Why does UVC radiation not reach the earth more than UVA radiation?

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According to this website, "UVA rays have the longest wavelengths, followed by UVB, and UVC rays which have the shortest wavelengths. While UVA and UVB rays are transmitted through the atmosphere, all UVC and some UVB rays are absorbed by the Earth's ozone layer. So, most of the UV rays you come in contact with are UVA with a small amount of UVB."

But shorter wavelengths have more energy/penetration power, so why doesn't more UVC radiation reach the earth?

electromagnetic-radiation radiation

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edited Dec 10, 2019 at 10:00

asked Dec 9, 2019 at 16:44

laksheya
83 2 11

2 Answers

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Well, UV-C surely carries more energy than UV-A and UV-B, but the reason as to why UV-C radiation doesn't reach Earth is because of the presence of O_2 and O_3 in the stratosphere. UV-C radiation carries enough energy to excite an electron present in the oxygen molecule to shift to a higher energy orbital in the same oxygen molecule. Almost all energy from UV-C radiation is used up.

Now, this excited O_2 decomposes to form two free radicals of oxygen $[O]$ which further reacts with other oxygen molecules found in the atmosphere to create O_3 (Ozone) molecules.

In a way, the energy from UV-C is used up in creating O_3 molecules, therefore, there is no radiation reaching us. UV-A radiation, however, reaches us because O_3 is transparent to UV-A radiation, that is, UV-A radiation doesn't provide enough energy (wavelength is inversely proportional to energy) to excite the electrons present in O_3, so most of UV-A radiation reaches the Earth but certain UV-B radiations have the energy to excite electrons in O_3, therefore, not much of UV-B radiations reach the surface of the Earth.

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answered Dec 9, 2019 at 17:28

Pratham Hullamballi
903 4 16

Thank you so much! :-) – laksheya Dec 10, 2019 at 2:24

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Also to an extent due to the high nitrogen content in our 'air' / atmosphere, which absorbs the UVC radiation. https://www.aeronomie.be/en/encyclopedia/atmospheric-chemistry-mixture-gases-protect-life-earth

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answered Jan 24, 2021 at 16:44

Francois Swanepoel
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