



Investigating 2019-2020 BARREL ultra long duration balloon data to study Earth's radiation belts

DARTMOUTH

20X Leave Term Project
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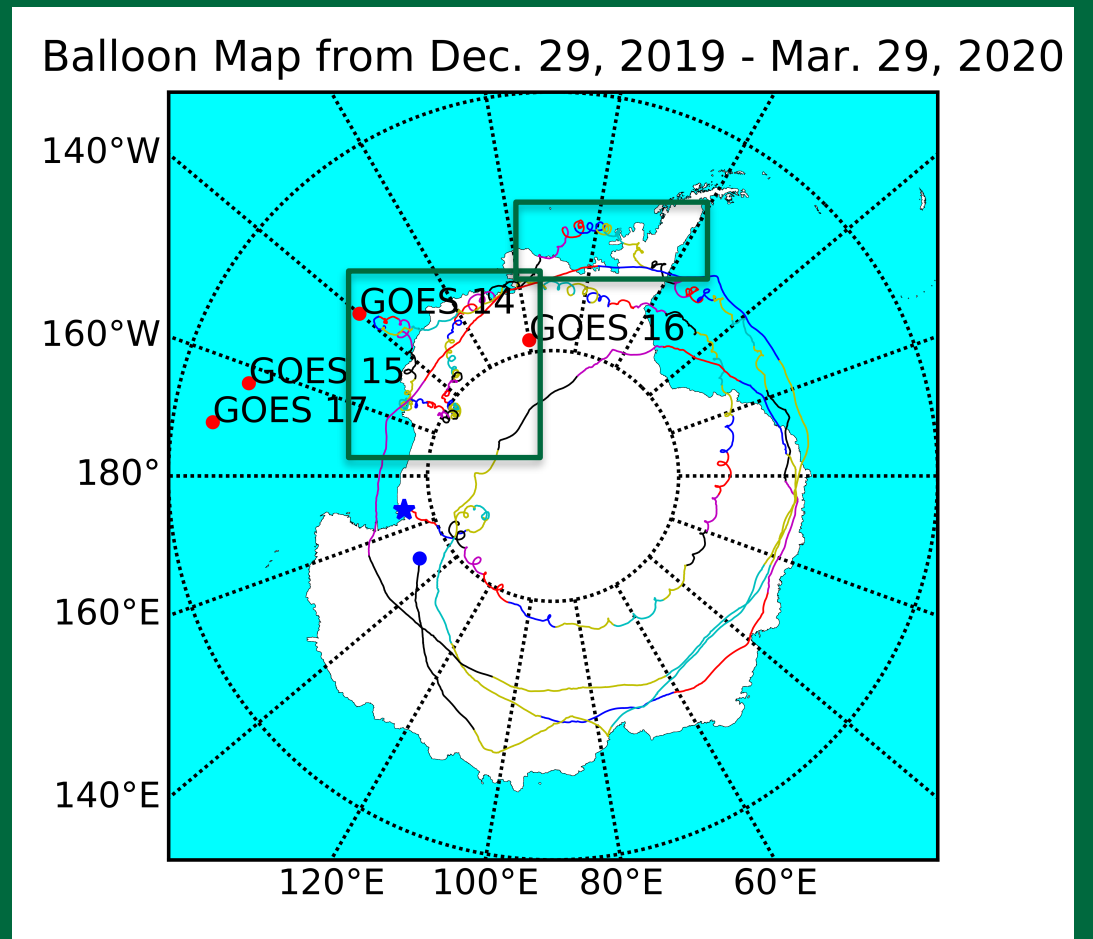
Objective: Analyze the results from the 2019-2020 Antarctic campaign of the Balloon Array for “Radiation Belt Storm Probes” (RBSP) Relativistic Electron Losses (BARREL) to learn more about the processes that scatter radiation belt electrons into Earth’s atmosphere.

