

“Why Should We Care for the Fate of Antarctica?”

What is RADIATIVE BALANCE?

Radiative balance is a natural condition reached when the incoming solar radiations are evenly absorbed (63%) and reflected (37%) towards the top of the atmosphere.

Some factors, like the *greenhouse effect*, can impact and affect the radiation balance. The greenhouse effect, greatly increased by gas emissions, causes the heat emitted by the Earth to be trapped under the atmosphere, amplifying the surface temperature.

Gas emissions are a natural and slow process (in 10000 years the CO₂ concentration increases by 100 ppm) but humans are accelerating the process, especially since the Industrial Revolution (in 160 years it increased by 128 ppm).

Radiative unbalance occurs when the radiations emitted by the Sun are trapped inside of the atmosphere due to greenhouse gasses. As a consequence there are more solar radiations absorbed than reflected and the balance is compromised.

In order to restore that balance we should reduce by **60 ppm** the concentration of CO₂ in the atmosphere.

Ocean: THERMO-REGULATOR

The role of the Ocean is crucial for the thermo-regulation of our planet, in fact the Ocean has a large heat capacity and it absorbs CO₂.

Due to the amount of gas emissions, Oceans are warming up and the sea level is rising, as a result of the *steric effect* that causes the expansion of water masses both horizontally and vertically (**+1.4 mm/year**), and of the ice-sheets and glaciers melting (**+1.9 mm/year**).

It is crucial to understand that the expanding volume of the Ocean will result in hundreds of kilometers of coastline and lands entirely submerged by water.

The current rate of sea level rising is +3.3 mm/year (+3.4 mm/year in Trieste), which means **+19 cm since year 1900**.

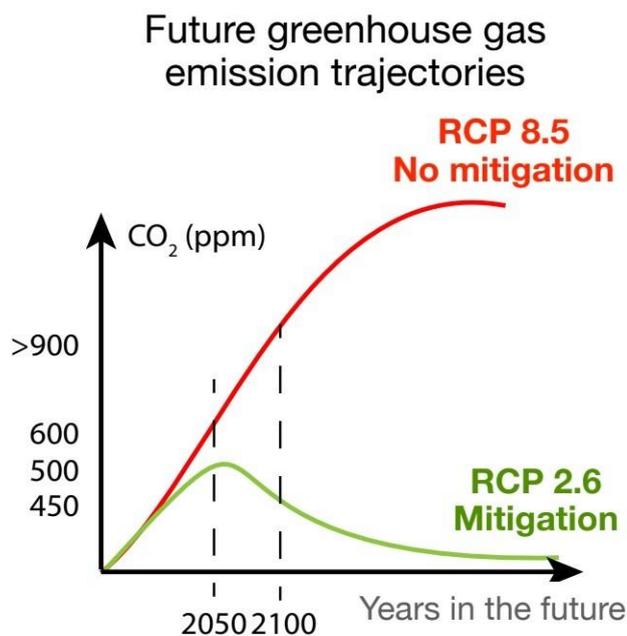
The warmth of the Ocean is causing the ice in Antarctica to melt faster from below. Blocks of ice flow from the top of the mountains towards the Ocean where they melt. This phenomenon occurs more and more frequently in Antarctica and eventually it will lead to the disintegration of its ice and to very intense sea level rise.

FUTURE SCENARIOS

Considering many aspects, such as increased population, natural resources, technological development, economic growth and politics, climatologists can calculate hypotheses about the future of global climate itself.

Two main future trends resulted possible from their statistics:

- A “**Best Case Scenario**”, that would occur only if the 2050 “*Zero Emissions Plan*” is perfectly respected, in which the CO₂ concentration in the atmosphere adds up to **440 ppm**, leading to a temperature increase of **+1.6°C** and a **+40 cm** increase of the sea level.
- A “**Worst Case Scenario**”, that would occur by keeping the same CO₂ emission levels we have today, in which the CO₂ concentration in the atmosphere adds up to **1130 ppm**, leading to a temperature increase of **+4.3°C** and a **+80 cm** increase of the sea level.



As a conclusion we have to acknowledge that the sea level will continue to rise, regardless of our emissions, so the only thing that we can and must do right now is to mitigate the effects of climate change to make this process less immediate and destructive, yet many populations will be forced to migrate due to the flooding of the coasts and the change in life conditions that this process will lead to.