



COUSTEAU

WWW.COUSTEAU.ORG
CUSTODIAN OF THE SEA
SINCE 1943

This project is co-funded
by the European Union

EMBLAS-Plus
Environmental Monitoring in the Black Sea



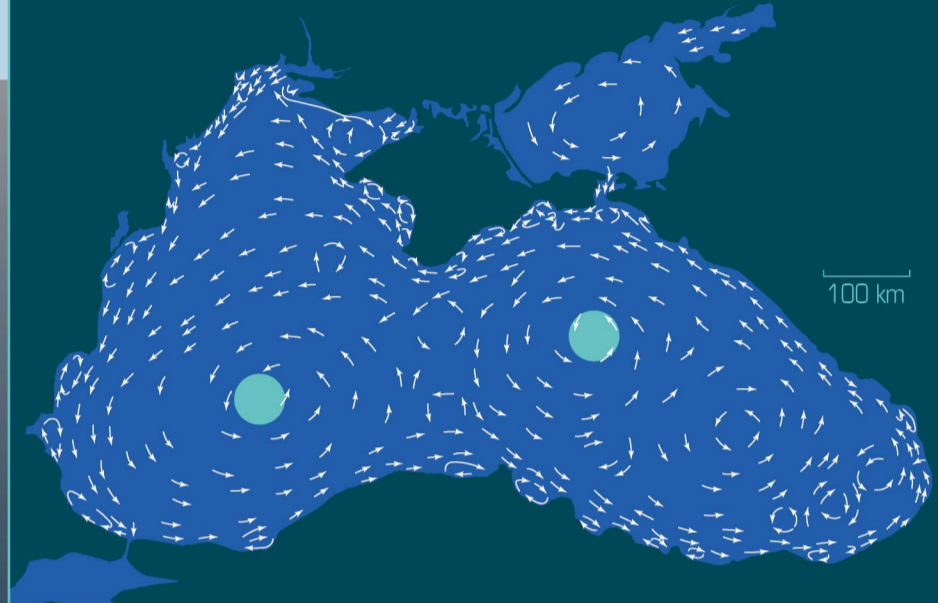
ANOXIC LAYER OF THE BLACK SEA

THE DANGER OF ITS RISE

Map of the main currents of the Black Sea

The lowest depths of the oxygen layers (54 m) have been found in **the middle of the western and the eastern cyclonic gyres** in the open sea. The oxygen layer is thicker (160 m) near the coast.

● spots of lowest depths of the oxygen layer



87% of the Black Sea's volume is anoxic, which means without dissolved oxygen (O₂).

This anoxic zone is impregnated with hydrogen sulphide (H₂S) which is a highly toxic chemical compound. It is the largest anoxic water basin in the world

The Black Sea is a closed sea and the vertical currents are weak in its deep part. The consequence is that the deep waters do not mix with the upper oxygenated waters. This induces an increasingly large anoxic zone.

Between 1955 and 2017, toxic boundary shoaled from **140 m to 54 m deep***. This phenomenon is strengthened by eutrophication and global warming.



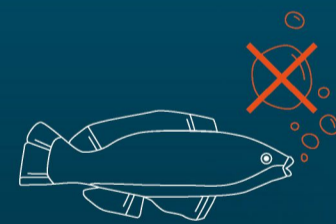
There is ongoing research about the potential use of H₂S to **produce energy**. This could be an advantageous solution to combat the rise of the anoxic layer.



Intake of bottom waters at 2 000 m of depth
H₂S hydrogene sulphide

ANOXIC ZONE
oxygen free layer
contains H₂S

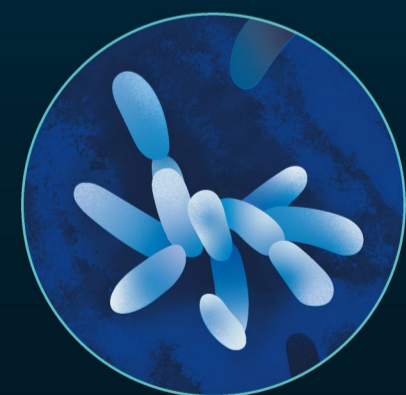
Consequences of the rise of the anoxic layer :



A compression of almost **40% of the habitable space** for oxygen dependent marine inhabitants (fish, shellfish, dolphins, algae and microorganisms). It threatens biodiversity.



The Black Sea is more vulnerable to **pollution and climate change**.



Microscopic observation of microorganisms belonging to the group *Lokiarchaeota*

Only a few microorganisms can live in the extreme conditions of the anoxic zone. Among them, the group *Lokiarchaeota* were found in the Black Sea. Discovered in 2015, this group is very interesting because it is a kind of 'missing link' between prokaryotes (organisms which do not have nucleus) and eukaryotes (ones which have nucleus, like animals and plants).

160 m

2 km • maximum depth

* According to the EMBLAS-II field data (2017). More information at http://emblasproject.org/wp-content/uploads/2019/07/EMBLAS-II_NPMS_JOSS_2017_ScReport_FinDraft2.pdf

WHAT CAN WE DO ABOUT IT?

We can all act to make things better!

As a citizen: Reduce your carbon footprint. Use as less energy as possible at home and at work. Prefer the use of public transports or bikes rather than cars when possible.

As a decision maker: Adopt measures and laws to limit air pollution and greenhouse gases. Join international agreements to fight climate change.

More information at emblasproject.org

