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CHARACTERISTICS OF THE BLACK SEA

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ABSTRACT

This article is about the Black Sea. It contains interesting subjects about Black Sea, like history, geography, structure of the sea, chemical and physical characteristics, and the whole process of evolution from the first data about the Black Sea to the present moment. Also, we will talk about the species of fish which live in the Black Sea, the entire biosystem, a few information about pollution problems, natural resources of the seabed. Each element presented will be exemplified by images from different official sources.

Keywords:

Black Sea, geography, chemical/physical characteristics of the Black Sea

INTRODUCTION

As a short history, the Black Sea was originally named "Axaina" what means "dark blue". In the period of greek colonization, it name was "Pontos Euxeions" what means "welcoming sea". Romans used the name "Scythicum Sea" and after, during the Byzantine Empire appeared other names like "Great Sea" or "Mare Maggiore". With the expansion of the Ottoman Empire, in the XV century, it appeared "black" in the name of the sea.

In the past, the Black Sea was often treated as Romania's only friend. The Black Sea has always had a special significance in the formulation of foreign and security policy. Romania's strategic position encompasses a number of different dimensions and the exit to the Black Sea is an important benefit both in the history and in the present of the Romanian security policy.

Historically, the Black Sea represented an important trade route between the European Union and Central Asia and the Near East. Since the Middle Ages, the great powers carried out economic activities in the Black Sea area and in the modern era, along with technological development, trade intensified and began to develop on other bases. In addition to international trade, the Black Sea represented the meeting area of several cultures and civilizations here which sold both problems and opportunities at the Geo Strategic level.

GEOGRAPHICAL CHARACTERISTICS OF THE BLACK SEA

The Black Sea is a marginal Mediterranean Sea of the Atlantic Ocean. It is lying between Europe and Asia, east of the Balkans, south of the East European Plain, west of the Caucasus and north of Anatolia. It is bounded by Romania, Bulgaria, Georgia, Russia, Turkey and Ukraine. Among the most important tributaries are the Danube, Dnieper and Don. The surface of the Black Sea covers more than 430 000 km^2. The maximum depth is 2 212 m. The most important port-cities along the coast are Odessa, Constanta, Varna, Trabzon, Burges, Sochi and Samsun. The shores are slightly indented and show few islands, peninsulas, bays, or straits. The Black Sea is connected to the other seas trough three straits: Kerci Strait- Azov Sea, Bosporus Strait- Marmara Sea and Dardanelles Strait- Mediterranean Sea. The relief comprises the continental shelf, the continental escarpment and the abyssal plain.

Figure 1. Location of the Black Sea

Regarding flora and fauna, along the Romanian coast, 131 species of fish live in the Black Sea. From a certain depth, sea water contains negligible amounts of oxygen, therefor there are only some microorganisms living there. The Black Sea has only an island: Snake Island. The most important peninsula is the Crimean Peninsula.

Figure 2. Sea anemone (photo taken by author)

Figure 3. Jellyfish (photo taken by author)

The Black Sea belongs to the category of standing salt water ecosystems. In terms of salinity, the Black Sea is divided into:

- Surface area;
- Depth area.

Under the biocentric aspect we find three areas:

- The littoral zone;
- The pelagic zone;
- The abyssal zone.

The Black Sea is a body of salt water that stretches 1 014 km from east to west and 530 km from north to south, except between the Crimean Peninsula and Turkey, where it cinches 232 km. The Black Sea is usually considered the boundary between Europe and Asia.

Below 200 m, the water holds no oxygen, and the Black Sea is there for the largest anoxic basin in the world with about 90% of its water permanently anaerobic.

In the area of Black Sea, over 160 million people live, and it serves as a thoroughfare for oil tankers and other vessels. The sea's anoxic nature aggravates problems of pollution. In the 1990s, two geologists at Columbia University in New York City proposed a new theory: the Black Sea had been a freshwater lake until 5000 B.T.C. The Mediterranean Sea swelled, flooded northward over Turkey and funneled through the Bosphorus Strait with an impact greater than 200 times the force of Niagara Falls. During this flood the Black Sea rose at an exploratory team in 1999 and 2000 that found evidence of an ancient shoreline 168 m below the current level of the Black Sea.

The Romanian coast of the Black Sea stretches for 245 km between the Musura arm and Vama Veche. It comprises two sectors: a low northern deltaic and lagoonal between the Musura arm and Midia Head and a high southern one with cliffs and beaches between Midia Head and Vama Veche.

Figure 4. Deltaic and lagoonal littoral

Figure 5. Littoral with cliffs

LESSER-KNOWN THINGS ABOUT THE BLACK SEA

Archaeologists claim that an ancient fortress is currently located on the bottom of the submerged Black Sea near the city of Mangalia. It is about the Callatis Fortress founded by the Dorian Greeks in the 6th century before Christ. All this construction sank in the early memorials, the most plausible explanation of the scientist being the earthquakes, due to which successive ruptures of the banks took place. This is how the walls and other facilities in the citadel, from streets to various divisions of a civil or military character, were destroyed.

