; E-mail: caspian_almaty@mail.ru & kaspy@meteo.kz

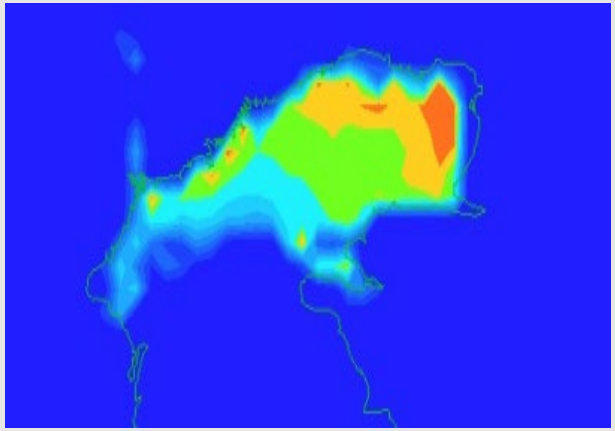
Forecasting of an Ice Conditions with Global Forecasting System



Global Forecasting System (GFS) is the weather numerical forecasting system containing global computer model and the variation analysis made by National Weather Service of the USA (NWS).

Mathematical model is started four times per day and gives forecasts for 16 days ahead with reduction of spatial resolution in 10 days.

The forecast for March 17, 2018 (GFS)

