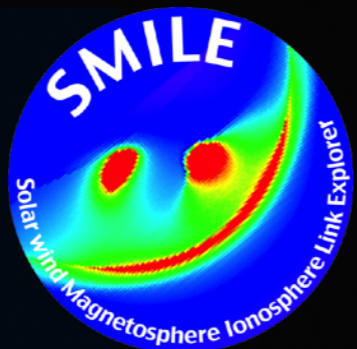
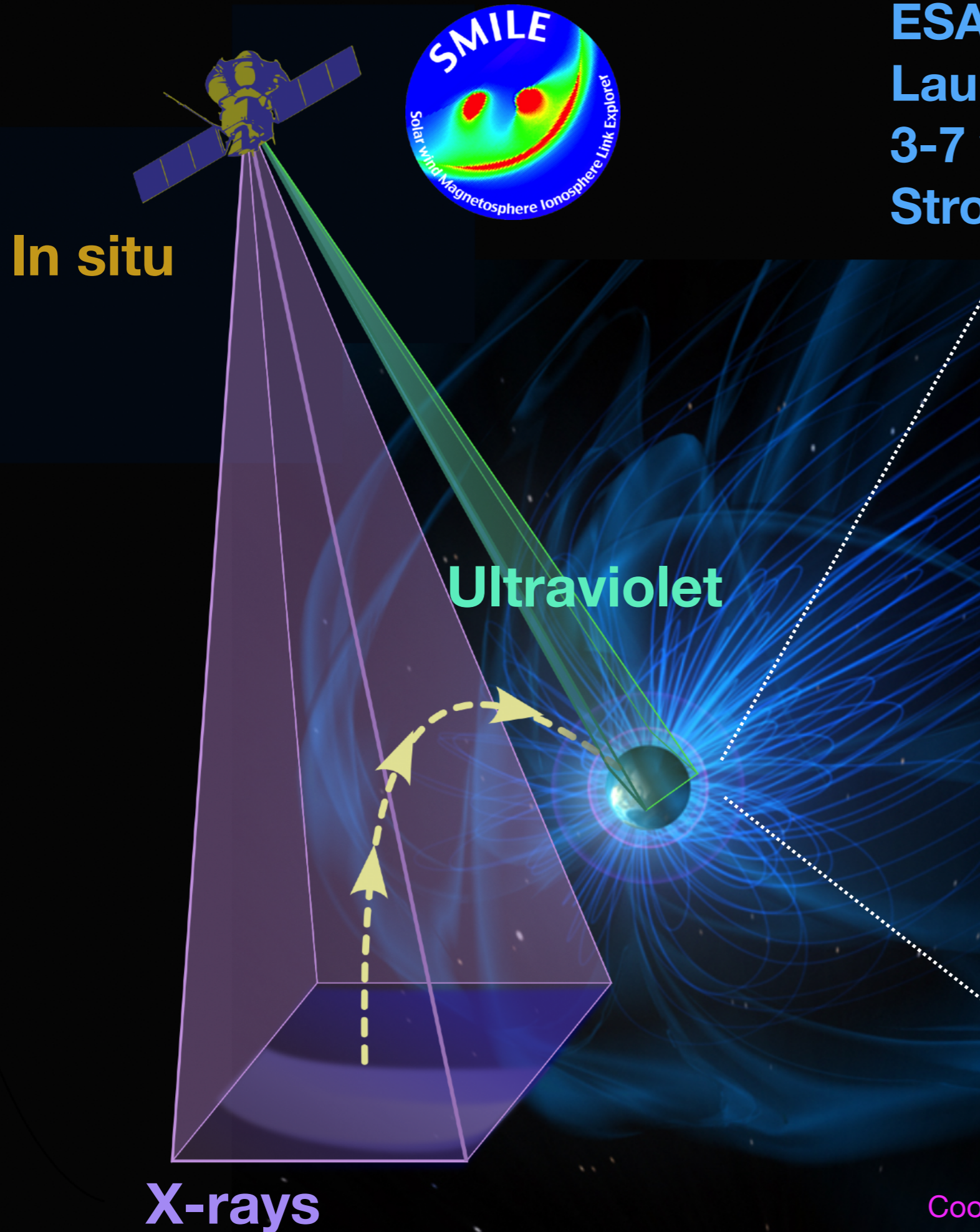
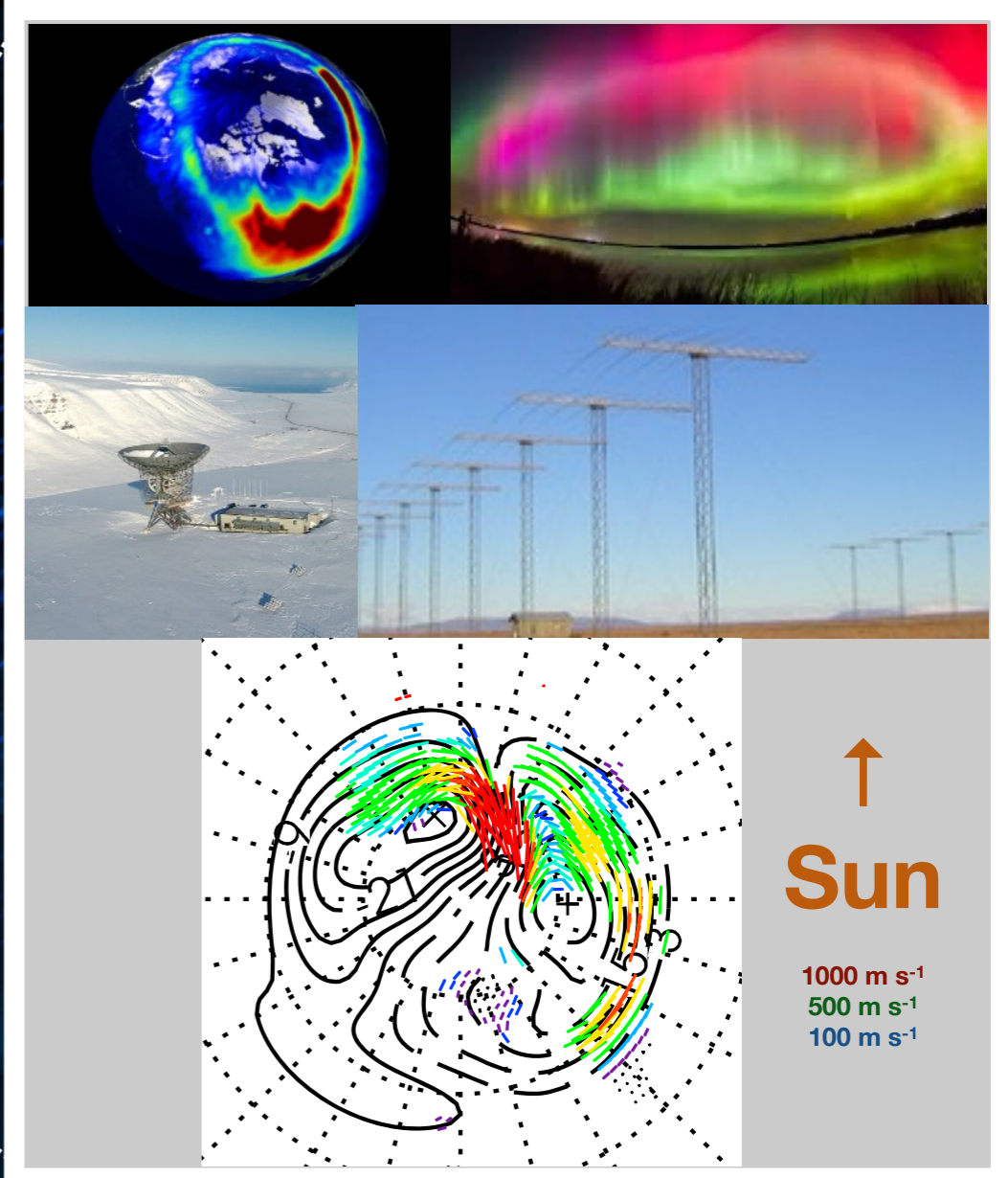


In situ

X-rays

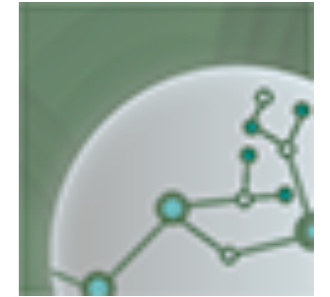


ESA, CAS mission
 Launch ~late 2025 (< 09/26)
 3-7 year mission, apogee 19 R_E
 Strong link with ground-based



