

Swedish Armed Forces

What are the impacts of space weather and what information do we need?

Space Weather since 2010

- The Swedish Armed Forces has used space weather [forecasts](#) for planning purposes since fall 2010.
- It is mainly used for staffs (as part of the weather information) and communication planning.

Main impact areas

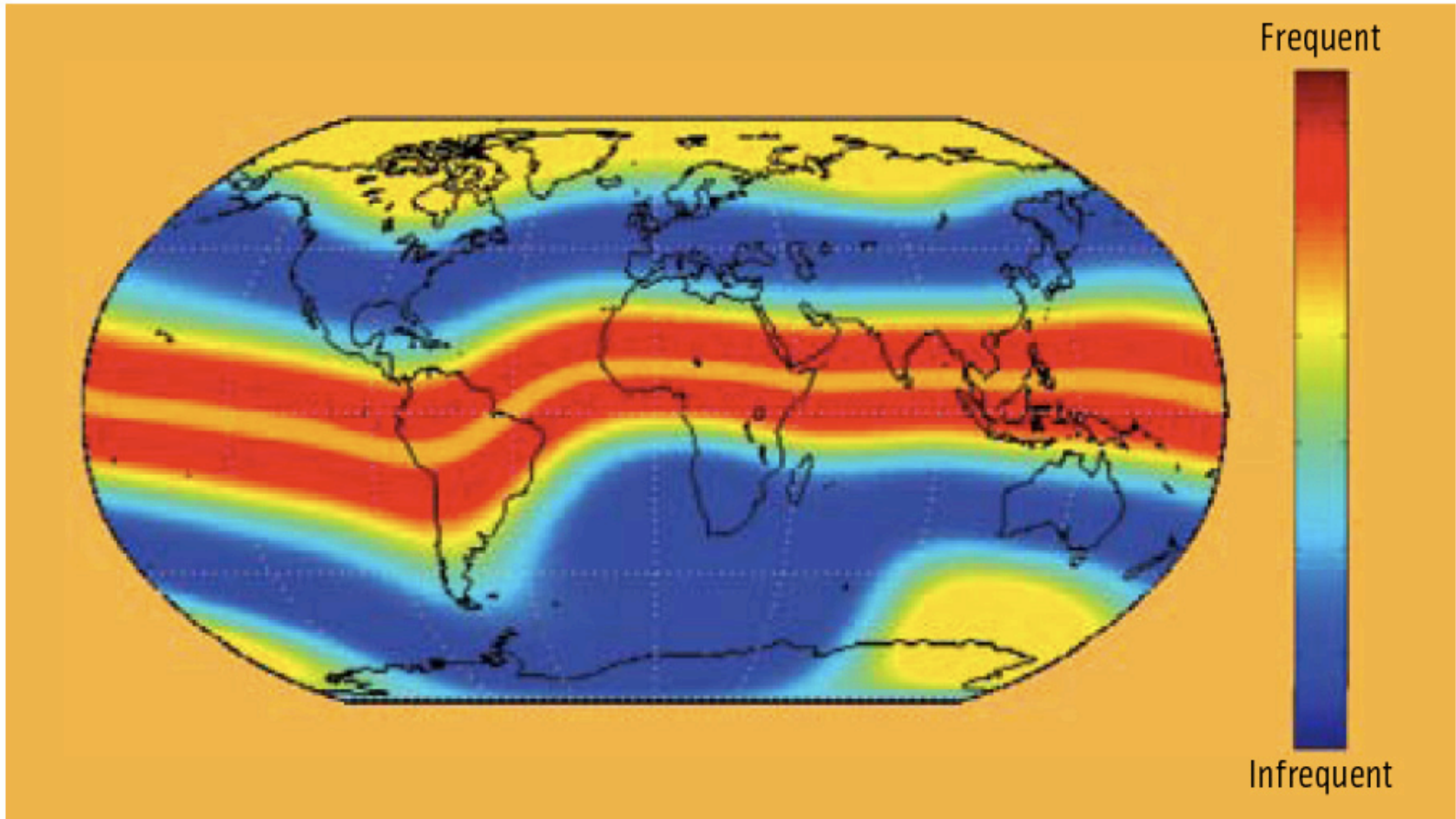
- HF communication
- Satellite communication

To a lesser extent

- GNSS services

High frequency radio

- Ground and sea forces uses HF radio as main long distance communication.
- Northern Sweden often has disturbances.
- Mission areas (Greater Horn of Africa and Mali) have disturbances every evening.



