

# ESA SSA and Space Safety Space Weather Activities

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ESA Space Safety Programme Office

RAS discussion meeting:  
Transitioning Research and Instrument Expertise in Heliophysics into  
Space Weather Monitoring Capabilities at L1 and L5

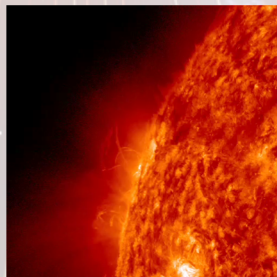
London, 8 March 2019

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# Space Situational Awareness

## ESA Space Situational Awareness Programme (SSA)

is an initiative aiming to provide European autonomy in civil systems and services needed to protect satellites and the Earth

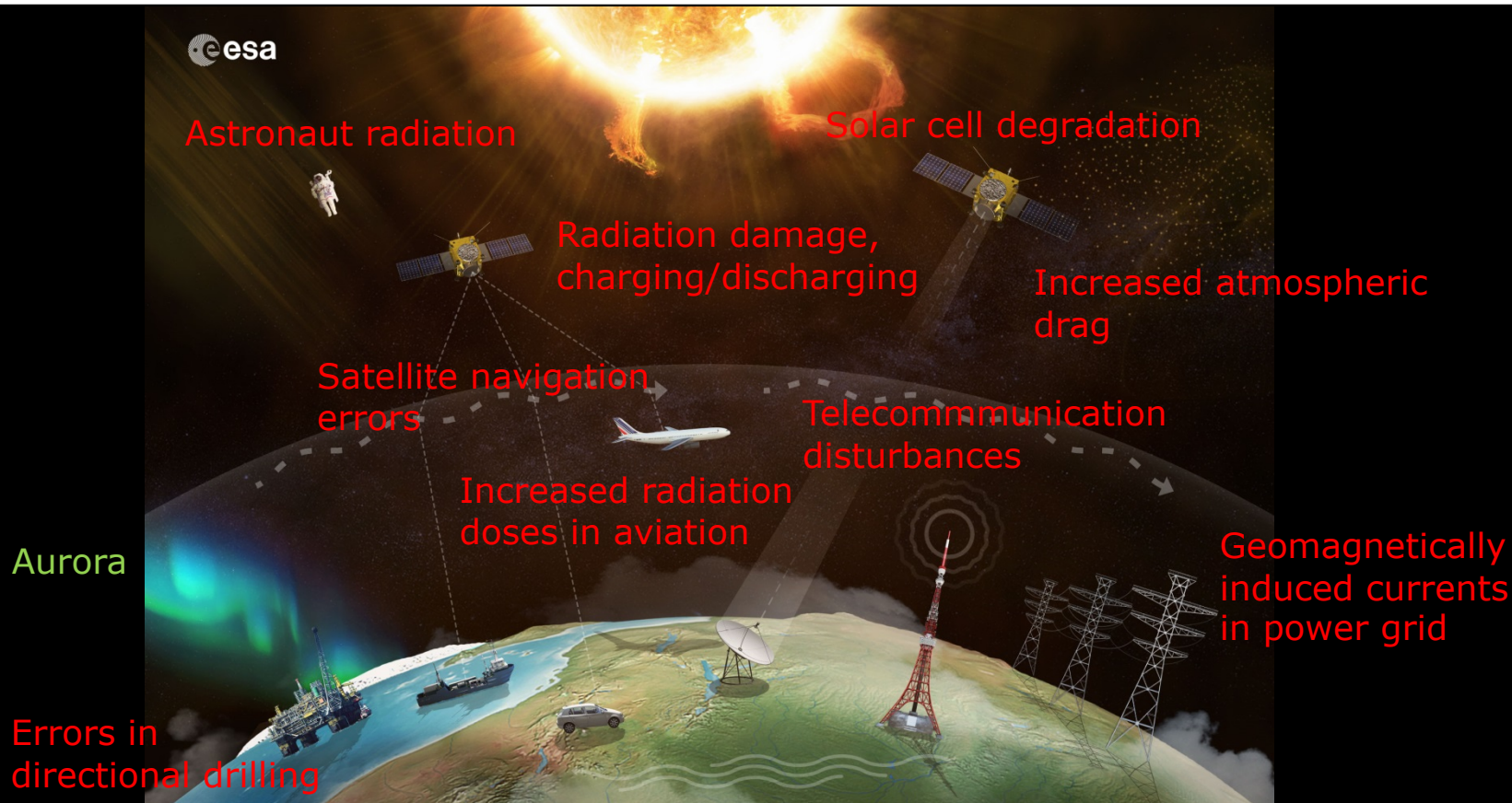


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Juha-Pekka Luntama | 08/03/2019 | Slide 2