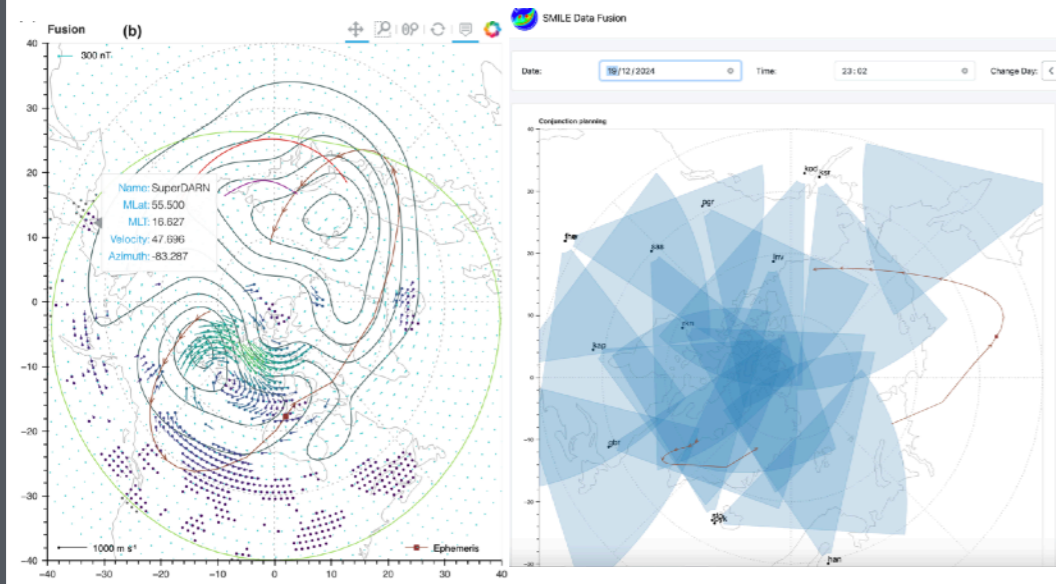
Cause & effect
 Bridge the scale gap

SMILE Ground-based WG



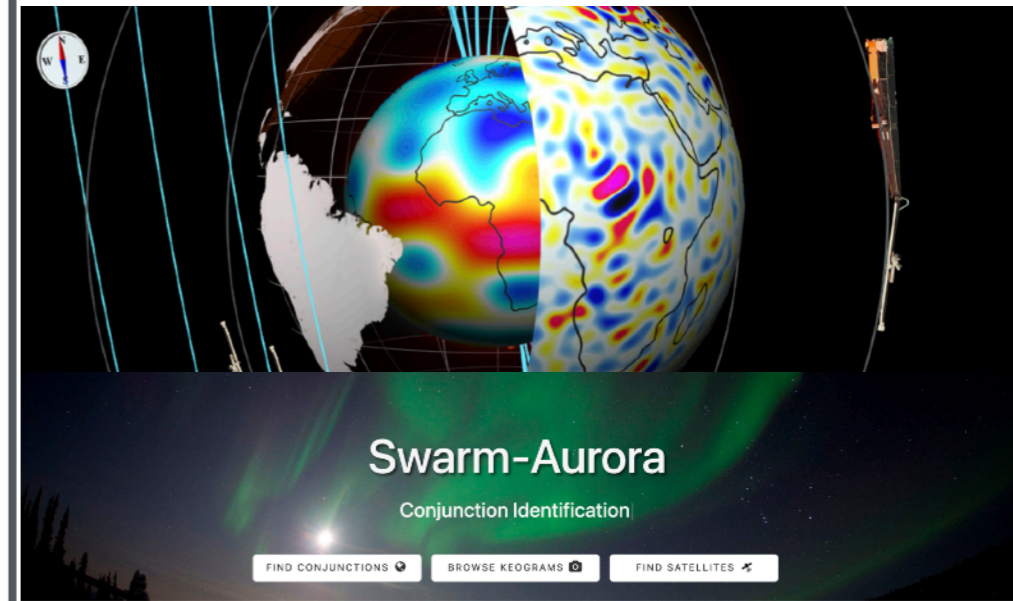
Data Fusion Facility

(1) Visualisation (2) Conjunction planning
Field-line trace Mp & s/c to ionosphere
SuperDARN + SuperMAG + EISCAT + etc.



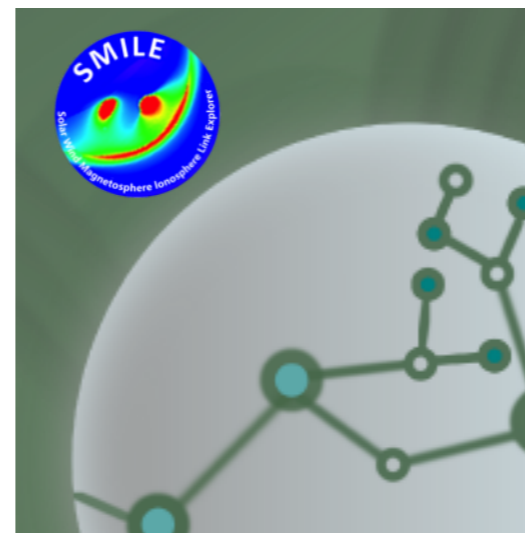
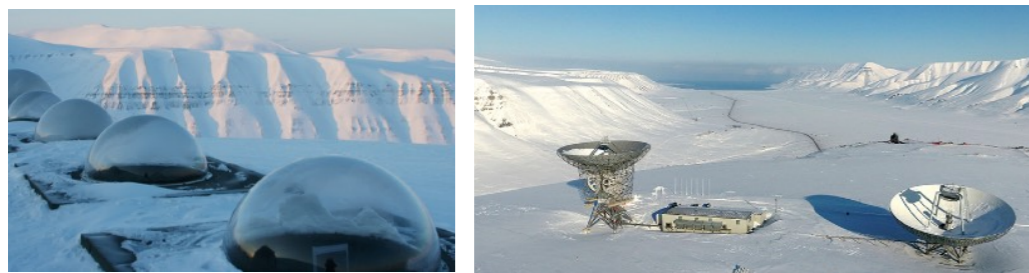
Linking to Swarm & ViRes

Data product mock-ups for ESA & DTU Spaces's ViRes tool. Ingestion into all-sky imager facility+s/c: Swarm-Aurora



Winter campaigns

Preparing dedicated multiple experiment **coordinated observing** in Northern months of darkness; first & future winters



Carter+ 2023/2024:
Multiple temporal & spatial scales holistic approach

doi: [10.26464/epp2023055](https://doi.org/10.26464/epp2023055)

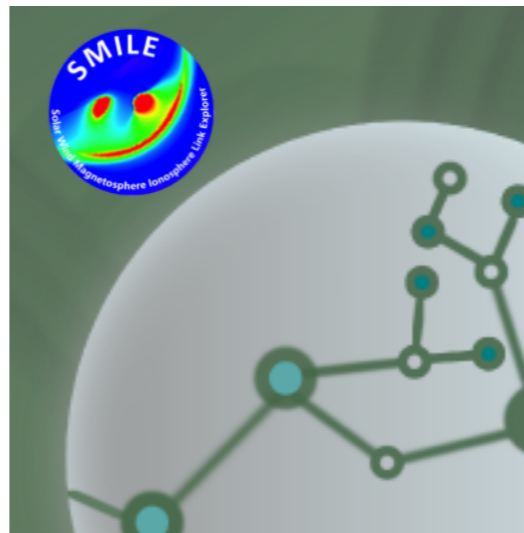
Missions/project coordination

Establishing **connections, future coordinated campaigns, programmes, & good practice**

GDC (NASA), EZIE (NASA), LEXI, TRACERS, NanoMagSat, E3D, ...

International Polar Year 32 if possible

SMILE Ground-based WG



Upcoming ISSI paper
Ground GDC group
led by Bea Gallardo-
Lacourt, Catholic
University of America

Missions/project coordination

Establishing connections, future coordinated campaigns, & good practice

GDC (NASA), EZIE (NASA), LEXI, TRACERS, NanoMagSat, E3D, etc. ESA/ESTEC Heliosphere-interested team: e.g. Efforts to include ground-based data in [archives](#)

Ground based support needs



Need to know launch with some notice; see also Public Engagement programme

**Critical dates in STP community, table to be adjusted, consortia often on best efforts/
individual institution dependent**

Name/Initiative	Type of experiment	Call date	Lead time required	Data delivery as non proprietary
SuperDARN	Coherent radar	Running	~2 months	Raw data immediate
SuperMAG	Magnetometers	Running	Not required	~5 months partial, longer for completeness
EISCAT, E3D*	ISR	(UK): Early October, close December	~1-3 months	QL same day, can be 1 year proprietary
ISRs World Day	ISRs	~July	~0.5 years	[Unknown]
SMILE ASI	ASI	N/A	N/A	Immediate
Svalbard ASIs/ experiments	ASI	N/A	[Experiment & PI dependent]	[PI dependent]

Winter campaign



Paper DOI: [10.1093/rasti/rzae038](https://doi.org/10.1093/rasti/rzae038)

