

NWS14-2014-000068

Abstract for an Invited Paper  
for the NWS14 Meeting of  
the American Physical Society

### **Launching Balloons in Antarctica to Study Earth's Radiation Belts**

ROBYN MILLAN, Dartmouth College

Discovered in 1958, Earth's radiation belts are filled with energetic electrons traveling at speeds near the speed of light. This region of near-Earth space is known to be highly variable, and many questions remain about the mechanisms responsible for rapidly energizing particles to relativistic energies there. Observed rapid depletions and subsequent rebuilding of the belts imply an efficient energization process, in some cases accelerating electrons to multiple MeV energies on a timescale as short as minutes. The importance of understanding the radiation belts continues to grow as society becomes increasingly dependent on spacecraft which travel through this region for navigation, weather forecasting, and more. BARREL (Balloon Array for Radiation belt Relativistic Electron Losses) is a multiple-balloon investigation designed to study the loss of electrons from the radiation belts. Two Antarctic balloon campaigns were carried out in 2013 and 2014, collecting measurements in conjunction with NASA's Van Allen Probes, to understand and quantify atmospheric loss of radiation belt electrons. This talk will introduce the current science questions in radiation belt science and will present a summary of the BARREL balloon campaigns.