

Geologic Time

Arctic Peat: A Very Old Source of Tons of Carbon

Scientific studies using fossils and ice core data indicate that the peat that is part of the permafrost found today in the Arctic formed approximately 11,000 years ago from living plants that died and have been decomposing ever since at a very slow rate.



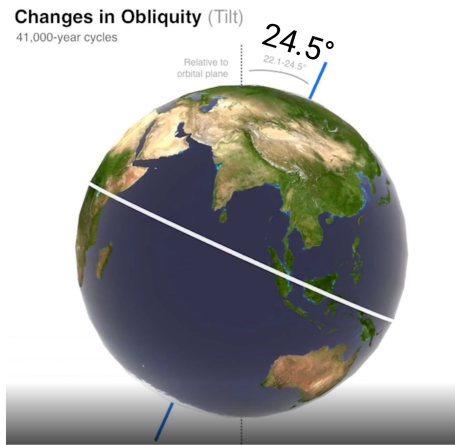
A rendering of what scientists believe what the Arctic looked like 11,000 years ago.

There is an estimated 1.5 trillion metric tons of organic carbon in the peat in the permafrost. That is a lot of carbon! It is twice as much carbon as what is currently found in the Earth's atmosphere. In the Arctic, with lower levels of solar radiation, how could enough plants grow to produce all the carbon found in the peat?

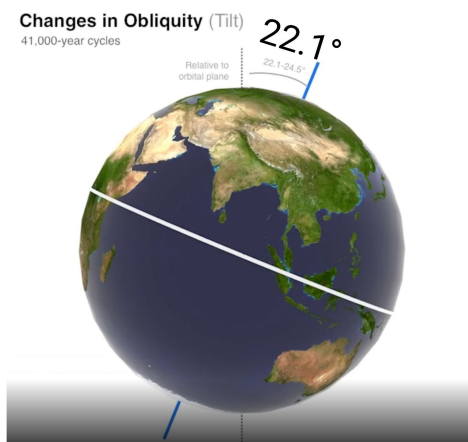
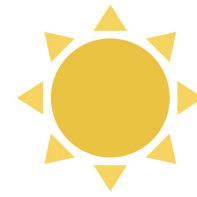
Has the Arctic Cooled?

Data from the Arctic suggests that 11,000 years ago, when the peat formed, the Arctic was a little bit warmer than it is today. Several factors could contribute to a warmer Arctic, including the **tilt** of the Earth. Tilt refers to the angle between the imaginary line between the North and South poles and the imaginary line Earth orbits around.

Over geologic time, the angle of the Earth's tilt has changed. This has resulted in changes to the amount of solar radiation that reaches the surface of the Earth. Currently, the tilt of the Earth is 23.5° (nasa.gov). When the plants that formed the peat were growing, the Earth was tilted 24.5° . This means that the Arctic experienced more solar radiation for a longer period of the year, so the Earth got more direct sunlight and therefore more energy. As the tilt of the Earth decreased, less solar radiation was available in the Arctic. The Arctic cooled; there was less direct sunlight and less solar energy, and this was followed by peat and permafrost formation.



Greater angle of tilt,
more of the Arctic
gets direct solar
radiation.



Lesser angle of tilt,
less of the Arctic
gets direct solar
radiation.



Earth image source: <https://climate.nasa.gov/>

References

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