Leads: M.-T. Walach & Y. Soobiah

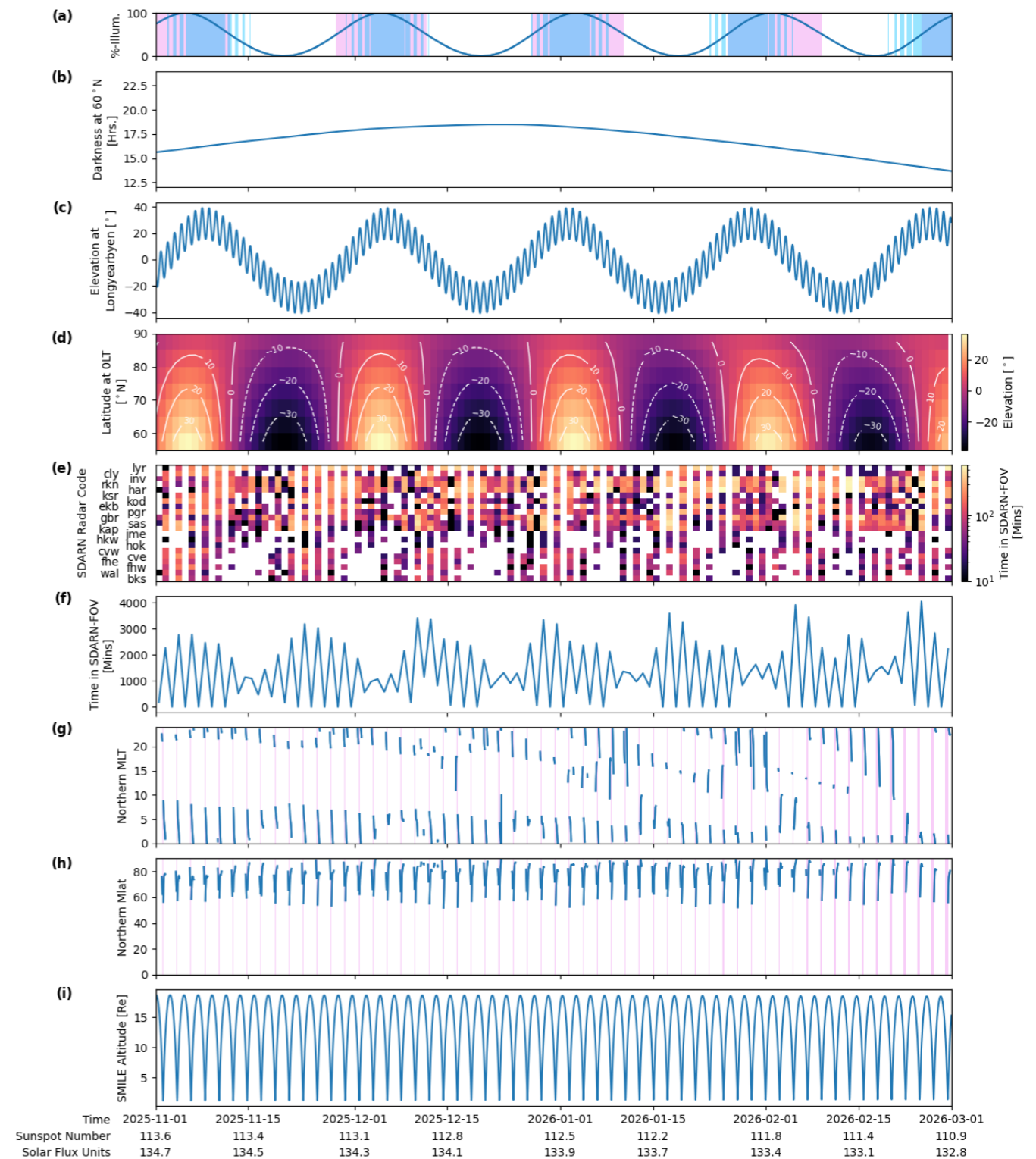
Explore themes such as cusps influence, auroral drivers, and interhemispheric differences through e.g.:

auroral patches, poleward moving auroral forms, throat aurora, streamers, convection patterns, ULF waves, etc. etc.