Figure 6. Archaeological monuments at the bottom of the Black Sea

Figure 7. The work of archaeologist divers

CHEMICAL AND PHYSICAL CHARACTERISTICS OF THE BLACK SEA WATER

The oxygenated water in the upper layers of the sea has a relatively low salinity of about 17‰, due to the overflow of the rivers with about 600 km3 of fresh water per year. In the deeper layers, below 150 m, the salt content is much higher because it comes from the Bosporus Strait from the Mediterranean Sea. Annually, about 450 km^3 of brackish water flows through the Bosporus on the surface from the Black Sea to the Mediterranean with a concentration of 17–19‰ and along the bottom about 50 km^3 of water with a salt concentration of 38–39‰ from Mediterranean towards the Black Sea, causing in straits dangerous currents to navigation.

The Black Sea is the largest brackish water basin in the world with varied biotopes and a fauna that has undergone continuous transformations due to the strong opposing influences exerted by fresh waters and the Mediterranean Sea. In the north-west of the marine basin, due to the greater contribution of continental waters, the salinity is lower below 18‰ in the Gulf of Odessa and below 15‰ in the Danube catchment area. In the south of the Black Sea, due to reduced precipitation, higher evaporation and lower flow of continental waters, the water masses have a higher salinity, around 18–19‰. The average annual temperature of marine waters in the Romanian sector of the Black Sea varies around 12–14 ^oC. In the evolution of the water temperature in the coastal area, some disturbances occur mainly due to the atmospheric circulation. Thus, the winds from the western and southern sector move the superficial waters to the sea and to the north, their place being taken by colder deep waters. The vertical temperature distribution in the waters of the

Black Sea presents a particular aspect imposed by the stratification of the water masses and the isolation character of the marine depression.

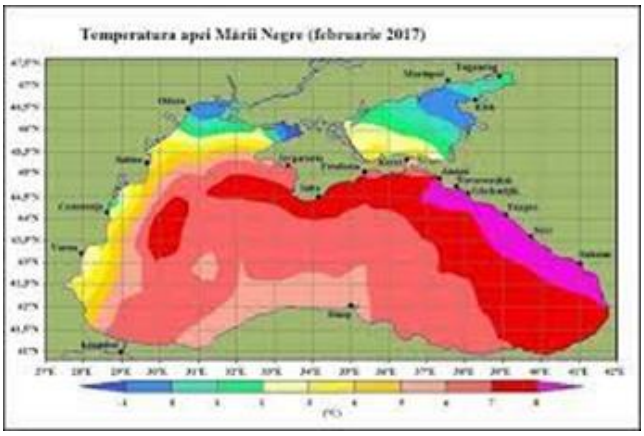

Figure 8. The temperature of the Black Sea

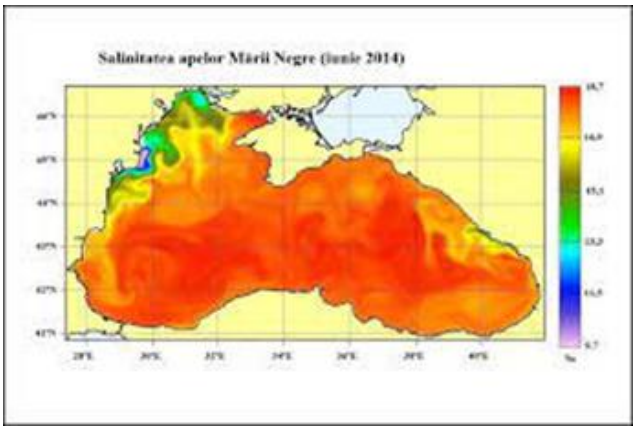

Figure 9. The salinity of the Black Sea

The transparency and color of the Black Sea in the area of the Romanian coast varies widely depending on the amount of light and dissolved substances. In the catchment area of the Danube, the color of the sea water is strongly influenced by the suspended alluvium transported by the river. In front of the Danube Delta, the color of the water is yellowish brown, to the south it is greenish yellow and towards the sea it is greenish blue.

The formation and development of waves are the result of the uneven pressure on the surface of the water, which initially causes small irregularities that are nothing more than the embryos of waves in the making. Apart from the pressure on the waves, it also influences the morphometric characteristics of the Black Sea.

