Proposal for SD-RBSP modes

To: SuperDARN PIs, Spacecraft Working Group, Scheduling Working Group

From: ad hoc discussants (Tim, Mike, Jim, Rob F, Mervyn, Kathryn, Simon, Sessai)

Re: Scheduling special SuperDARN modes in support of the RBSP mission

Background:

Various items concerning RBSP and SuperDARN involvement including Tim’s ‘Call for decision’ with scientific justification are accessible at the VT SuperDARN web site under “SD-RBSP” or link to:


Dates:

20-21 AUG 2012 RBSP Science SWG Meeting, Cocoa Beach, FL
23 AUG 2012 4:08 AM Launch from Cape Canaveral Air Force Station, FL


~mid-October RBSP ready for joint science

Scientific aims:

1. Use all the SuperDARN to map the large-scale ionospheric electric fields and monitor ULF wave activity during storm periods

2. Use specific radars during times of apogee conjunction with RBSP to perform more precise analysis of M-I processes

Experimental Concept:

Two modes of SuperDARN operation in support of RBSP are proposed. Runs of either will be considered Common Time (CT).

1. The first mode is triggered on the basis of a prediction of storm activity or the reality of a storm as gauged by Dst; designate these unscheduled runs CT-TRIG. Upon notification PIs are required to switch their radars from running the standard CT mode to running the CT-TRIG mode. The key feature of the CT-TRIG mode is a fast sub-scanning over three beams (designated n, n-1, n+3) that is carried out during a standard full-beam CT scan.

2. The second mode is planned on the basis of apogee conjunctions of RBSP with the fields of view of particular SuperDARN radars; designate these scheduled runs CT-APOG. The precise times and locations of the apogee conjunction will be determined by the Satellite Working Group in sufficient time for the Scheduling Working Group to make the appropriate designations in the monthly operating schedule. It is expected that radars involved in a conjunction will run special high-resolution scans while the other radars will run supporting scans. Details are TBD.
Notes:

Three categories of CT operation will co-exist, the standard CT mode, the CT-APOG mode, and the CT-TRIG mode. The first two will be scheduled while the triggered mode will usually not be scheduled; instead, the CT-TRIG time will be carved out of the existing CT blocks.

In terms of mode priority, CT-TRIG will have priority over both CT and CT-APOG. However, DT and ST will have priority over CT-TRIG. That is, the triggered runs can only occur within the blocks of time that were scheduled as CT (or CT-APOG, CT-THEMIS, etc.)

Since the SD-RBSP modes are planned in advance for CT and do not detract from the time available for DT and ST runs, there does not seem to be a need to allow PIs to opt out. The main issue is whether to accept that approximately 1/3 of CT will be used to run SD-RBSP modes.

All the SD data collected during the SD-RBSP runs will be flagged as CT in terms of CPID and be immediately available for analysis, consistent with NASA open-data policy. (We are not obliged to follow this policy but it seems sensible.)

All the SD radars will run the 3-beam mode during CT-TRIG to allow the fullest possible assessment of the capabilities of this mode.

The productivity of the SD-RBSP runs and coordination with RBSP will be assessed bi-monthly by the SuperDARN PIs and the two Working Groups and changes proposed, discussed, and implemented in the next monthly schedule.

Trial runs of the SD-RBSP modes will be arranged after the radar control languages have been prepared and before RBSP enters its science phase.

The control programs needed to run CT-TRIG are being developed by Jeff Spaleta and Julian Thornhill.

Other Concerns (incomplete):

i) How to decide when to trigger the CT-TRIG mode (the trigger algorithm)
ii) Which beams to select for the sub-scan at each radar
iii) How to interleave sub-scan beams and regular beams most efficiently
iv) Whether the scan times should start and stop on precise minute boundaries
v) How to select the times and radars for running the CT-APOG mode
vi) How to program the conjunctive and non-conjunctive radars radar during CT-APOG runs