Planning of 'best' scenarios, e.g New Moon

Conjunctions in paper for 'first winter' but this now not likely

Mechanisms in place to apply for next and subsequent winters



SMILE DFF – Site tools

LIA, MAG

In-situ

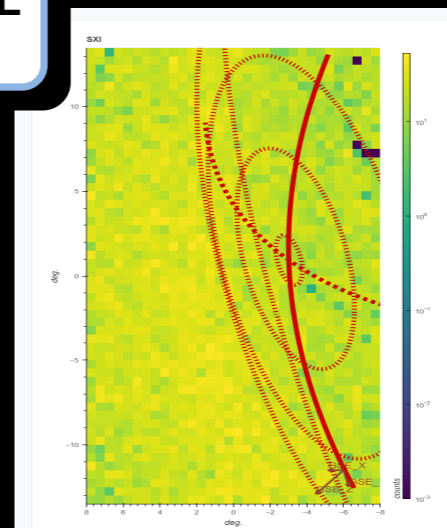
UVI

Auroral response
in Northern
hemisphere

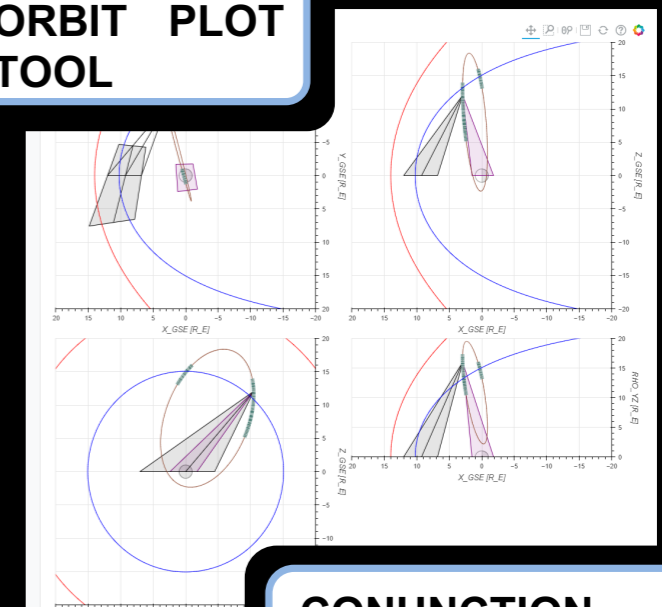
SXI

Magnetopause
movements

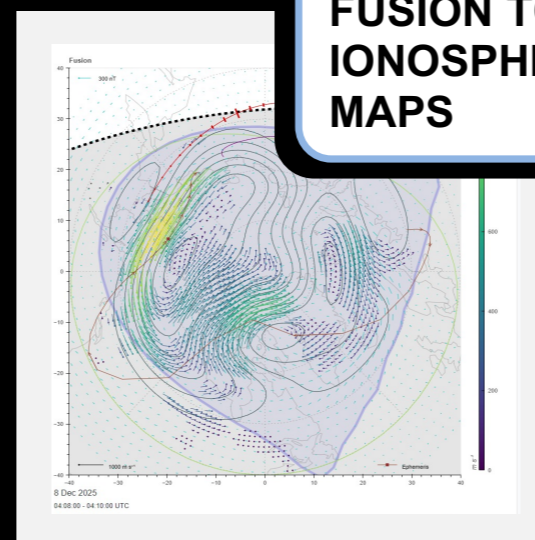