"GNSS and Ionospheric Scintillation" by prof Paul Kintner et al
from "Inside GNSS" July/August 2009

Satellite communication

- The Swedish Armed Forces don't have it's own satellites but buy satellite bandwidth from commercial companies. It is used mainly at camps and larger vessels.

GNSS services

- GNSS is mostly used as "cheap", "easy" and "nice to have" with more resilient and expensive systems as primary systems.

What do we need?

- For frequency planning the state of the local ionosphere 12-48 hours in advance is wanted.
- For satellite communication a heads up 24-48 hours in advance is wanted.
- For GNSS disturbances the expected duration and degradation/loss is wanted 12-24 hours in advance.

Today's sources

- 557th Weather Wing military tailored space weather forecasts is the core.
- SWPC is used for redundancy.
- 3hr forecast of Kp from RWC Sweden.
- HF forecast (LAMP) for 0-1000 km from Australian Space Weather Services.

In the future

- Space Situational Awareness / Recognised Space Picture will be necessary with space weather as an important part.

Questions?

Thank you!

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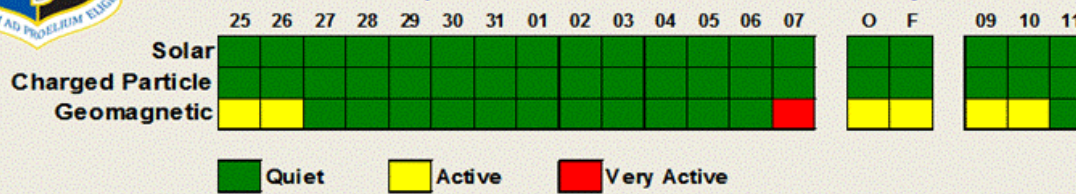


Space Environment Global Situational Awareness

Valid: 08-Nov-2017 0000 Z

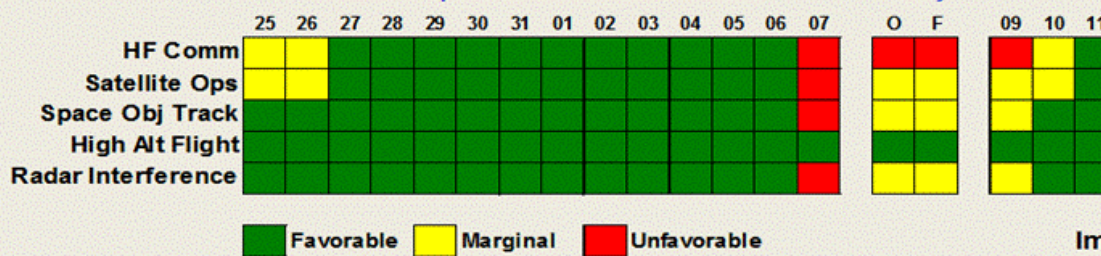


Observed Space Environmental EVENTS



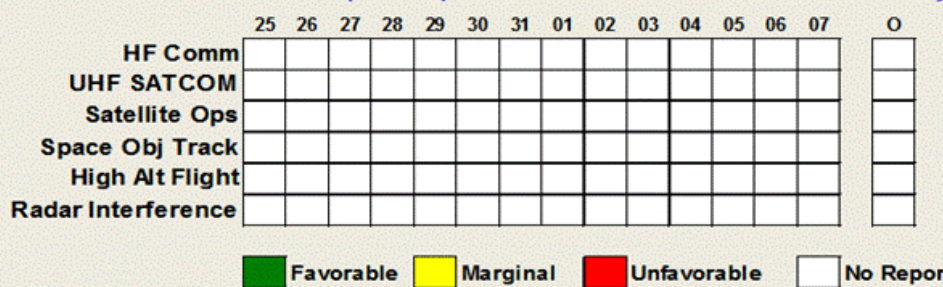
See Discussion and Events Slide for details

Probable Space Environmental IMPACTS



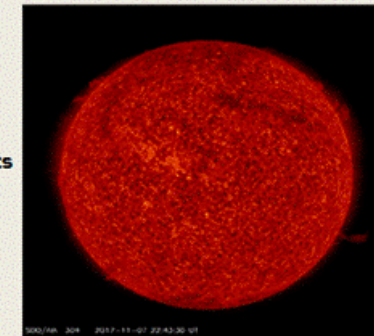
See Discussion and Impacts Slide for details. Check regional products for specific details in your AOR.

