

FORMATION OF RADIATION BELT “STORAGE RING”

What is the science question?

How does the recently discovered ultra-relativistic third electron radiation belt form?

What are the findings?

Using a data-driven, time-dependent specification of ultra-low-frequency (ULF) waves (quantified by K. R. Murphy) we show how the third radiation belt is established as the consequence of extremely fast outward ULF wave transport developing during geomagnetic storms (top right).

What is the impact?

Storm-time ULF wave transport of radiation belt electrons is 2-3 orders of magnitude faster than expected. This leads to rapid loss during the main phase of geomagnetic storms (ii) and rapid enhancements during the recovery phase of geomagnetic storms (iv).

Why does it matter?

This has important implications for accurately forecasting space weather and highlights the need to accurately characterize storm-time magnetospheric dynamics and wave-particle interactions used in radiation belt forecasts.

