



**University of
Leicester**

Radio and Space Plasma Physics Group

Spacecraft working group report

SuperDARN workshop 2013

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Since last workshop...

- Use of themisscan has been discontinued
- Main target for coordinated operations is now the Van Allen probes (formerly RBSP) – launched in August
- PIs agreed a ‘triggered’ mode (CT-TRIG) for storm times, in support of Van Allen
 - Mode is Common Time
 - Triggered when $D_{ST} < -50$ nT; ends when $D_{ST} > -30$ nT)
 - Consists of a full scan interleaved with a mini-scan of three beams (for ULF wave measurements)
 - Automatically overrides any other scheduled Common Time mode (e.g. normalscan)

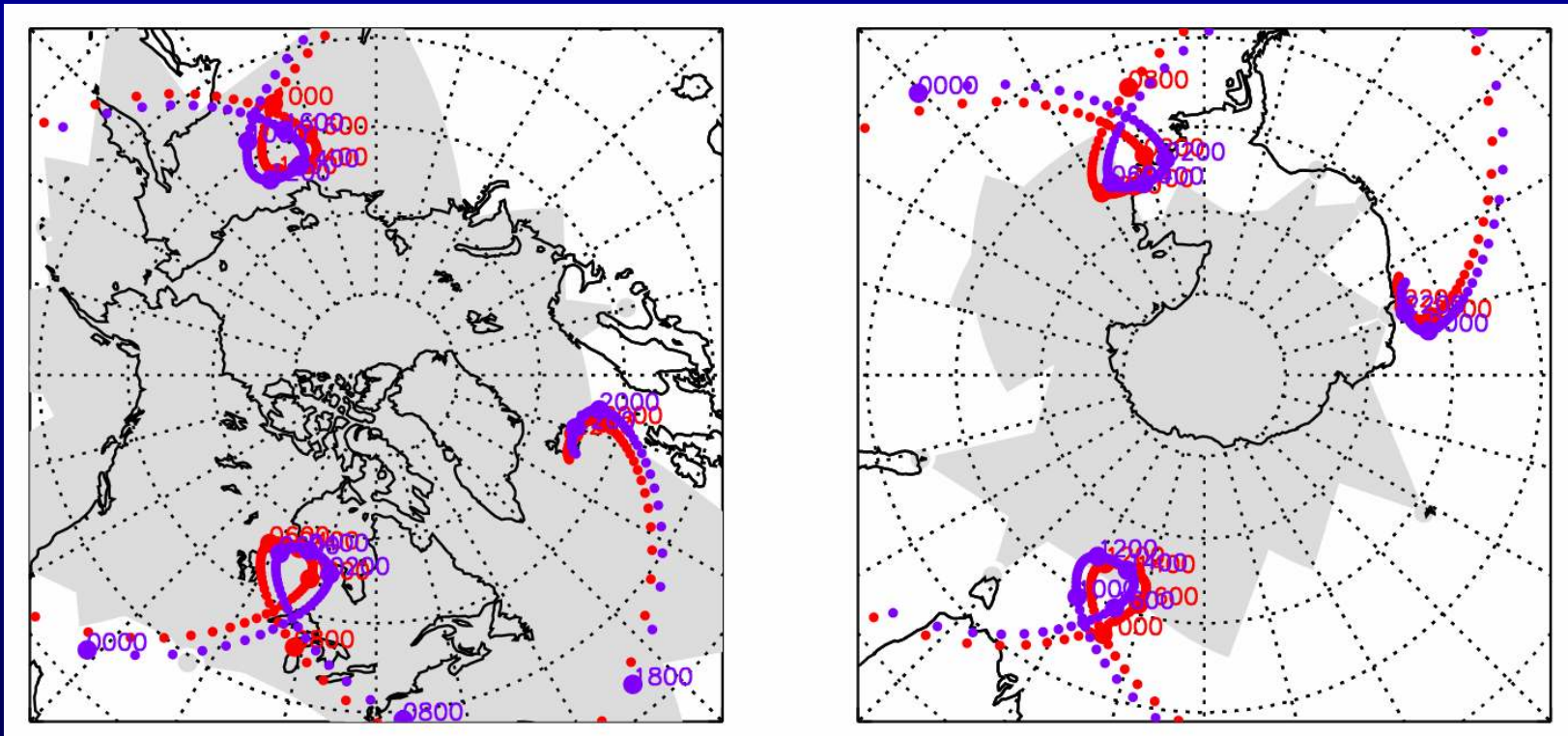


Additional scheduled support

- In addition to triggered mode, apogee periods are selected for potential non-stormtime studies
- In these periods, SuperDARN runs in “ST-APOG” mode
 - Same interleaved scan as CT-TRIG, but PIs are welcome to customise mode (e.g. shorter range gates) based on footprint plots
 - Scheduled for good conjunctions between Van Allen and SuperDARN (irrespective of D_{ST} conditions)
 - Counts as Special Time mode
 - Subject to Special Time cap (6 days/month – equates to 24 conjunctions)
- Spacecraft Working Group identifies best 24 conjunctions each month
- Footprint plots are publicly available – help yourself!
<http://www.ion.le.ac.uk/~rcf11/RBSP/>