Reported Space Environmental IMPACTS



See Impacts Slide for details

Image Updated: 07 / 2249Z



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Prepared by 2 WS/WXZ DSN 272-8087 COMM (402) 232-8087

For more detailed and regional information go to:



<https://weather.af.mil/confluence/display/AFWWEESTBT/Space+Weather+Main+Page> <https://weather.af.mil/confluence/display/AFWWEESTBT/Space+Weather+Main+Page>

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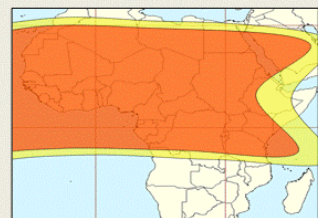
Africa Space Environment Situational Awareness

557TH WEATHER WING Valid: 08-Nov-2017 0000Z

	Today 08-Nov			09-Nov			3 - Day Forecast 10-Nov			11-Nov		
	night	day	night	night	day	night	night	day	night	night	day	night
HF Comm	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
UHF SatComm	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
High Alt Flight Radiation	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
Radar Interference	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green
GPS Error (Single Freq)	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green	Green

■ No Impacts
■ Impacts Possible
■ Impacts Likely

HF Forecast Valid: 08/0000Z --- 08/0600Z
UHF Forecast Valid: 08/0000Z --- 08/0600Z

Space Weather Impacts Summary

Solar Flare Probabilities: M: 01% X: 01%

HF Comm (YELLOW or RED): Temporarily degraded or total loss of HF radio communications.
Forecast GREEN - 08 - 11 Nov during all hrs.

UHF SatComm (YELLOW or RED): Temporarily degraded or total loss of UHF radio communications.
Forecast RED (Severe Scintillation) - 08 - 11 Nov during night hrs.
Forecast GREEN - 08 - 11 Nov during day hrs.

High Alt Flight Radiation (YELLOW or RED): Increased harmful radiation dosage to personnel in high altitude operations.
Forecast GREEN - 08 - 11 Nov during all hrs.

Radar Interference (YELLOW or RED): Increased interference or false returns to sunward and poleward looking radar.
Forecast GREEN - 08 - 11 Nov during all hrs.

GPS Error (Single Freq) (YELLOW or RED): Temporarily degraded or total loss of GPS signal.
Forecast YELLOW (Errors 15-50 Meters) - 08 - 11 Nov during night hrs.
Forecast GREEN - 08 - 11 Nov during day hrs.

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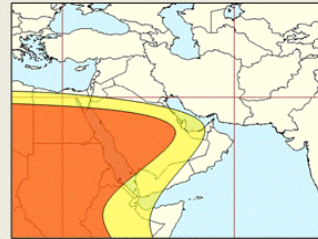
SWA Space Environment Situational Awareness

