BARREL REP Events

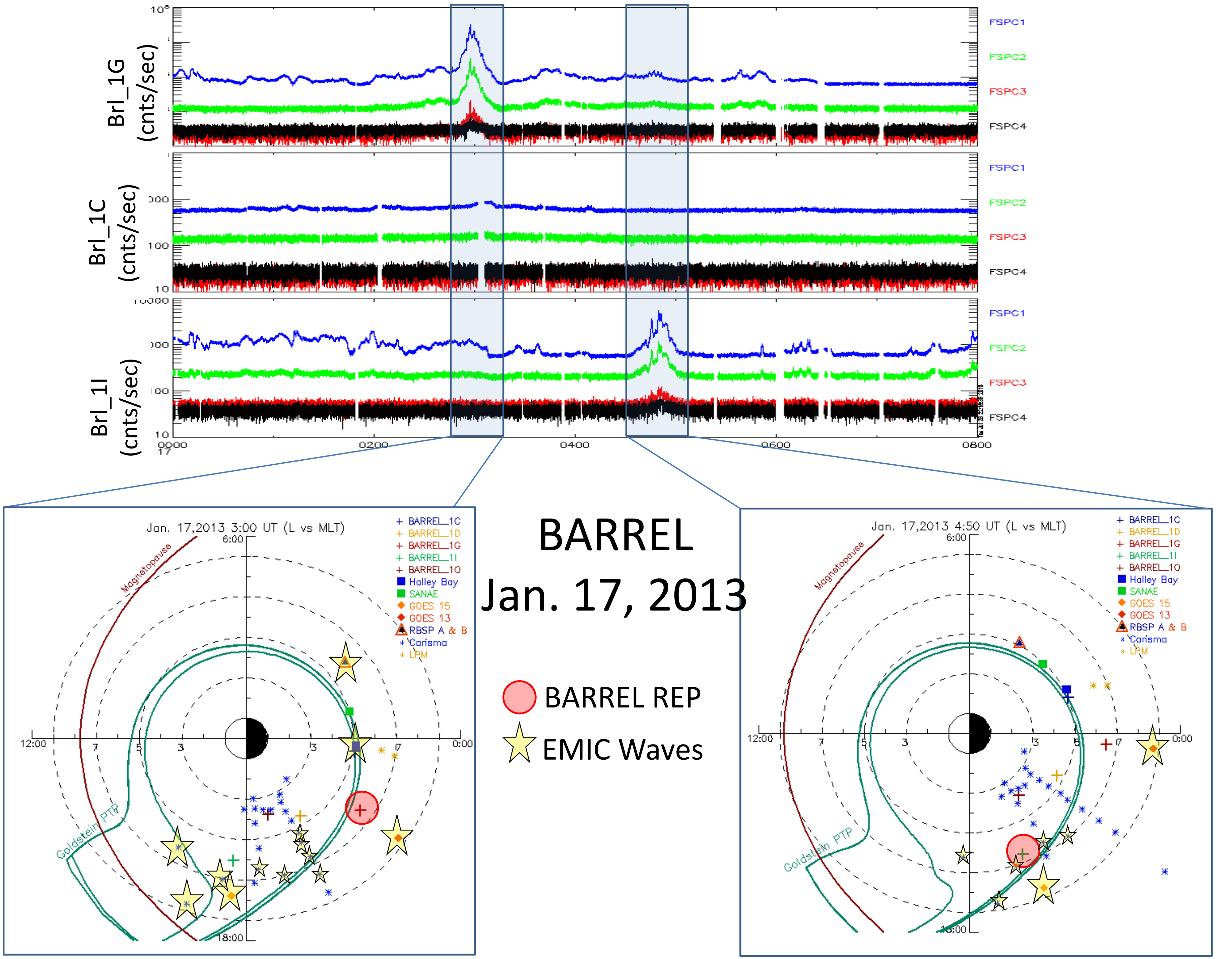
By Leslie Woodger

Characteristics of Relativistic Electron Precipitation (REP) events

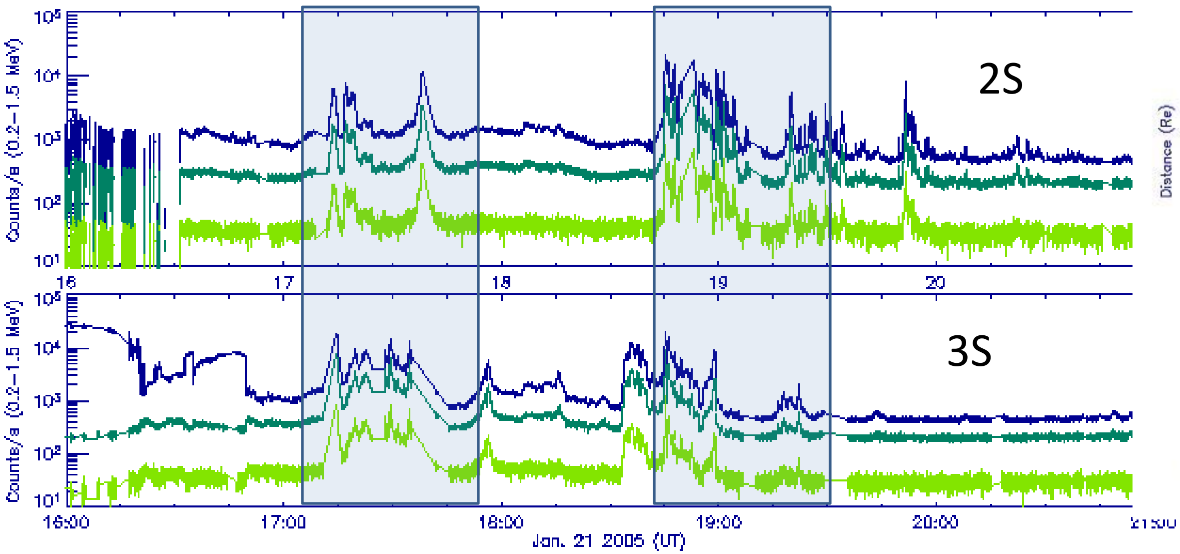
- Event Studies show the following characteristics of REP events
  - REP caused by EMIC waves (Li et al., 2014)
  - Very localized REP precipitation (Blum et al., 2013)