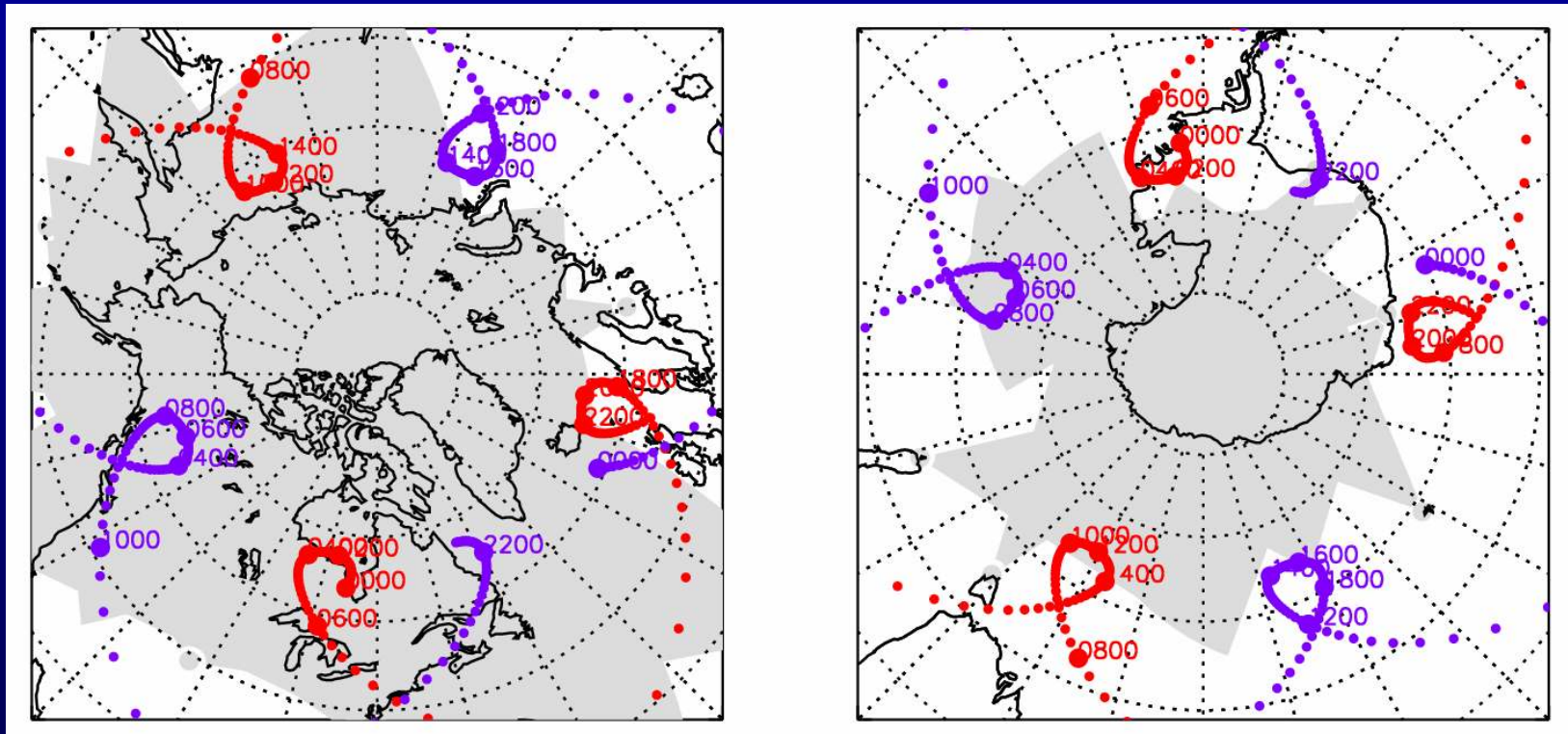
Example daily footprints: 1st June 2013



- Nearly 3 orbits per day
- Phasing between spacecraft varies from month to month
- Leads to various possible separations for (e.g.) ULF wave studies



