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Recent Results From The Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) on the Van Allen Probes

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1. Introduction

The physics of the creation, loss, and transport of radiation belt particles is intimately connected to the electric and magnetic fields which mediate these processes. A large range of field and particle interactions are involved in this physics from large-scale ring current ion and magnetic field dynamics to microscopic kinetic interactions of whistler-mode chorus waves with
energetic electrons. To measure these kinds of radiation belt interactions, NASA implemented the two-satellite Van Allen Probes mission.

2. Instrumentation

As part of the mission, the Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) investigation is an integrated set of instruments consisting of a tri-axial fluxgate magnetometer (MAG) and a Waves instrument which includes a tri-axial search coil magnetometer (MSC). These wave measurements include AC electric and magnetic fields from 10Hz to 400 kHz. Details of the instrumentation are given in the suite's instrument paper [1]

3. Recent Results

We show examples of plasmaspheric wave-particle interactions, specifically wave heating of the plasmasphere by whistler –mode waves, low frequency wave features including EMIC waves and their statistical properties, magnetosonic wave statistics with respect to location in magnetic local time, and properties of whistler mode waves including upper and lower band chorus and plasmaspheric hiss. These data are compared with particle measurements to show relationships between wave activity and particle energization.

4. References

1. C. A. Kletzing, W. S. Kurth, M. Acuna, R. J. MacDowall, R. B. Torbert, T. Averkamp, D. Bodet, S. R. Bounds, M. Chutter, J. Connerney, D. Crawford, J. Dolan, R. Dvorsky, G. Hospodarsky, J. Howard, V. Jordanova, R. Johnson, D. Kirchner, B. Mokrzycki, G. Needell, J. Odom, D. Mark, R. Pfaff, Jr., J. Phillips. C. Piker, S. Remington, D. Rowland, O. Santolik, R. Schnurr, D. Sheppard, C. W. Smith, R. M. Thorne, J. Tyler, "The Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) on RBSP", *SpaceSci. Rev.*, doi:10.1007/s11214-013-9993-6, 2013.