Most storms occur on the Black Sea in the cold season with north-easterly winds, their maximum frequency being reached in January. Storms that create strong sea disturbances are rare during the summer. During storms, wave heights reach 6-8 m with a period of 10-12 sec and lengths of 60 m. Thus, depending on the frequency of the waves and the degree of agitation, the Black Sea is divided into two parts: the north-west part, which is especially agitated in winter and the south-east part with waves whose elements are less, especially in the warm season. The factor that determines the size of the sea agitation is the wind. There is a correlation between in intensification of the wind and the state of the sea. The sea agitation is higher in the case of winds from the sea than those from the land.

Due to the strong north-easterly winds and the nearby jet in the Black Sea, a system of marine currents is formed that surrounds the sea basin in a counter-clockwise direction. The main circular current follows the coastal areas near the Bosporus. The current forms on the coasts of Anatolia with a speed of 5–30m/s, on the coasts of the Caucasus the speed exceeds 30 cm/s, near the Kerch Strait the current reduces its speed to 5 cm/s because near the Saraci Head to exceed 30cm/s again on the coasts of Crimea and along the entire length of the western shore. The average speed of the current varies between 5 and 20 cm/s.

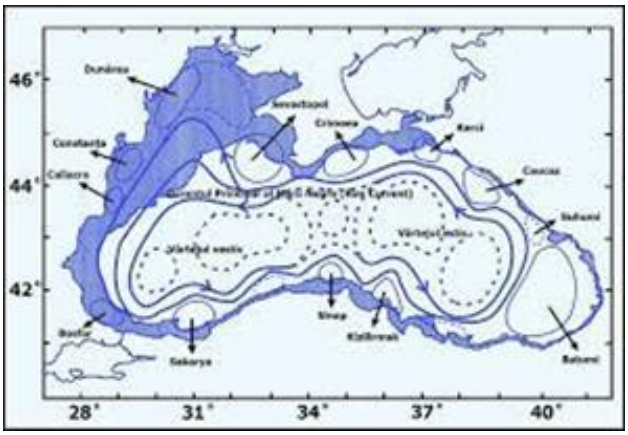

Figure 10. Formation of currents in the Black Sea

In marine deposits, accumulations of heavy minerals are mentioned, especially in the northern shore sector. Agglomerations of ferromanganese and phosphoric concretions are reported off the continental shelf. The greatest geological importance is represented by the hydrocarbon deposits exploited in the sector of the Romanian head. Among the biological resources are worth mentioning algae fields of plankton, red and brown algae, and numerous invertebrates. The potential resources that

are valued under the economic aspect are maritime transport, tourism, and balneology.

Frost phenomena are manifested only in the coastal areas of the north and west where the depths are shallow, and the salinity is low. Ice usually begins to appear in the second half of December at the mouths of rivers in the north-west and in January and February on the western coasts. First phenomena disappear at the end of February and the beginning of March. The ice is unstable. The ice bridge on the Romanian coast appears at an interval of 5–6 days after the air temperature has remained below 0°C. In the last eight decades, the strongest frosts occurred at the beginning of the years 1929, 1954 and 1963. In February 1954, the compact ice sheet extended offshore to 2–4 km beyond which 12–17 km were sheets of drifting ice.

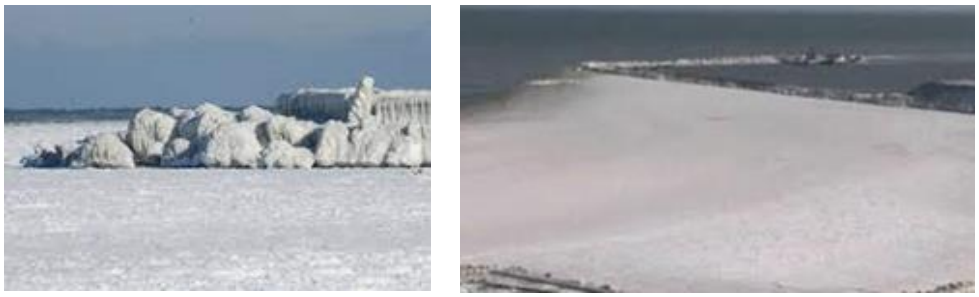

Figure 11. Examples of ice on the Black Sea

SUMMARY

As a final opinion about this article, we can say that we have touched the most important topics regarding the geographical, chemical, and physical characteristics of the Black Sea. We tried to go inside as well as possible into the lesser-known secrets of sea water, we looked for different sources of information, both in published books and in videos and articles found on the Internet. Thus, we managed to put information about each characteristic separately, exemplified with images. In many of them, we referred to the Romanian coast, because the information about this part of the Black Sea is much more numerous among the searches found. We would like to conclude with a few words said by the former chief of the General Staff of the Naval Forces, at the time of his retirement from the Naval Forces: the sea does not forgive stupidity, that is why we have to prepare ourselves every day to be a team capable from all points of view to carry out missions at sea in safe conditions.

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