**FUSION TOOL
– SXI**



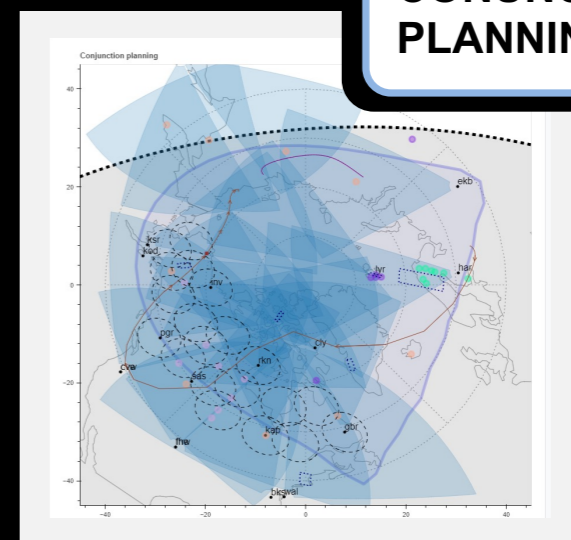
**ORBIT PLOT
TOOL**



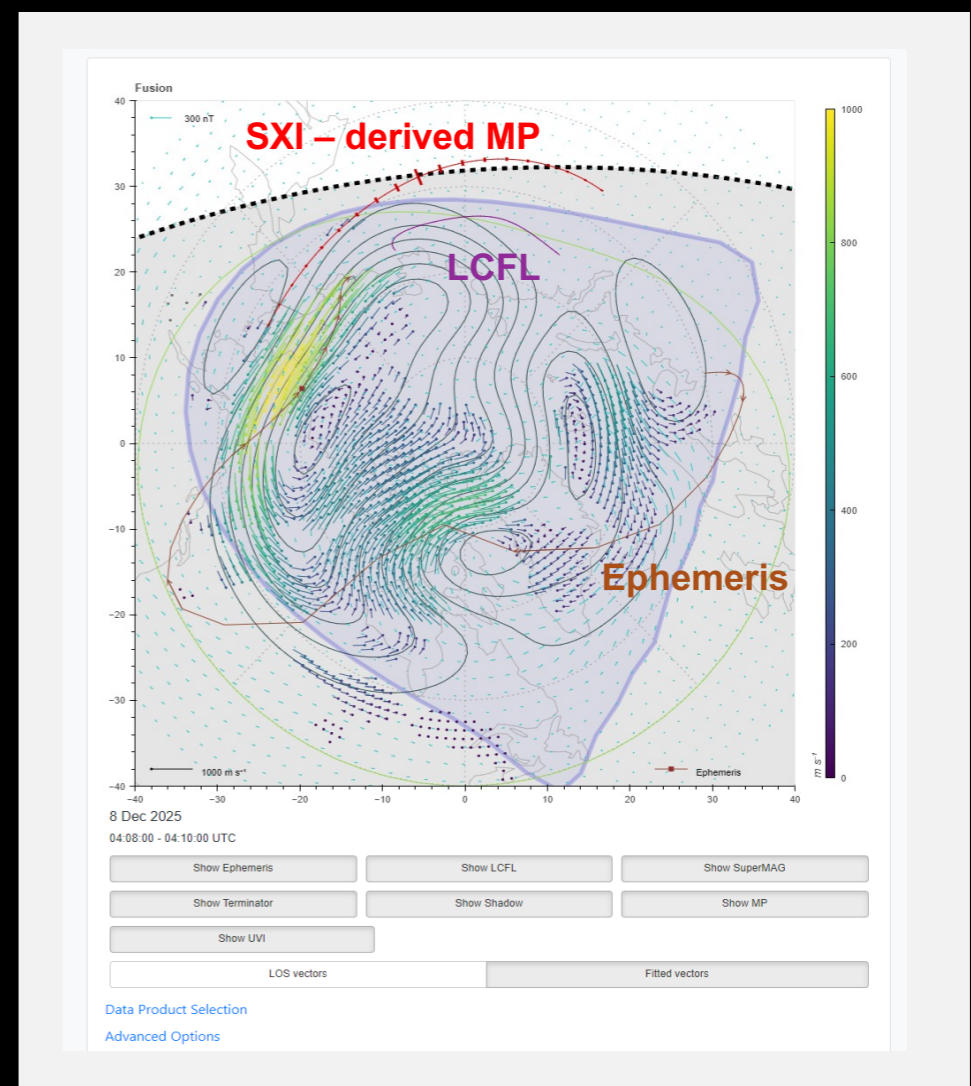
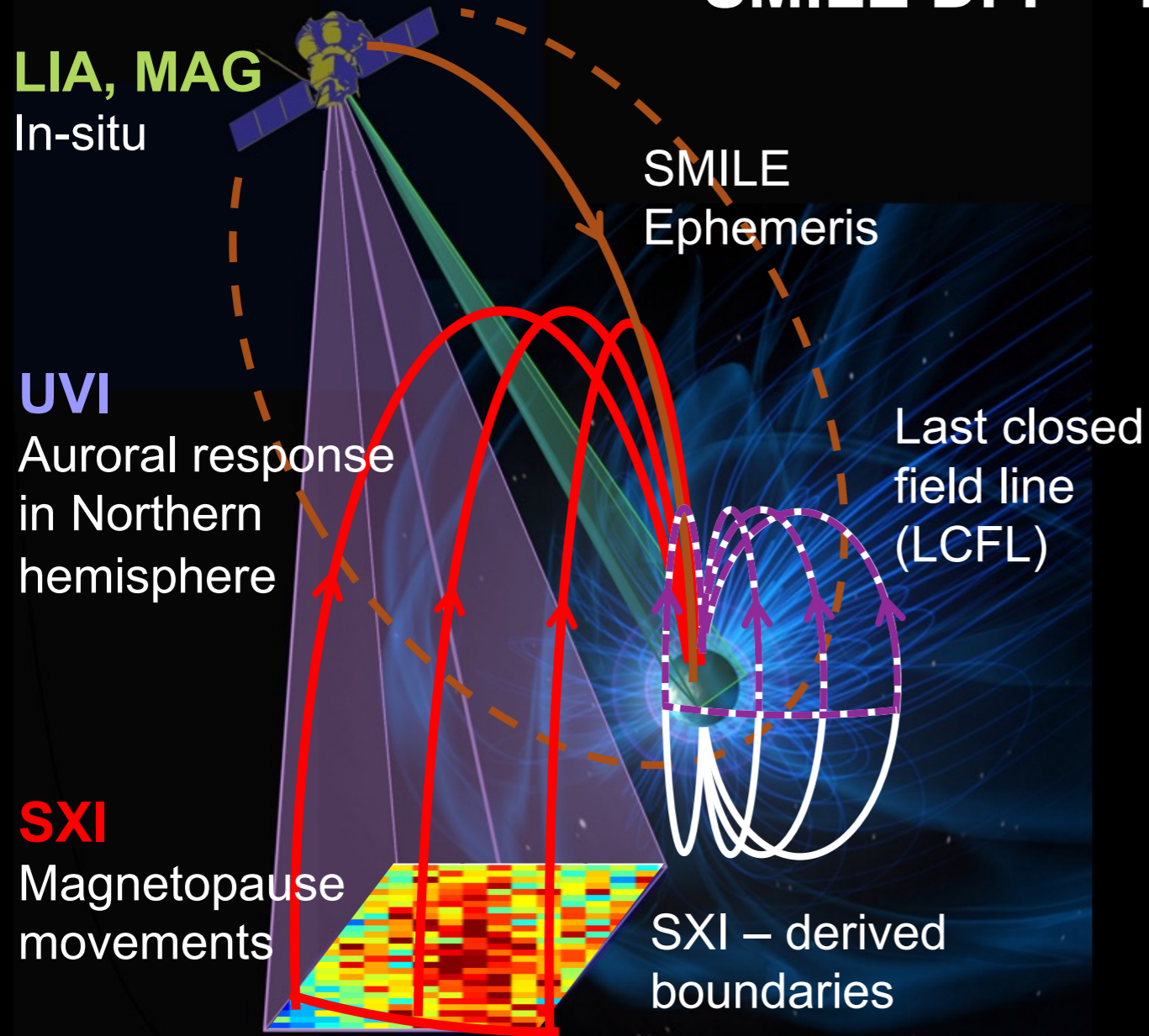
**FUSION TOOL –
IONOSPHERE
MAPS**



**CONUNCTION
PLANNING
TOOL**



SMILE DFF – Magnetic field line tracing

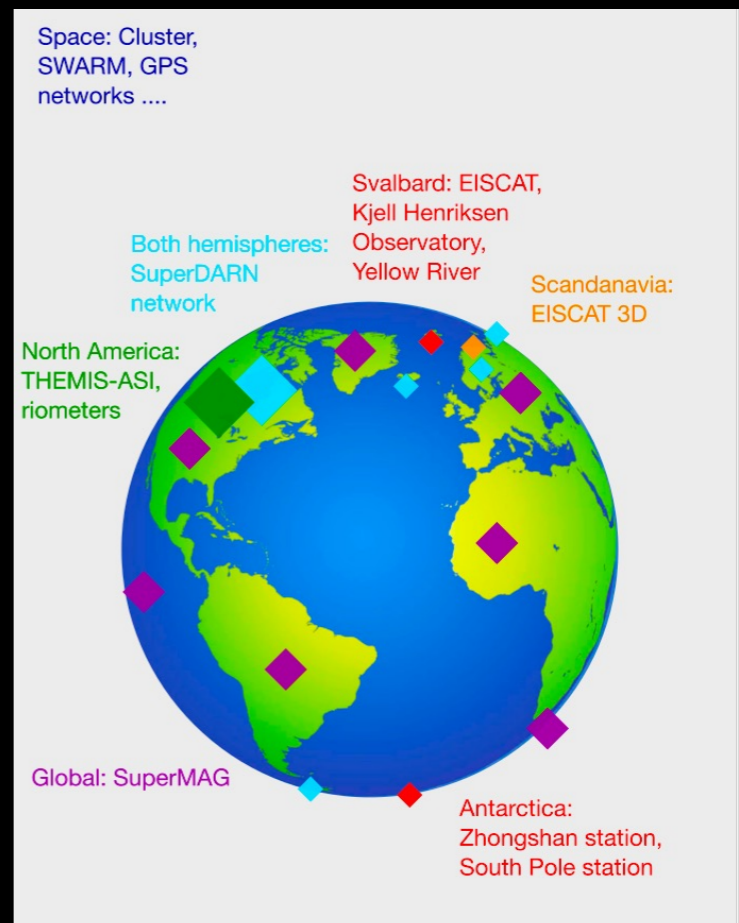
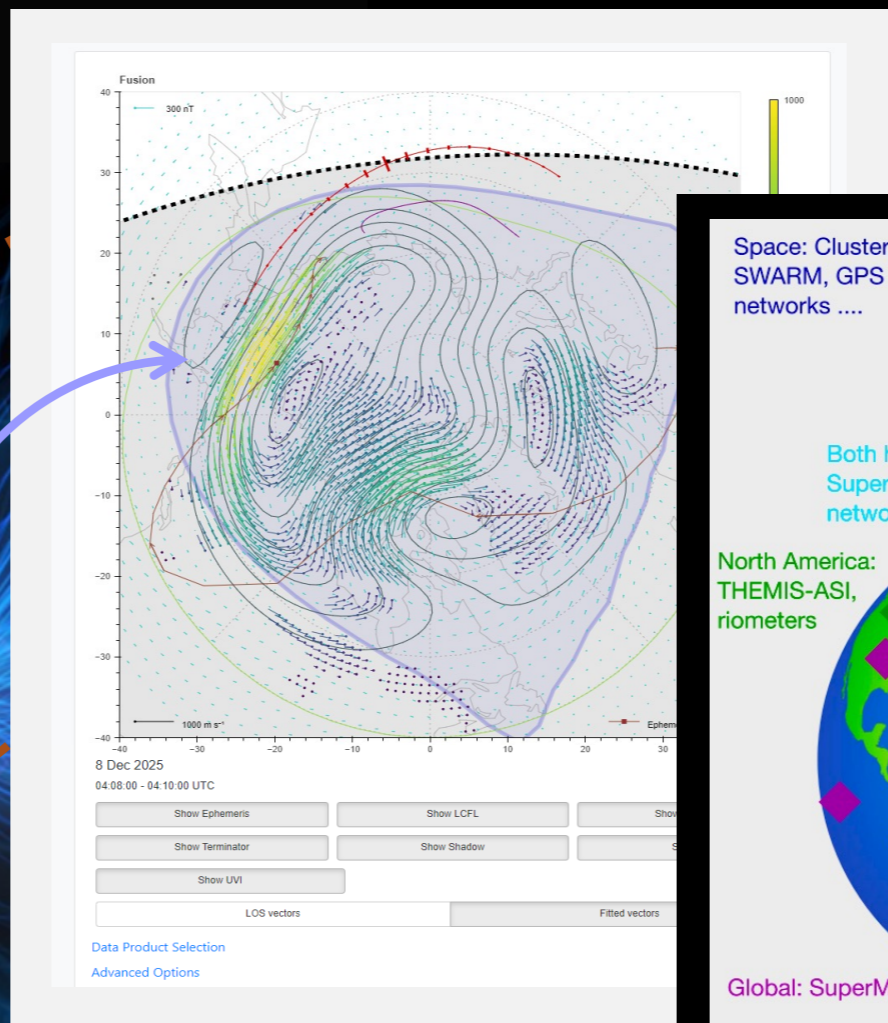
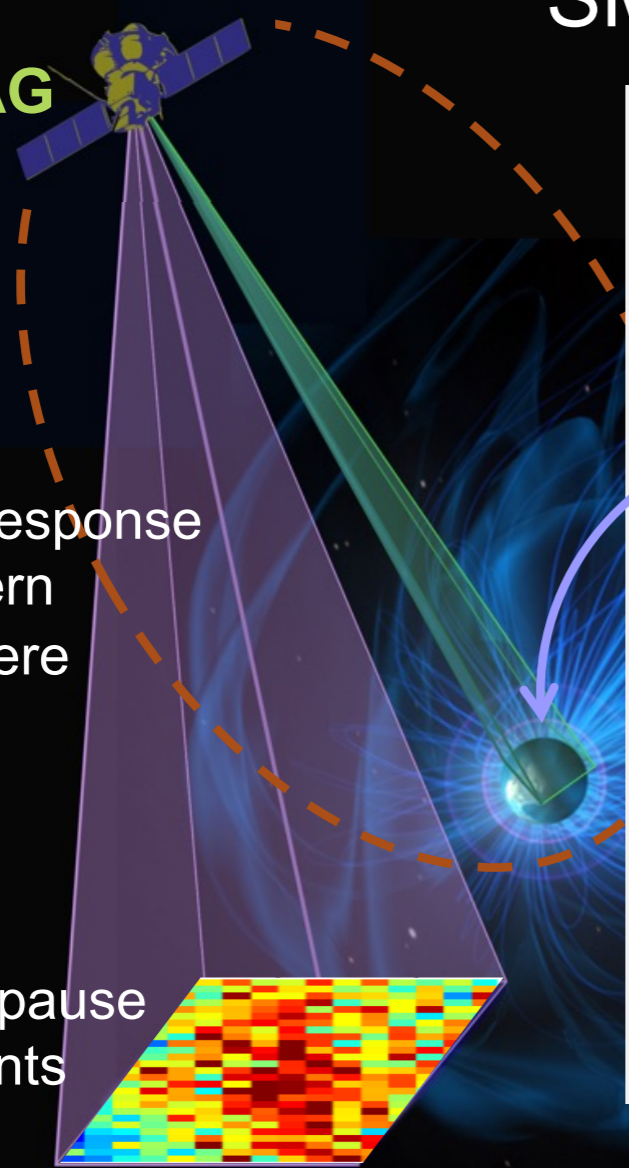


