

A Science Service Feature

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? WHY THE WEATHER ?

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WHAT HOLDS THE ATMOSPHERE?

The moon has no atmosphere; the earth has. Why the difference? The moon seems to be made of the same stuff as the earth, in fact, some people believe it was formed from a portion of the earth's crust peeled off from the Pacific Ocean side of the earth. Eruptions of some sort, meteoric or otherwise, have made the craters and almost undoubtedly discharged gases. But today there is no trace of a lunar atmosphere. When a star sets behind the moon, or is occulted, as the astronomers say, it disappears suddenly, without fading or lingering as it would if there were any atmosphere to dim or bend the rays. Those who saw the eclipse a year ago can remember how perfectly dark and sharp was the edge of the moon. Any atmosphere would have made it slightly hazy. There is no twilight on the moon. No evidence of wind or water action appears even with the most powerful telescopes. Not a speck of water is visible. Any gases emitted cannot have collected. Most likely they flew away. A speed of only 1.5 miles a second upward would be adequate to counterbalance gravity there; and this velocity could easily be attained by any atmospheric gas if heated so greatly as the moon^{is} during its long day.

The earth, on the contrary, has a strong enough pull of gravity and a continuously low enough temperature to hold its five or six quintillion tons of air. Only the molecules of hydrogen and perhaps helium may commonly attain upward velocities of 7 or more miles a second, sufficient to carry them permanently away from the earth. The molecules of the heavier gases move more slowly, and like bullets or rockets come back to earth after any projections upward.

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