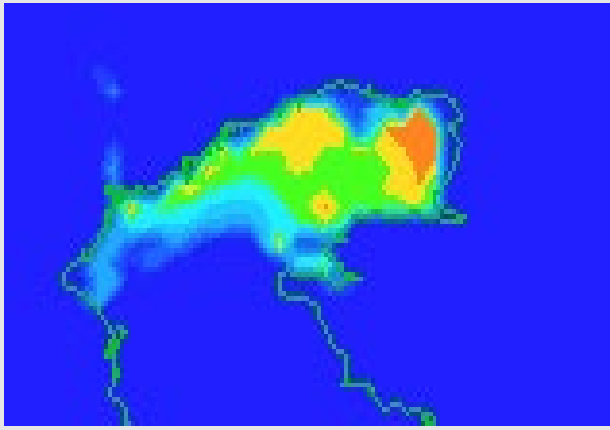


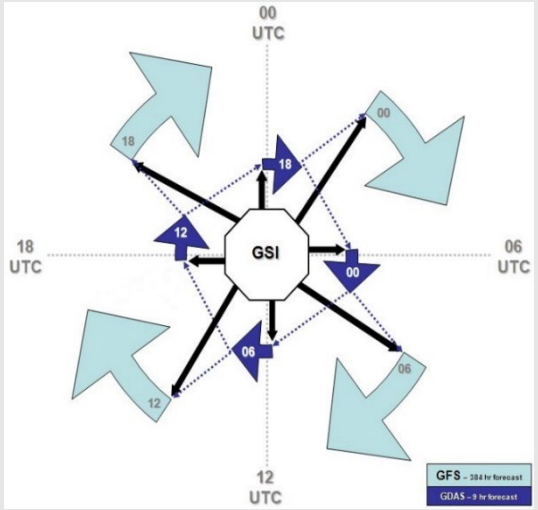
GFS

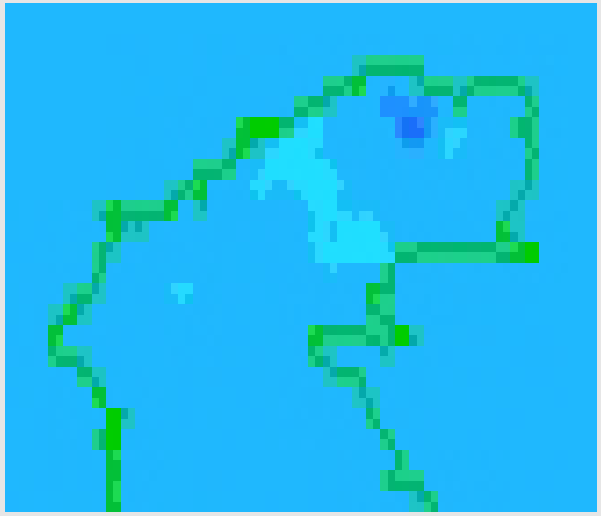
Initial forecast GFS

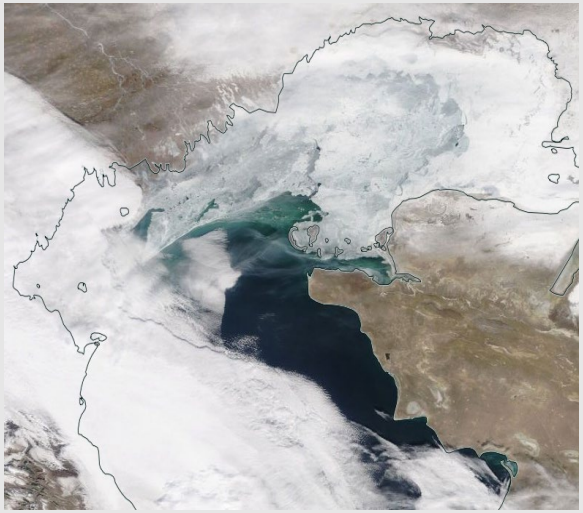
Final forecast GDAS

Check the forecast for March 17, 2018 (GDAS)









Difference between GFS and GDAS

Web-site RSE «Kazhydromet» https://kazhydromet.kz

Caspian Sea

Добавлено: 19 May 2017 11:22, Изменено: 23 May 2017 18:03

The **Caspian Sea** is the largest closed sea in the world, located on the continent of Eurasia. The coastline is 2,220 km is Kazakhstan.

The region of the Caspian Sea adjacent Kazakhstan, according to natural conditions, parts: the eastern part of the Northern Caspi part of the Middle Caspian. The eastern pa Caspian is shallow with a low coast and l bottom. Here the average depth is 2 m, depth, in the region of the Ural Furrow, is 8 of the bottom is complicated by the presen furrows. It is a semi-enclosed reservoir, a h which is formed in the conditions of the cor the Urals and the Volga.

Foto by Akim Mengeu

It is practically isolated from the direct influence of the waters of the Middle Caspian. The eastern part of t water. The average depth is 200 m, and the maximum depth is up to 700 m.

The Caspian Sea and its catchment area is of great importance for the economies of the Caspian Kazakhstan. This unique reservoir with a diverse flora of fauna and hydrocarbon reserves. Socio-econon the coastal zone has a significant impact on the hydrometeorological regime. The level of the Caspian Sea during the year

The Caspian Sea hydrometeorological research Department

Caspian sea water surface status review
Caspian sea hydrometeorological research
Caspian sea ecological research

Forecast*

of the Caspian Sea water level for 27 September – 02 October 2018

In the northern part of the Caspian Sea the sea level fluctuation from storm surges is expected about minus 27,94 m with the maximal increase up to minus 27,39 m and its minimal downturn up to minus 28,24 m.

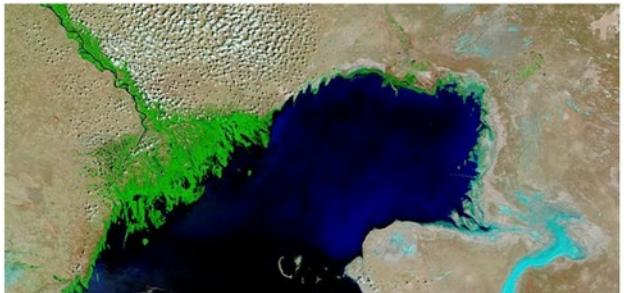
In the middle part of the Caspian Sea the sea level fluctuation is expected about minus 28,08 m with rise up to minus 27,81 m and recession up to minus 28,56 m.

** Calculations are received at use of the hydrodynamic module MIKE 21of the Danish Hydraulic Institutes adapted to conditions of the Caspian Sea in the RSE "Kazhydromet". At account the water level observational data and numerical forecast of the baric field were used (probability 24-120 h).*

Caspian Sea Water Surface, 20-26 September 2018

In the Caspian Sea Northern Part the mean sea level corresponded to mark minus 27,95 m, maximal – minus 27,81 m, minimal – minus 28,12 m (using observational data from the Kazakhstan's sea stations and posts: Peshnoy, Zhanbay, Kulaly Island and Roshydromet's sea station – Tuyleny Island).

In the Caspian Sea Middle Part the mean sea level corresponded to mark minus 28,08 m, maximal – minus 27,84 m, minimal – minus 28,50 m (using observational data from the Kazakhstan's sea stations and posts: Fort-Shevchenko, Aktau, Fetisovo and Roshydromet's sea station - Makhachkala).



Caspian sea ecological research

"Hydrometeorology and Ecology" scientific and technical magazine


A lot of thanks
for attention!