SMILE DFF – Conjugate studies

LIA, MAG
In-situ

UVI
Auroral response
in Northern
hemisphere

SXI
Magnetopause
movements

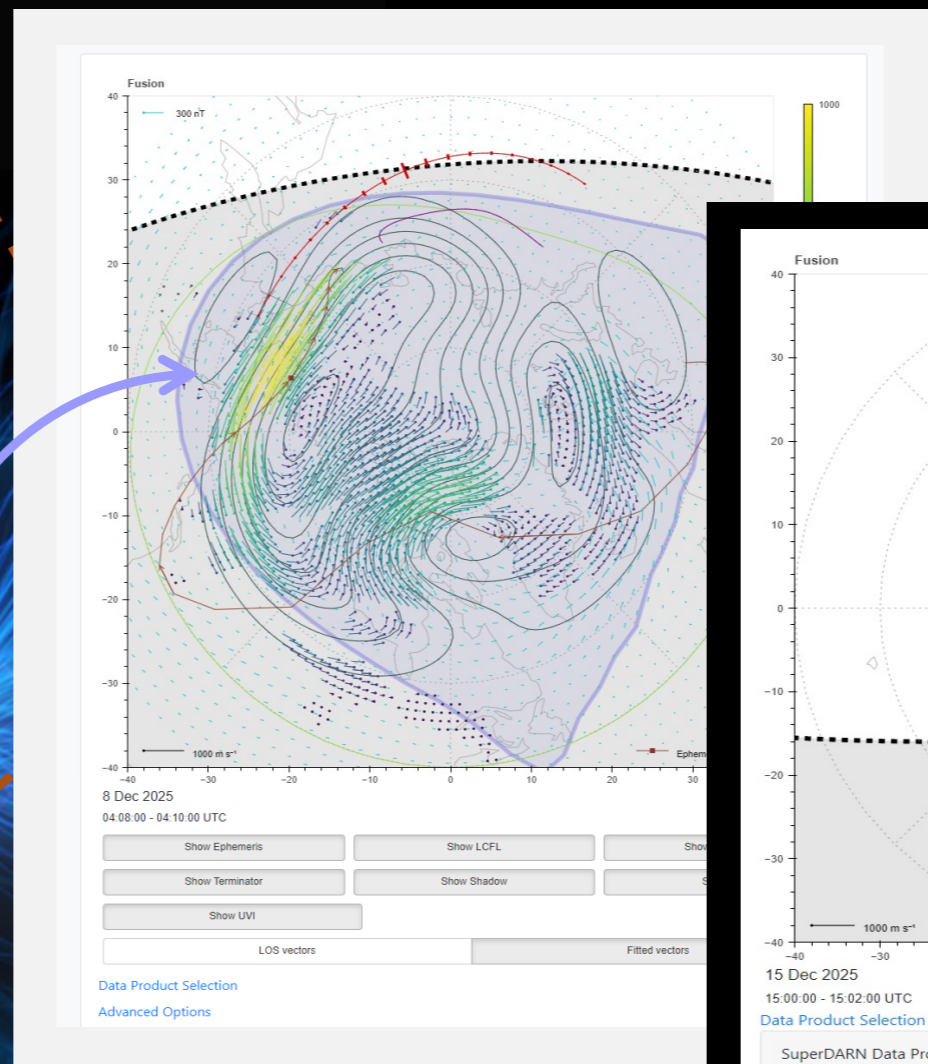
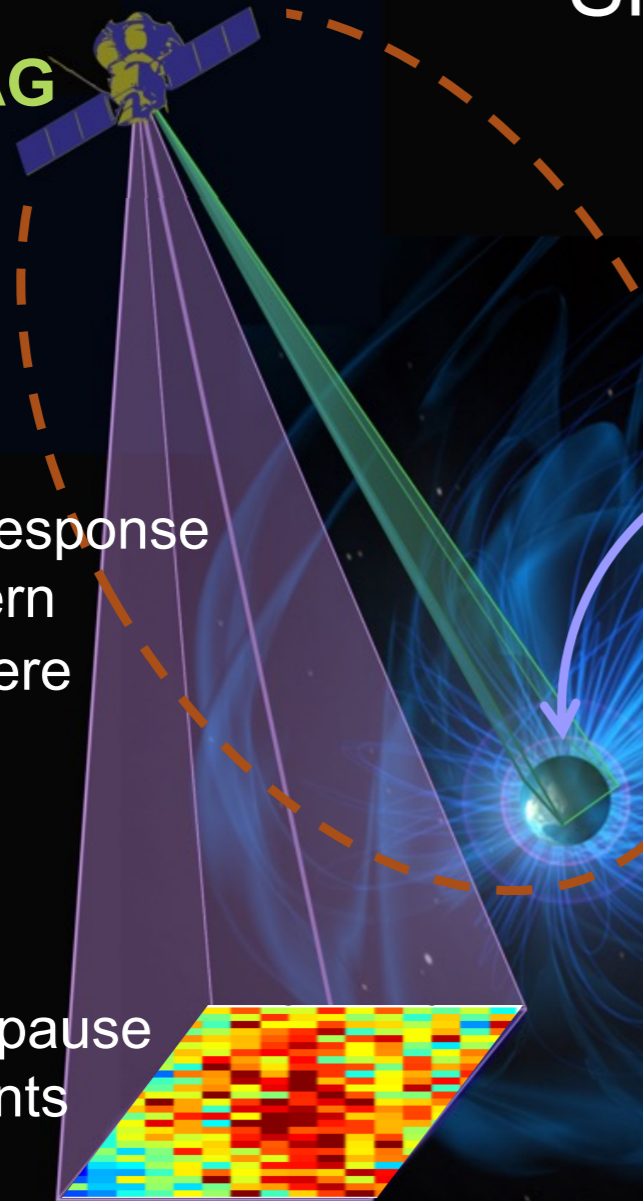