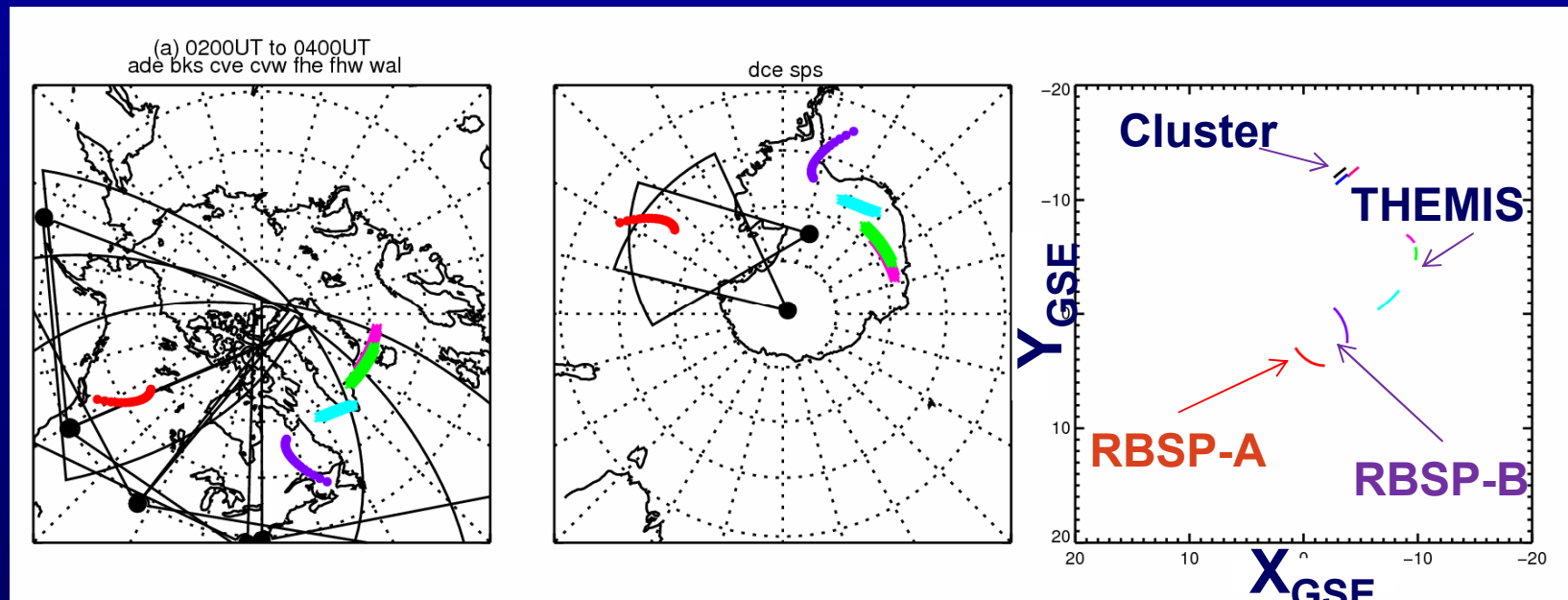
Example daily footprints: 1st July 2013



- Nearly 3 orbits per day
- Phasing between spacecraft varies from month to month
- Leads to various possible separations for (e.g.) ULF wave studies



Example detail plot for one apogee conjunction

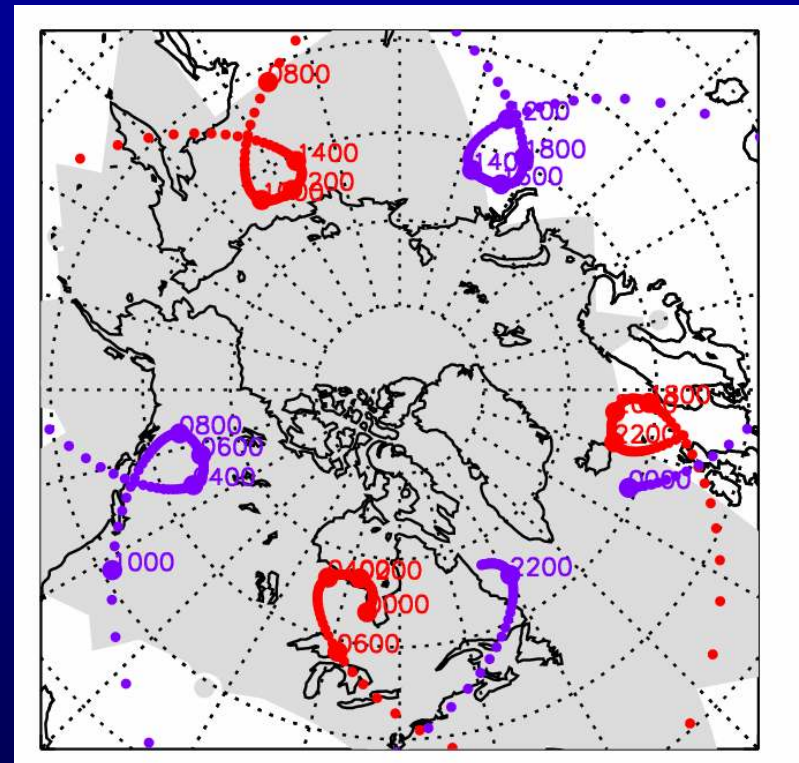


- Published footprint plots (<http://www.ion.le.ac.uk/~rcf11/RBSP/>) also have more detailed plots for all periods when both Van Allen probes are at $r > 3 R_E$
- Plots also show the locations and footprints of the Cluster and THEMIS spacecraft for conjunction studies