  - MLT dependence of REP (Comess et al., 2013)

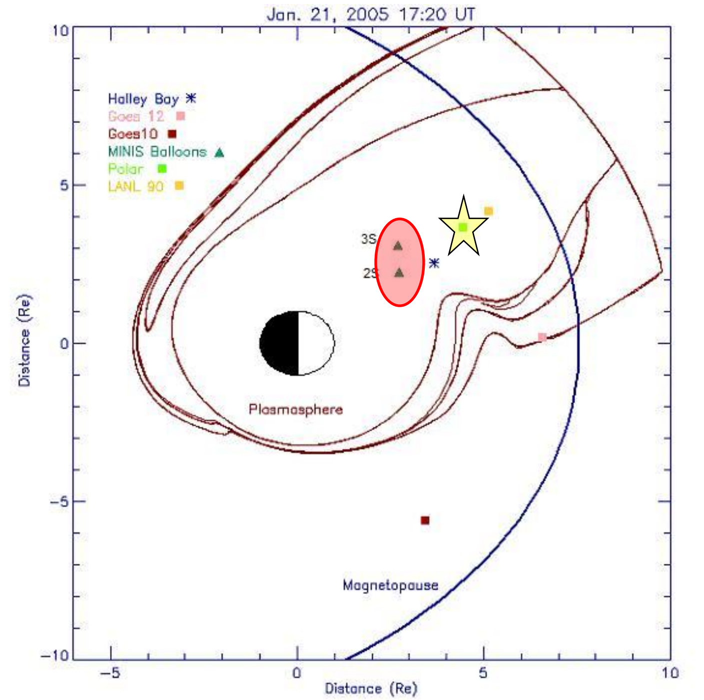
- Proposed Questions
  - Based on the REP observed by balloon-borne instrumentation…
    - Are these characteristics true for all REP events and what information does provide about the precipitation mechanism ?
    - Are REP events the result of a significant Radiation belt loss process?