SMILE DFF – Conjugate studies

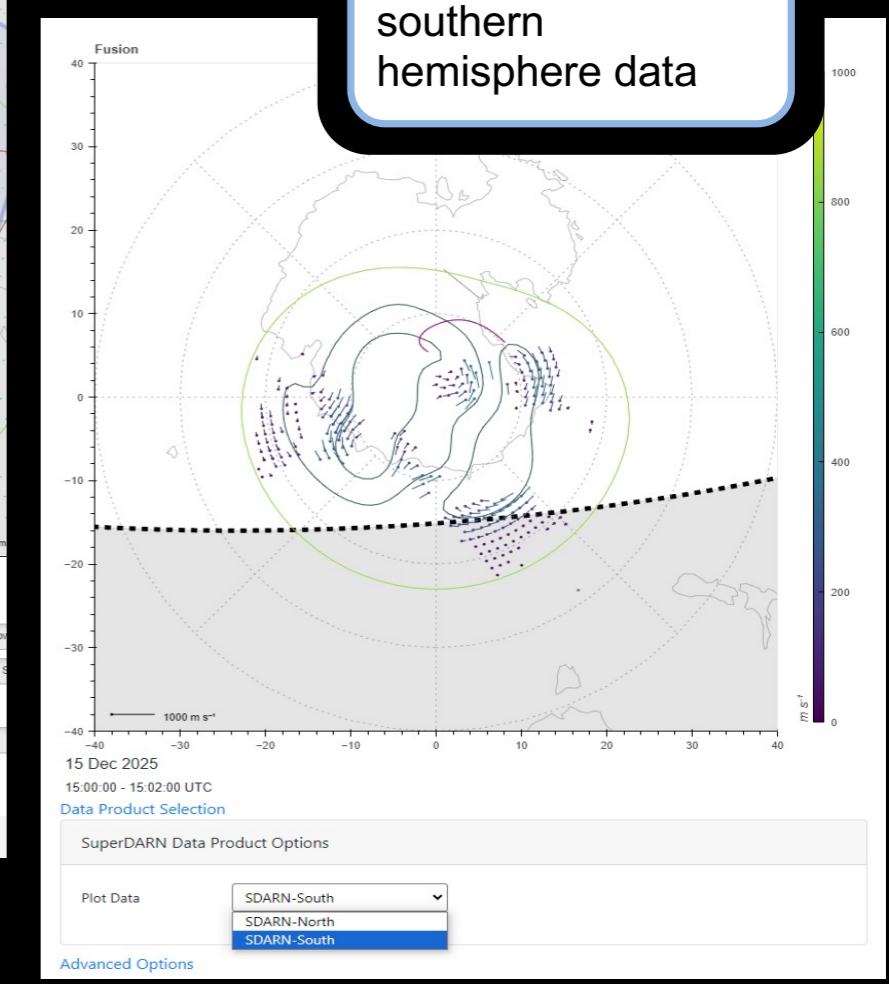
LIA, MAG
In-situ

UVI
Auroral response
in Northern
hemisphere

SXI
Magnetopause
movements

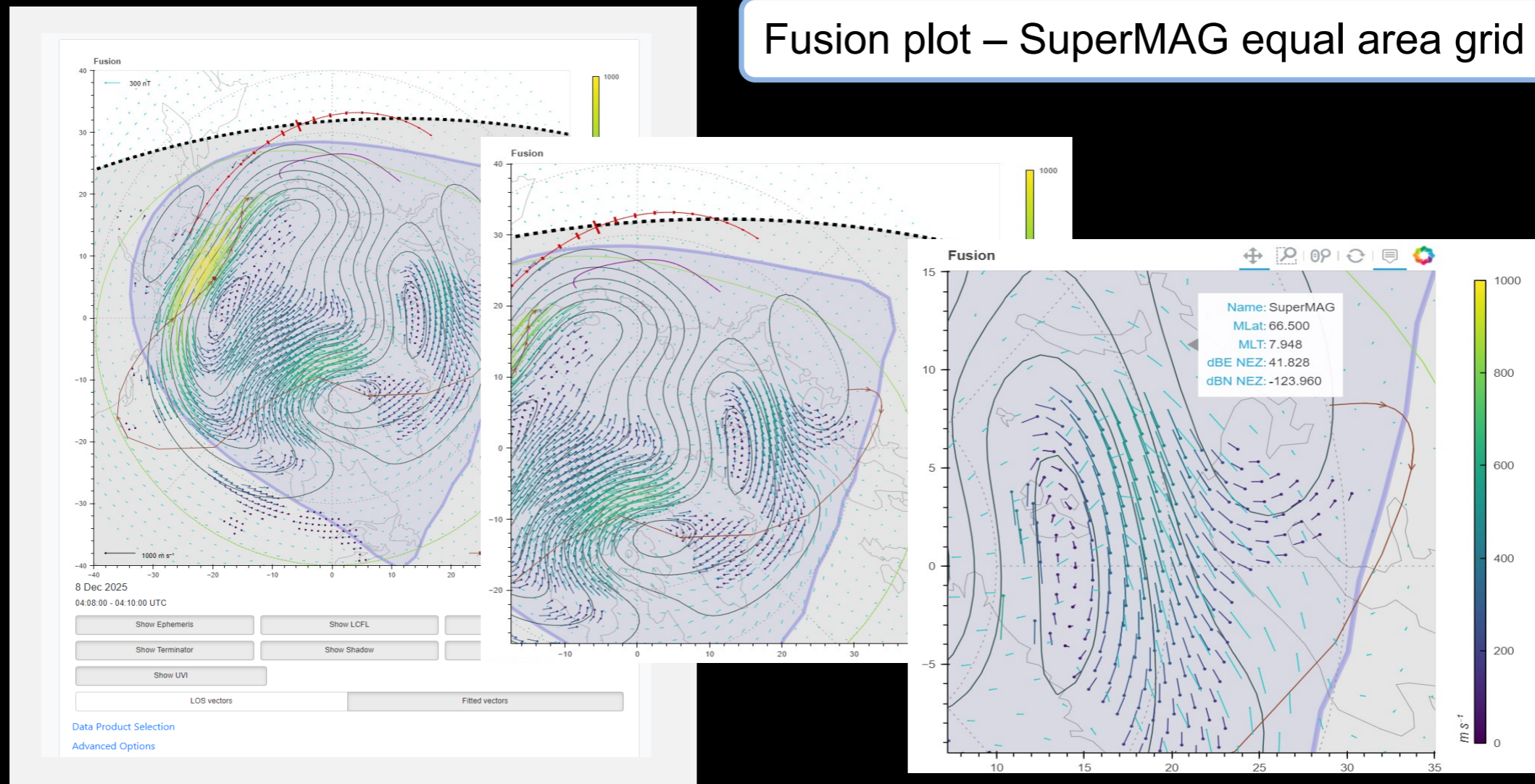


Comparison to southern hemisphere data

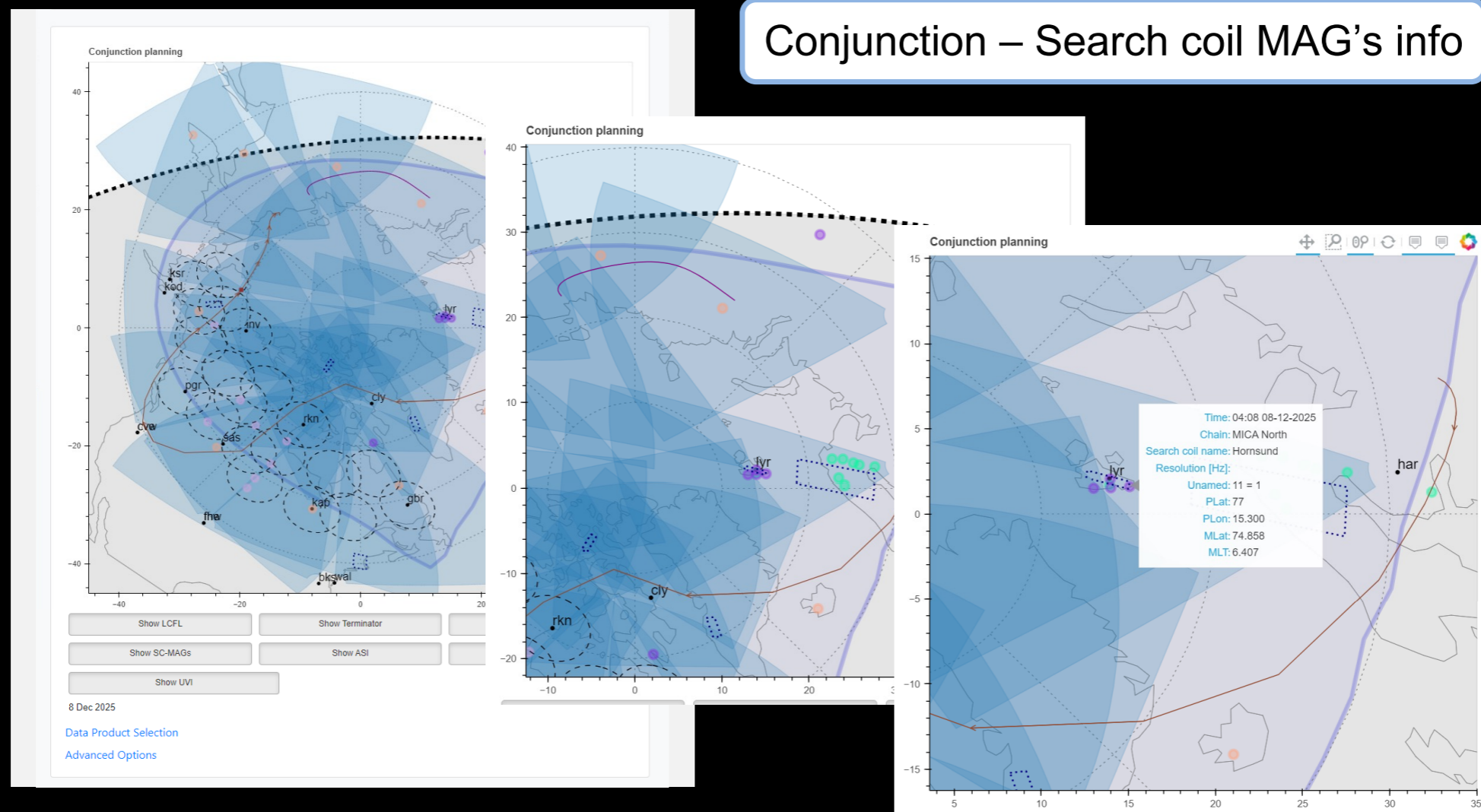


SMILE DFF – Incorporation of ground based data

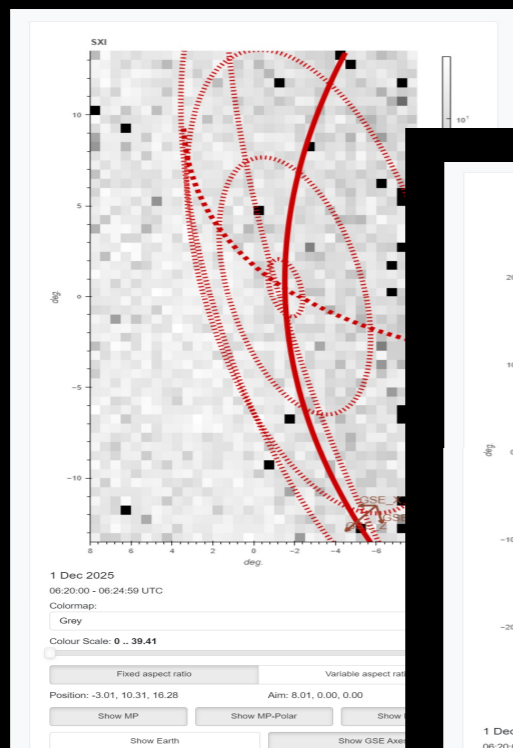
Fusion plot – SuperMAG equal area grid



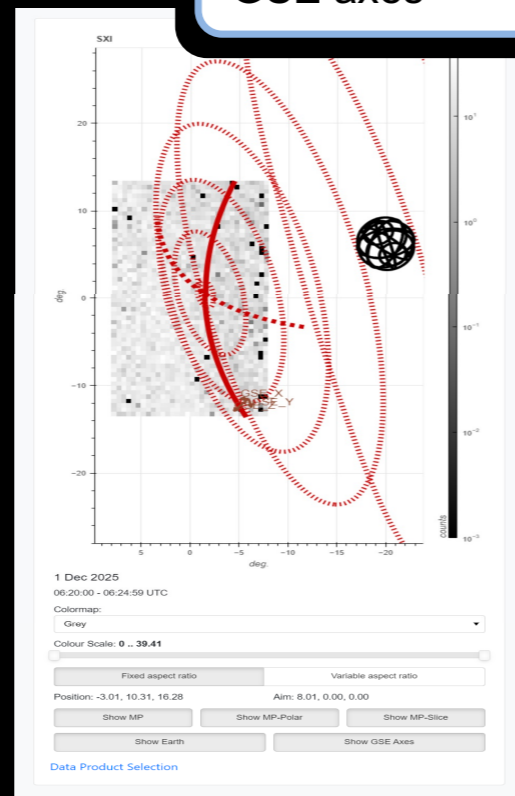
SMILE DFF – Incorporation of ground based data