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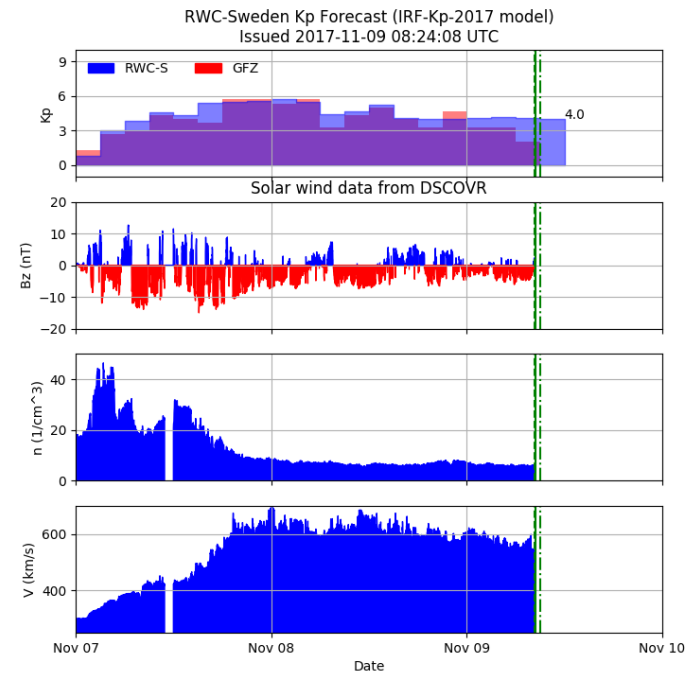
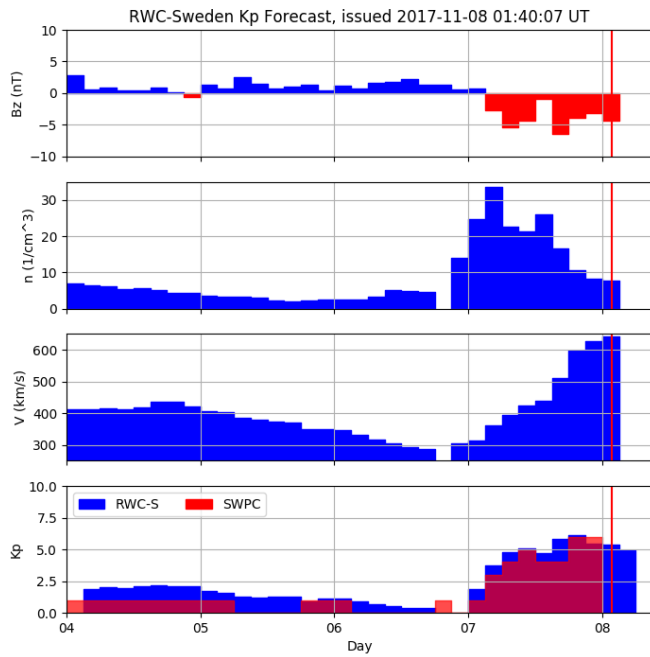
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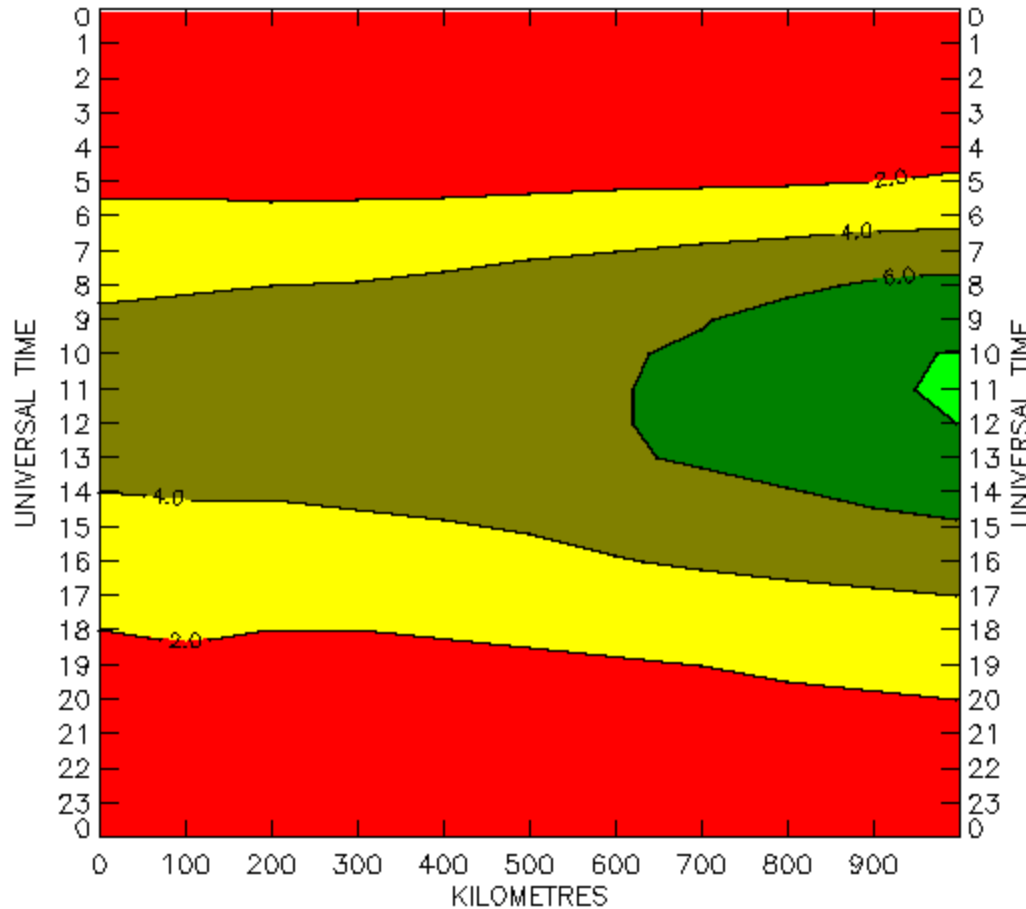
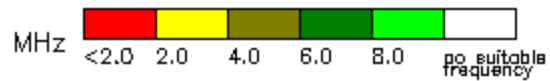


Local Area Mobile Predictions

8 November, 2017

Enk%C3%B6ping

Point to point communication within 1000kms of above location.



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