- We look at the first question here, but significantly more work needs to be done to address the second question


BARREL
Jan. 17, 2013
BARREL REP
EMIC Waves
Brl_1G (cnts/sec)
Brl_1C (cnts/sec)
Brl_1I (cnts/sec)
FSPC1
FSPC2
FSPC3
FSPC4
0000
0200
0400
0600
0800
Jan. 17,2013 3:00 UT (L vs MLT)
Jan. 17,2013 4:50 UT (L vs MLT)
6:00
12:00
0:00
18:00
Magnetopause
Goldstein PTP
BARREL_1C
BARREL_1D
BARREL_1G
BARREL_1I
BARREL_1O
Halley Bay
SANAE
GOES 15
GOES 13
RBSP A & B
Carisma
LPM

MINIS Jan. 21,2005

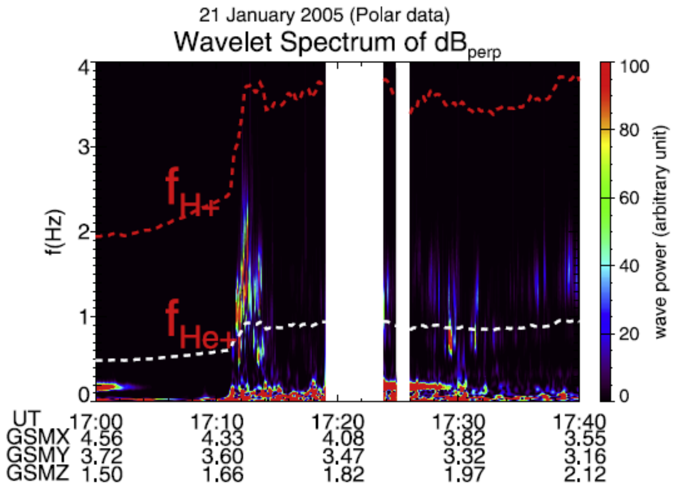




Simultaneous REP observations

Balloon Separation in L ~ 0.5

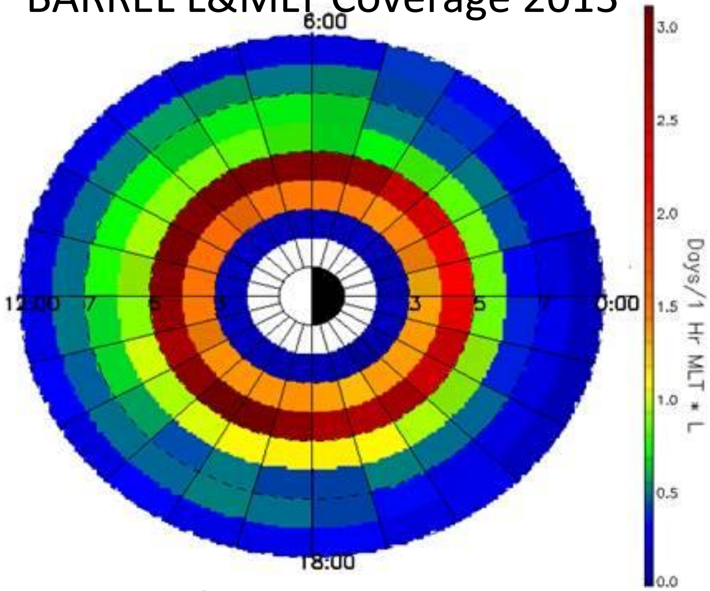
Balloon Separation in MLT ~ 0.75 Hr.



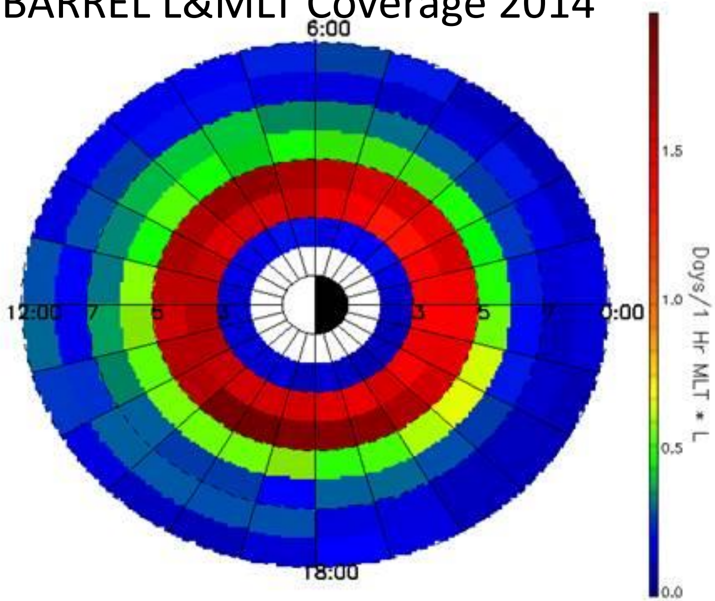
EMIC wave observations at Polar (Ref. Zhang et al., 2008)