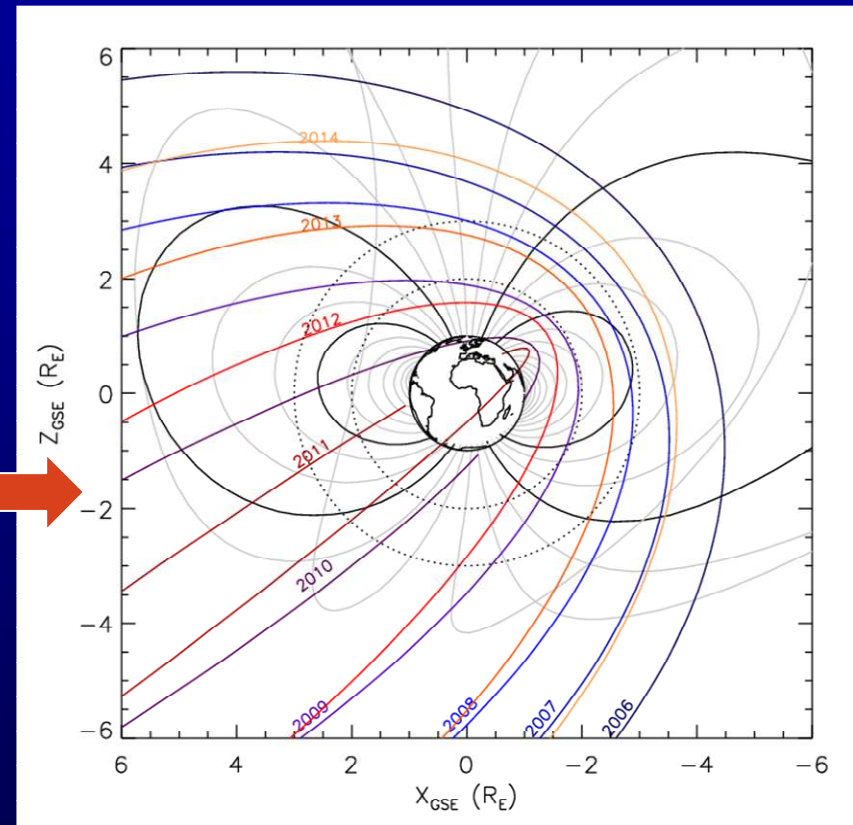
Monthly scheduling: ST-APOG

- There are many intervals when both spacecraft are at $r > 3 R_E$
 - 3-6 intervals per day, depending on s/c phasing
 - Special Time cap is 6 days per month
 - So we choose best 24 conjunctions per month (one 6h scheduling block per conjunction)
- “Best” intervals are based on:
 - Radar coverage
 - Preference for N America, due to StormDARN coverage
 - Length of conjunction
 - Scheduling time blocks
 - Prefer longer conjunctions that do not straddle scheduling blocks (00-06UT, 06-12UT...) – can cover a conjunction with less radar time
- We request same scan mode as CT-TRIG, but PIs are welcome to customise if they wish



Coordination with other spacecraft

- Footprint plots for other spacecraft still produced monthly
 - Available at <http://spears.lancs.ac.uk/~wildj/themis/>
 - Covers Cluster, THEMIS, ARTEMIS and Geotail
- Spacecraft working group still requests some time in support of Cluster
 - Mainly perigee passes for conjunctions with Auroral Acceleration Region
 - Cluster perigee decreased (allowing sampling of AAR) 2005-2011
 - Perigee now increasing again – AAR conjunctions will disappear
 - Some time to support Cluster observations of high altitude cusp
 - Specifically requested by Cluster PIs
 - All requested as normalscan time



Hours requested

- In previous years:
 - 150-250 hours of “themiscan” mode were requested each month
- Since last workshop:
 - 144h per month is requested in Special Time (Van Allen support)
 - Between 24h [for just AAR] and 168h [for AAR and high altitude cusp] requested each month for Cluster (Common Time – normalscan)
- Therefore some months have seen an increase compared with previous years
- But since the extra hours are “normalscan” (i.e. SuperDARN’s most common mode), hopefully this has not been too greedy



The near-term future

- Continued support for Van Allen probes (CT-TRIG and ST-APOG) if these intervals are proving useful
- Support for Cluster Auroral Acceleration Region campaign likely to be coming to an end (perigee is increasing again)
- Support for Juno Earth Flyby in October 