# Nightside Detection of a Thermospheric Wave Generated by the 2017 Solar Eclipse

During the 2017 solar eclipse, ground-based instrumentation showed the first ever observations of eclipse-driven thermospheric waves rolling through Earth's upper atmosphere. Just hours after the eclipse had ended, a wave propagated through the antipode of the atmosphere, indicating the eclipse had atmospheric effects well beyond the localized areas it passed over.

It has long been theorized that the path of the Moon's shadow across Earth during a solar eclipse causes a wave in the upper atmosphere; the cooling effect of the Moon's shadow pulls in the warmer atmosphere in front of the path. If correct, this theory implies that eclipses have a much larger effect on the atmosphere than previously assumed -- but it was only in the past decade that technology advanced enough to observe the phenomenon. The August 2017 eclipse offered a unique chance to test the theory.

*During the 2017 total solar eclipse, the Sun's corona, only visible during the total eclipse, is shown as a crown of white flares from the surface.*

Research published in the Geophysical Research Letters journal used the Thermosphere-Ionosphere-Mesosphere-Electrodynamics General Circulation (TIME-GC) Model to predict that a thermospheric wave would propagate throughout the atmosphere after the solar eclipse. The scientists used ground based instrumentation in Brazil to look for Doppler Shifts in the wavelengths of airglow, the faint emission of light in our upper atmosphere, to determine which direction the atmosphere was flowing.

After the eclipse, in the nightside of Earth -- the part of the atmosphere opposite where the eclipse happened -- the instrument data showed a shift in the airglow wavelengths of the atmosphere. This change indicated that despite being local to North America, the eclipse had effects on the atmosphere far beyond that. In addition to confirming the TIME-GC's model accuracy, the study bodes well for future observations, showing that ground-based eclipse studies can be conducted even when the eclipse itself is not over land.