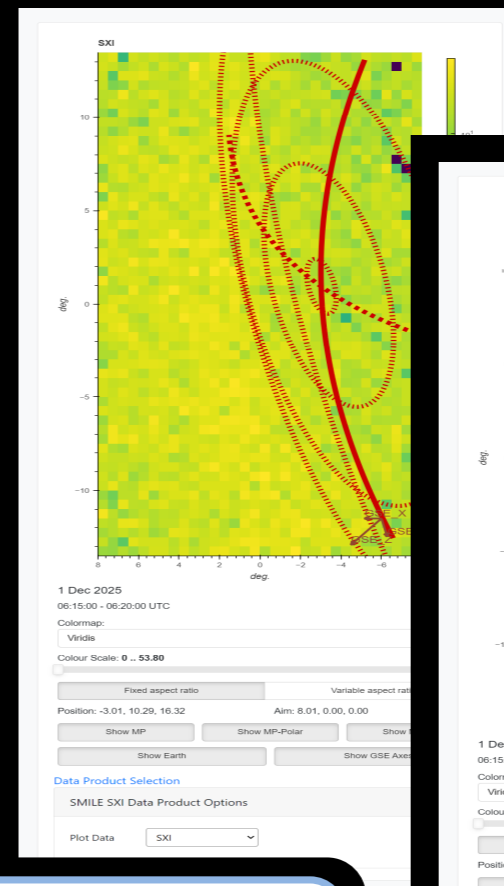
SMILE DFF – SXI tool



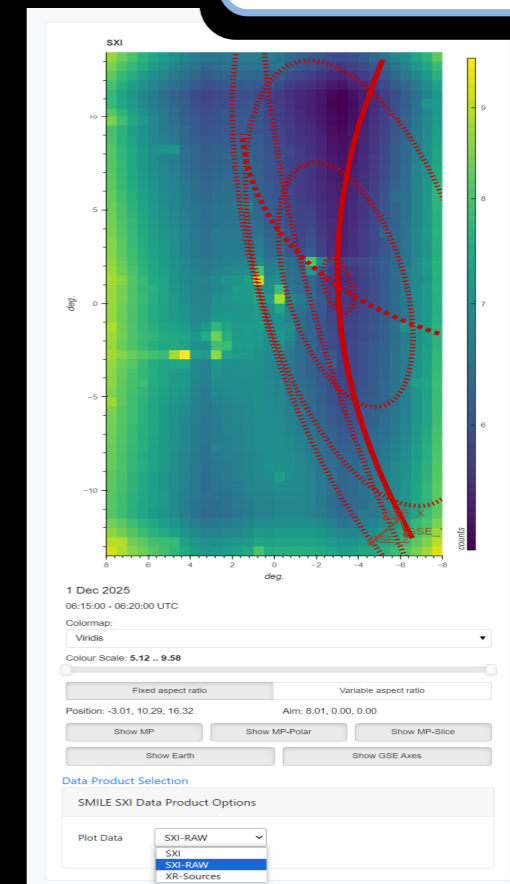
Earth frame and GSE axes



Magnetopause boundary in ecliptic, polar planes and different X-GSE

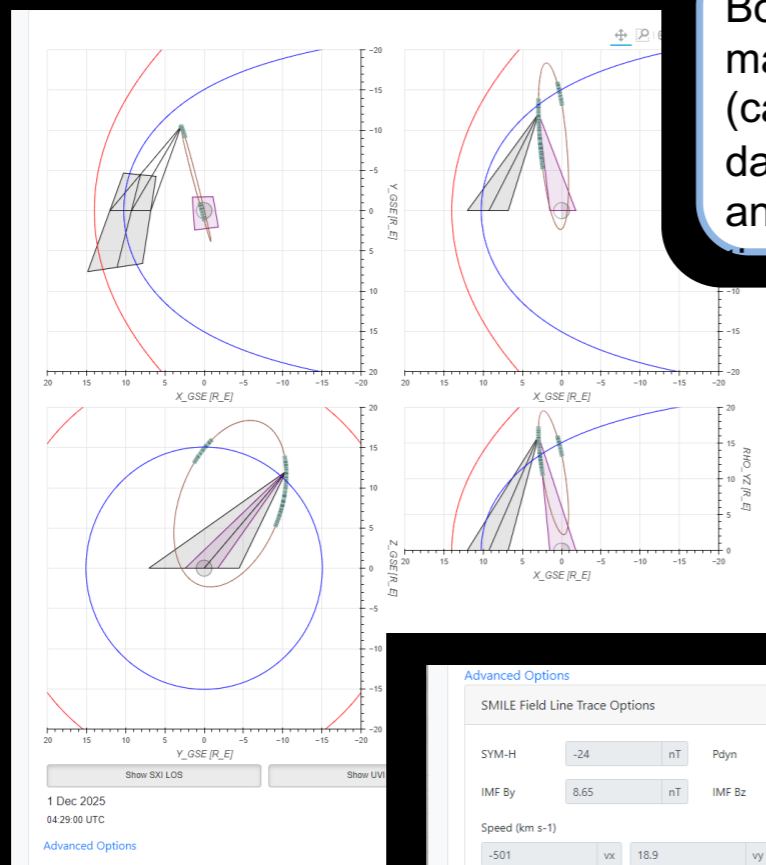


Change SXI data products

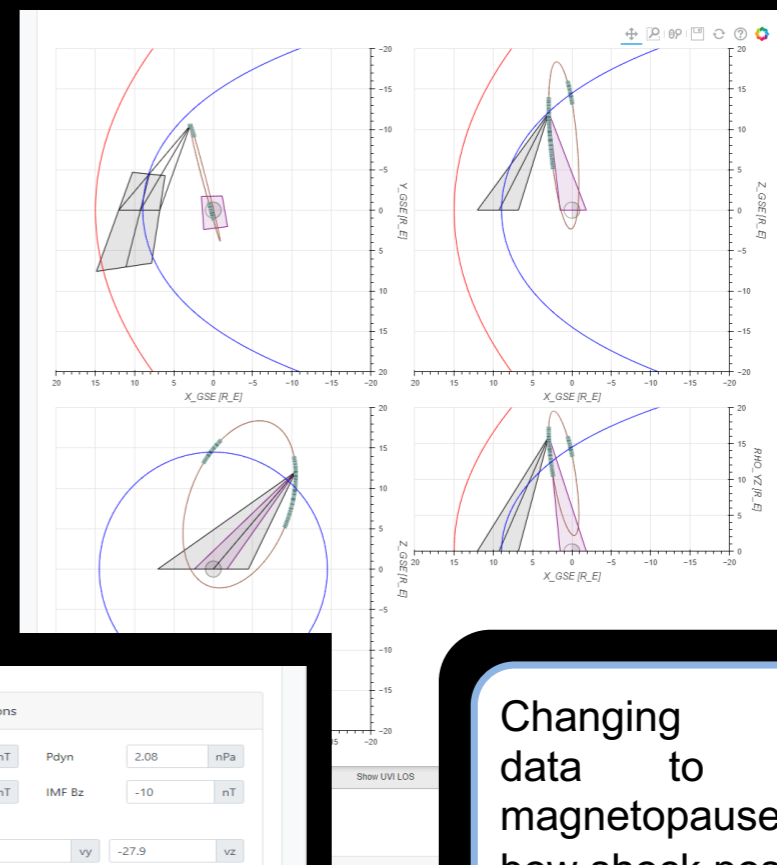


Colour options – Grey, viridis and plasma

SMILE DFF – Orbit tool and advanced options



Bow shock (red) and magnetopause (blue) (calculated with Omni-data), SXI / UVI LOS and SXI integration



Changing OMNI data to replot magnetopause and bow shock positions

Advanced Options

SMILE Field Line Trace Options

SYM-H	-24	nT	Pdyn	2.08	nPa
IMF By	8.65	nT	IMF Bz	3.53	nT

Speed (km s⁻¹)

vx	18.9	vy	-27.9	vz	-501
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Use OMNI data where available

Confirm changes Reset OMNI data

Advanced Options

SMILE Field Line Trace Options

SYM-H	-24	nT	Pdyn	2.08	nPa
IMF By	10	nT	IMF Bz	-10	nT

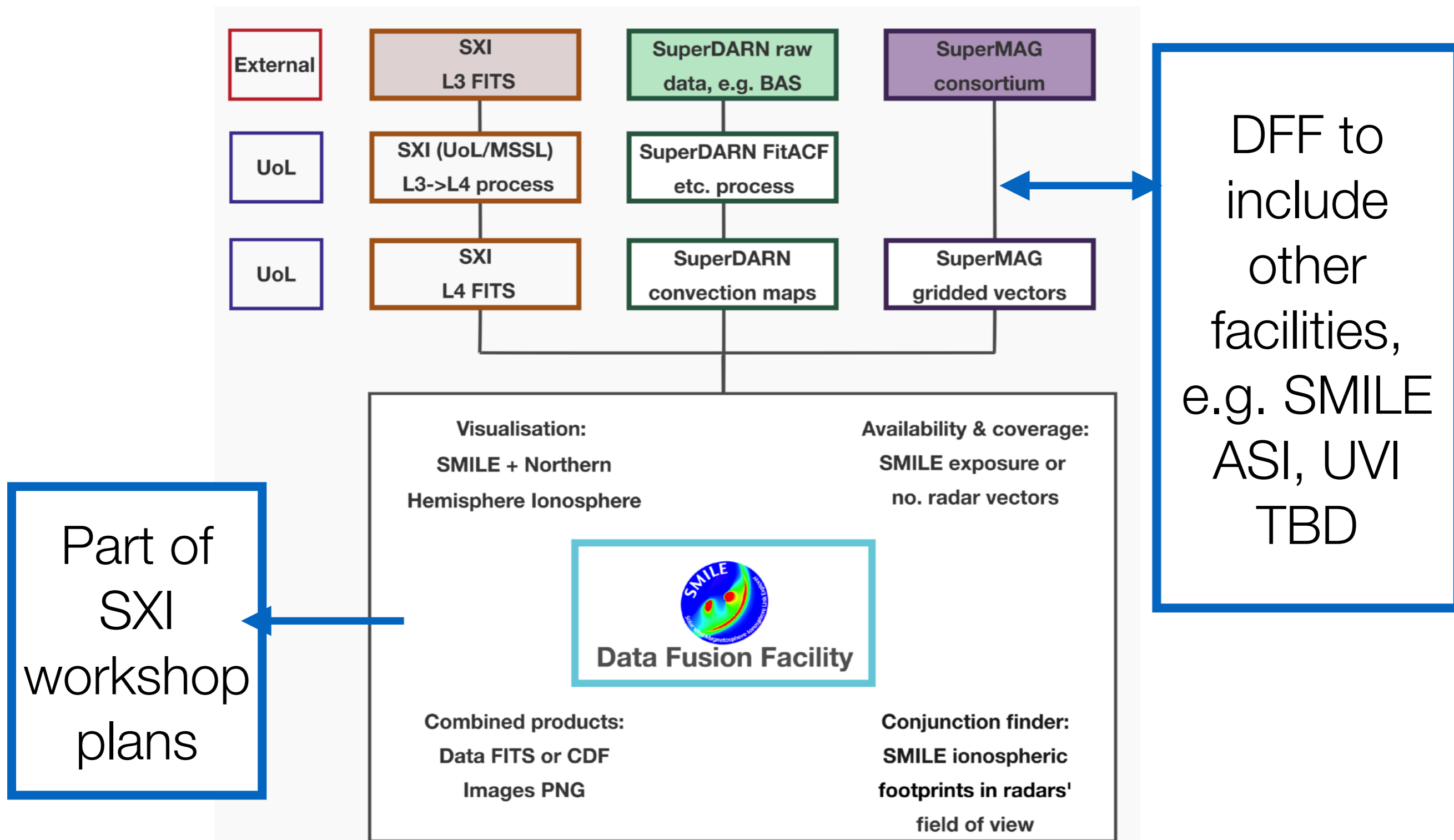
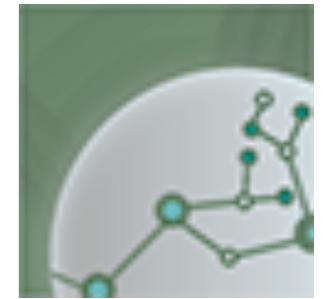
Speed (km s⁻¹)

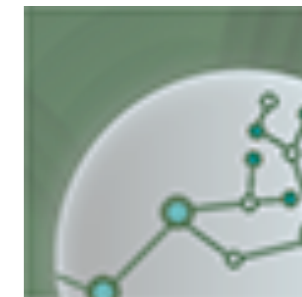
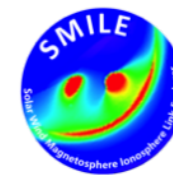
vx	18.9	vy	-27.9	vz	-700
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Use OMNI data where available

Confirm changes Reset OMNI data

Data Fusion Facility: Linking L3 to L4, structure. Use of the DFF will be part of **intended SXI workshop** that we hope to hold annually at Leicester, including talks on the mission and instrument status, plus practical data analysis sessions. This is styled on ESA's XMM-Newton SAS workshop that used to be held every year for new XMM-Newton data users.





SMILE Ground-based WG

Need to wait for launch to really put us to the test

Some of the things we would have done differently....

Ground written into original proposal

Mock up tools earlier, e.g. Swarm

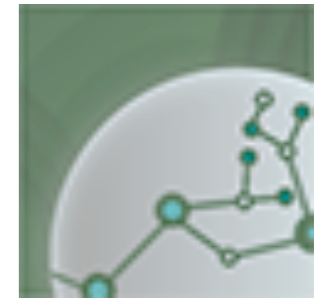
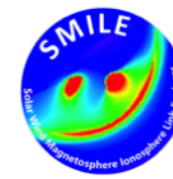
Recruit/fund earlier for e.g. software support

Time (just) to make changes before launch

[Note, effort so far mostly on best efforts basis, so we can be kind to ourselves]

[Note, we need to be adaptable after launch]

We are very open to ideas and suggestions....please email/join



SMILE Ground-based WG

Other points

How to establish routes of S/C+ground funding without falling between the cracks, e.g. UK, between STFC and NERC?

How to improve two-way communication, grow user base, between ground to space, space to ground? e.g. SuperDARN community

How to efficiently share tools and train on those tools, avoiding doubling up of effort - practical workshops to break down barriers to hands-on data usage and understanding of e.g. calibration, releases etc/?