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# ULF wave energy deposition in the ionosphere: frequency and spatial dependence

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Ultra Low Frequency (ULF) waves transfer energy in the Earth's magnetosphere through a variety of mechanisms that impact the Earth's ionosphere, radiation belts, and other plasma populations. Measurements of the electromagnetic portion of the energy transfer rate are a source of information for assessing the importance of ULF waves relative to other energy transfer mechanisms and as a diagnostic for studying the behavior of ULF waves. Using THEMIS satellite data, we examine the time averaged electromagnetic energy transfer rate, or Poynting vector, as a function of frequency (3-50 mHz) and region of the magnetosphere. This study extends earlier work focused on narrower frequency ranges or specific regions of the magnetosphere; here, we consider the Pc3 to Pc5 frequency range, all local time sectors, and radial distances from 3 to 13 Re. The Poynting vector tends to be field-aligned near the magnetic equatorial plane, suggesting that the ionosphere is an important sink of wave energy. We map the Poynting vector from the equatorial plane to the ionosphere, estimating the energy dissipation caused be ULF waves at different CGM latitudes, longitudes, and frequencies.