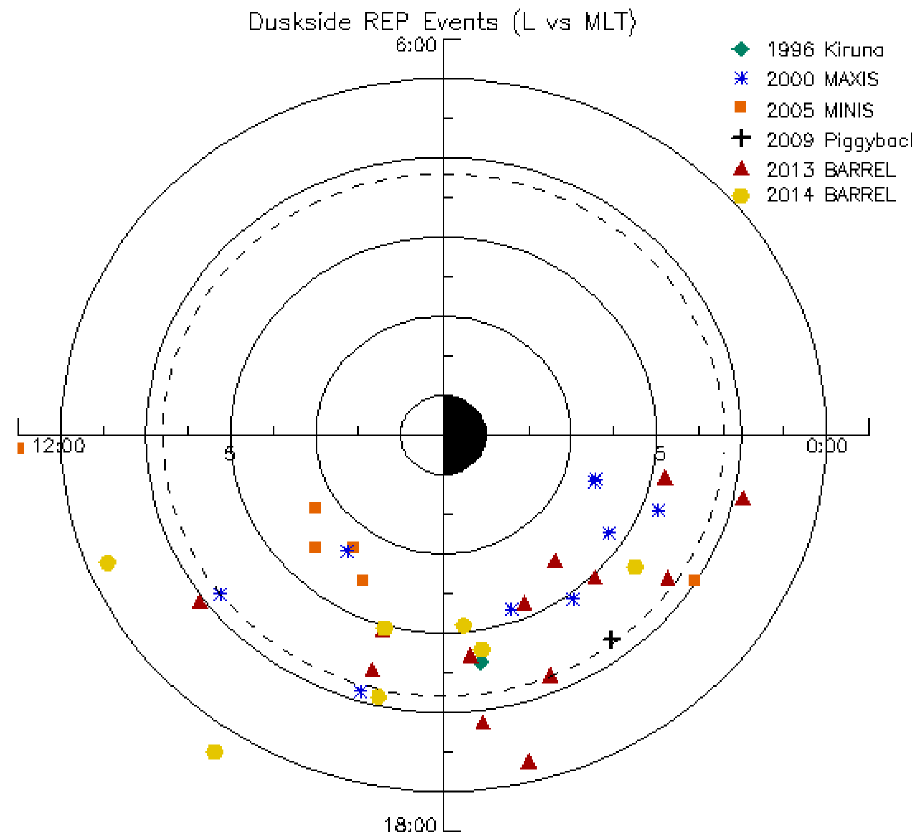
Balloon & REP Spatial Coverage

BARREL L&MLT Coverage 2013

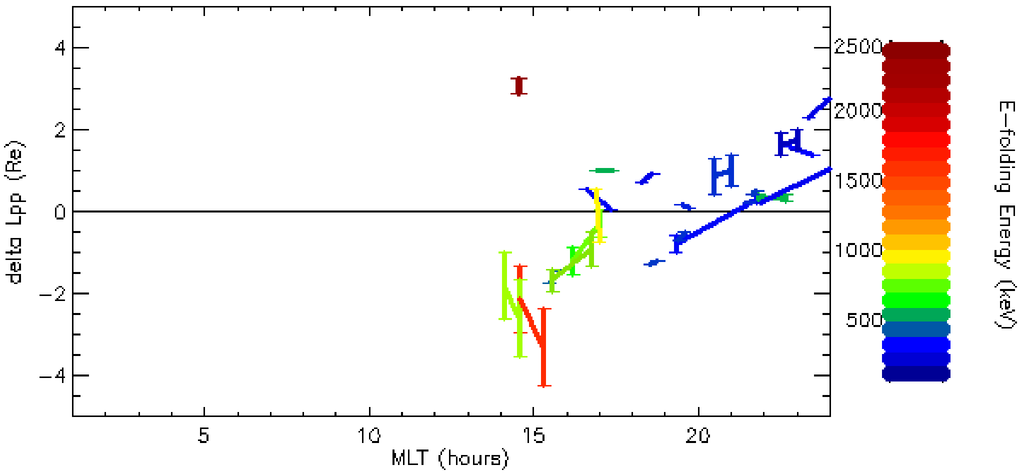


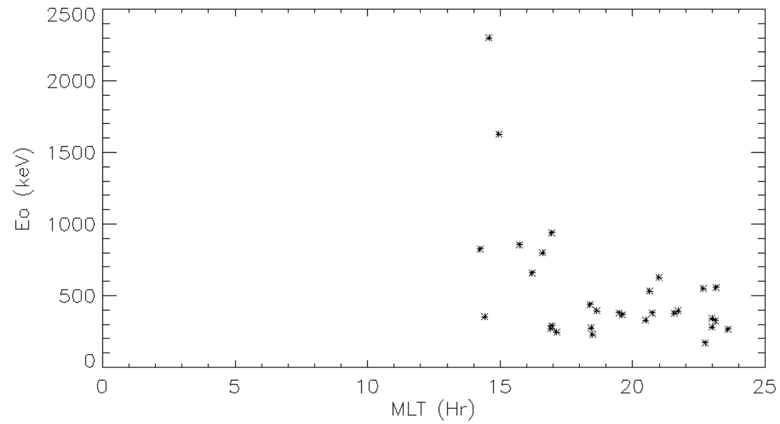
BARREL L&MLT Coverage 2014

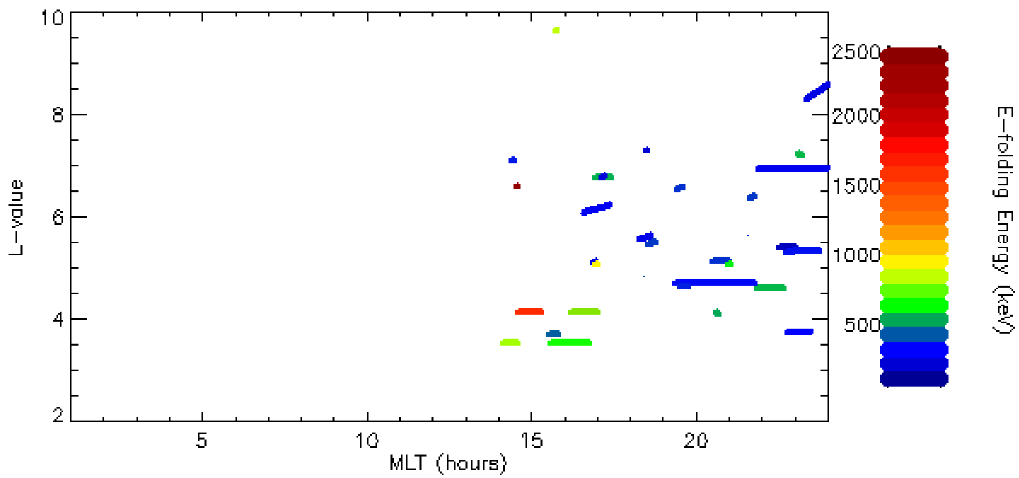


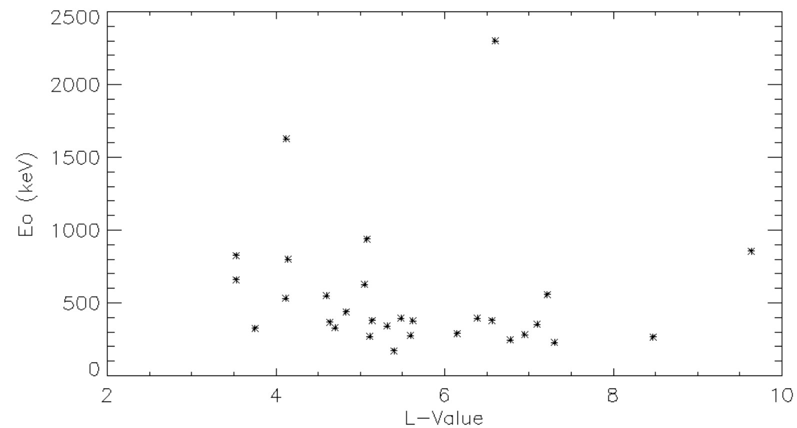


Balloon Observations of REP Events









Conclusion

- If precipitation mechanism for REP events is scattering by EMIC waves then then there is a very <u>localized effective region</u> where EMIC waves can scatter radiation belt particles where cold plasma could impact the energy spectrum of the precipitating population