

Lunar Atmospheric Tides Affect Our Space Environment

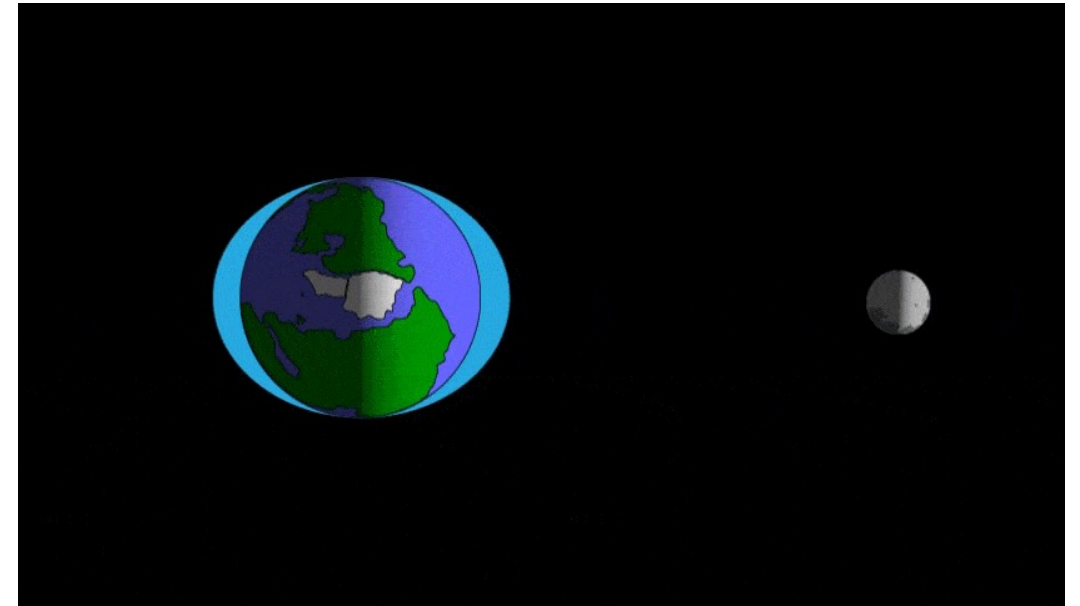


The moon not only creates tides in the ocean but also in our atmosphere. These tidal winds propagate upward from the neutral atmosphere influencing electric fields and plasma in our atmospheric interface to space, the ionosphere.

These mechanisms have never been fully identified in comprehensive and simultaneous measurements spanning the ionosphere-thermosphere-mesosphere (ITM) system. The atmospheric lunar tide is an effective marker of ITM coupling because it originates at Earth's surface, propagates vertically, and is fully sampled in daytime-only and post-sunset satellite measurements.

This work uses measurements from NASA's GOLD and ICON missions to track the lunar tide in neutral and plasma velocities, and in electron density. This first of its kind measurement provides a unique understanding of atmospheric waves and the connection between the neutral atmosphere and our interface to space.

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The pull of the moon's gravity creates a bulge in our atmosphere just as it does with the oceans. This creates waves in the neutral part of the atmosphere that travel into the upper layers all the way to the ionosphere. This is the ionized atmosphere that is directly impacted by space weather. This new research significantly broadens our understanding of the connection and interaction between these complex layers using our newest ionospheric missions, GOLD and ICON. Credit: NOAA