

EMIC waves and associated relativistic electron precipitation Jan 25–26 2013

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What is the science question?

Waves are created by particles interacting with each other in the magnetosphere. Can these waves cause the loss of relativistic electrons from the radiation belts?

What were your findings?

Yes. The waves cause so-called “killer electrons” to leave the radiation belts. These electrons can in-turn damage spacecraft and change atmospheric chemistry.

What was the impact?

Theory predicts that loss due to waves can be very fast and thus effective at clearing out very specific portions of the radiation belts. In this paper, we showed observations of the waves in space almost simultaneously to BARREL (Balloon Array for Radiation-belt Relativistic Electron Losses) observations of relativistic electron loss occurring at the same location.

Why does it matter to non-scientists?

To protect spacecraft from “killer electrons” and understand atmospheric chemistry changes these electrons can cause, we must accurately forecast radiation belt dynamics. Understanding the waves causing the electron loss is critical.



BARREL (Balloon Array for Radiation belt Relativistic Electron Losses) mission is launched. The buildings in the background are the new Halley VI Research Station, which is fully operational for the first time in the 2012-2013 winter season.
Credits: NASA/R. Millan