Key Highlights:

- BARREL measures X rays produced by electrons as they are scattered into Earth's atmosphere from the radiation belts
- Unique data set because payload was relatively stationary
- Region is magnetically conjugate to the Geostationary Operational Environmental Satellite (GOES), which provides in situ data

Goals:

- Better characterize local time dependence of radiation belts processes
- Compare GOES plasma wave data with X-ray data from BARREL
- Analyze impacts of geomagnetic activity on electron precipitation



Map of 2019-2020 BARREL data; star represents start point; dot represents end point; different colors represent different days over ~90 day period; positions corresponding to magnetically conjugate locations of GOES are plotted accordingly

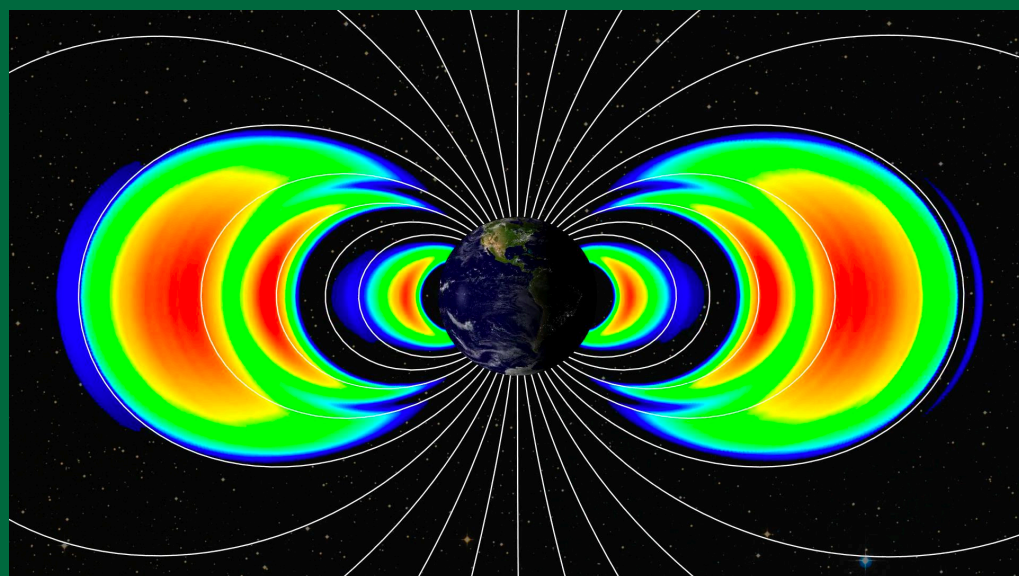
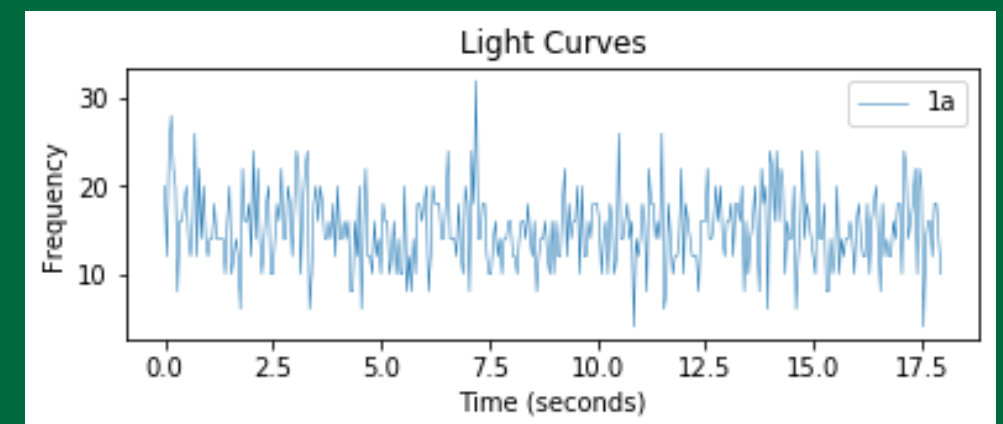


Image of Earth's inner and outer van allen radiation belts as well as Earth's magnetic field lines (JHU/APL)



Light curve data for time around Dec 31, 2019 at 11:10AM; 1a channel represents electron precipitation for energies between 20-80keV; frequency is in counts per 50 milliseconds