

**Thème 1 – Science, climat et société**

**L’atmosphère terrestre et la vie : évolution conjointe**

**Atmospheric ozone : “bad” or “good” ?**

**With those documents and the help of your scientific knowledge, explain why ozone, this element that we have been protecting, can be questioned .**

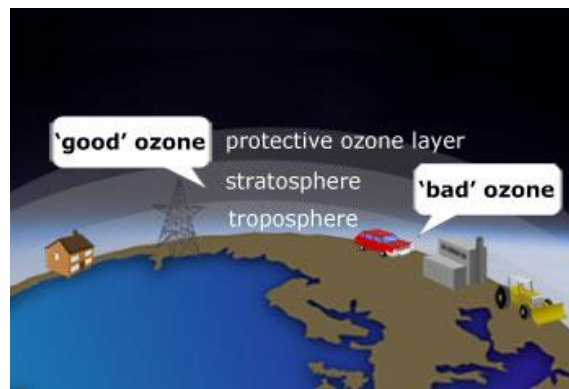
**Document 1 :**

Atmospheric ozone absorbs ultraviolet (UV) radiation from the sun, particularly harmful UVB-type rays. Exposure to UVB radiation is linked with increased risk of skin cancer and cataracts, as well as damage to plants and marine ecosystems. Atmospheric ozone is sometimes labeled as the "good" ozone, because of its protective role, and shouldn't be confused with tropospheric, or ground-level, "bad" ozone, a key component of air pollution that is linked with respiratory disease (...)

In 1974, Mario Molina and Sherwood Rowland, two chemists at the University of California, Irvine, published an article in *Nature* detailing threats to the ozone layer from chlorofluorocarbon (CFC) gases. At the time, CFCs were commonly used in aerosol sprays and as coolants in many refrigerators. As they reach the stratosphere, the sun's UV rays break CFCs down into substances that include chlorine. The groundbreaking research—for which they were awarded the 1995 Nobel Prize in chemistry—concluded that the atmosphere had a “finite capacity for absorbing chlorine” atoms in the stratosphere. One atom of chlorine can destroy more than 100,000 ozone molecules, according to the U.S. Environmental Protection Agency, eradicating ozone much more quickly than it can be replaced.

National geographic, October 8 2014

**Document 2 :**



European Environment Agency, March 30 2017

Teacher's corner :

Doc 1 :

“Good ozone” : In the stratosphere, ozone protects against UVB responsible skin cancers / cataracts / damage plants and marine ecosystems

“Bad ozone” : ozone in the troposphere produced by human activities can cause respiratory diseases.

destruction ozone in stratosphere can be destroyed by CFC

Doc 2 : the good ozone is in the stratosphere and the bad ozone is in the troposphere (is created by car, industry / human...)

Other possible questions :

- What can UVB cause on cell skins that develop skin cancer ? Mutation
- Can you indicate what the ozone hole is? What is its impact ?
- Which means do scientists use to study the ozone hole ? weather balloon with big pressure
- Do you know the montreal protocol ?
- The frequency of cancers is very important for example in Australia, is the hole in the ozone layer the only consequence? (majority of population with white skin / improper use of solar products / fashion to be tanned / high altitude / reverberation...)
- Can you explain what the carbon cycle is ?
- Can you explain : what is the impact of the combustion of fossil fuels by humans on earth ?