

NEXT-TIME QUESTION

CONCEPTUAL Physics



Why is it significantly colder on a winter night under a clear sky than under a cloudy sky?

thanx to Rick Lucas



ARBOR SCIENTIFIC
TOOLS THAT TEACH.

Hewitt
Drawit!

NEXT-TIME QUESTION

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Answer:

We all know that energy from the glowing Sun affects temperature here on Earth. Almost as important but less well known, is energy emitted by the "glowing" Earth. Like the Sun, the Earth glows—but only in the infrared. This is terrestrial radiation—lower in both frequency and intensity than solar radiation. On a clear night, terrestrial radiation escapes through the atmosphere, which lowers the temperature of the Earth's surface and the air near it. But on a cloudy night, much terrestrial radiation is absorbed by the clouds and reradiated back to the Earth, countering a nightly lowering of temperature.

We see why frost forms on a lawn under a clear night sky, but not under a park bench or a grove of trees. The bench and trees reradiate terrestrial radiation to the ground, keeping it warmer.



We also see why fruit growers use smudgepots in orchards on frosty nights. The dark smudgy cloud close to the ground absorbs terrestrial radiation and reradiates it, keeping the air and fruit above freezing. This marks time until sunlight comes to the rescue the following morning!



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Drewit!