# Space Weather Impacts on Infrastructure



<http://swe.ssa.esa.int>



## Data archives

- SSA SWE Data Centre (Redu)
- Federated data repositories

## SSA SWE Coordination Centre

- User Helpdesk
- Space Pole, Belgium

## SWE Expert Service Centres (ESCs)

Solar  
Weather

Ionospheric  
Weather

Space  
Radiation

Geomagnetic  
Conditions

Heliospheric  
Weather

European expert groups and centres of excellence

## Sensor systems

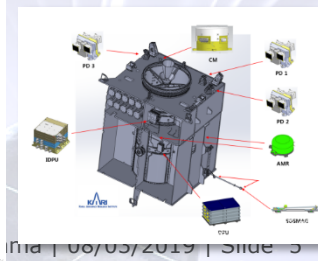
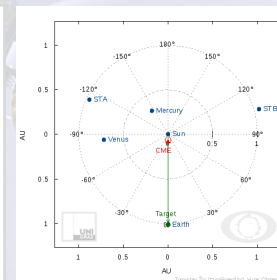
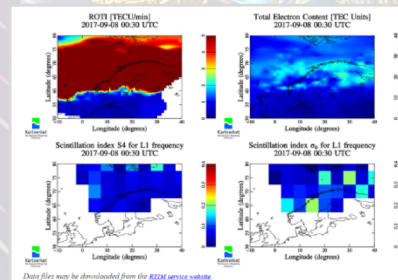
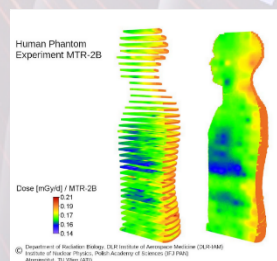
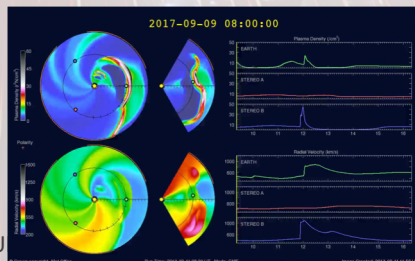
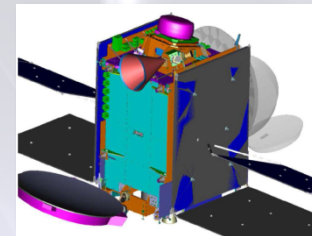
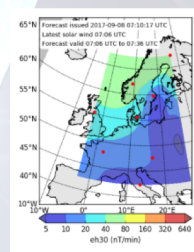
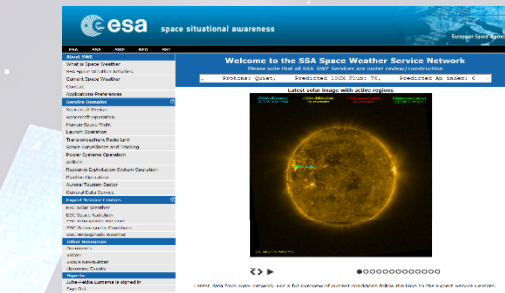
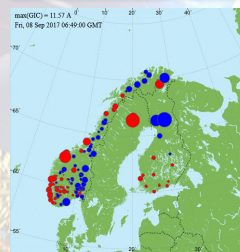




# ESA SSA Space Weather System Today



- 25 pre-operational services based on >200 products
- European Service Network of >40 Expert Groups
- > 850 registered users (November 2018)
- > 600 000 hits on service portal monthly
- Hosted payload missions
- Lagrange mission to L5
- Coordinated Communication Protocol for Europe



ESA U




European Space Agency

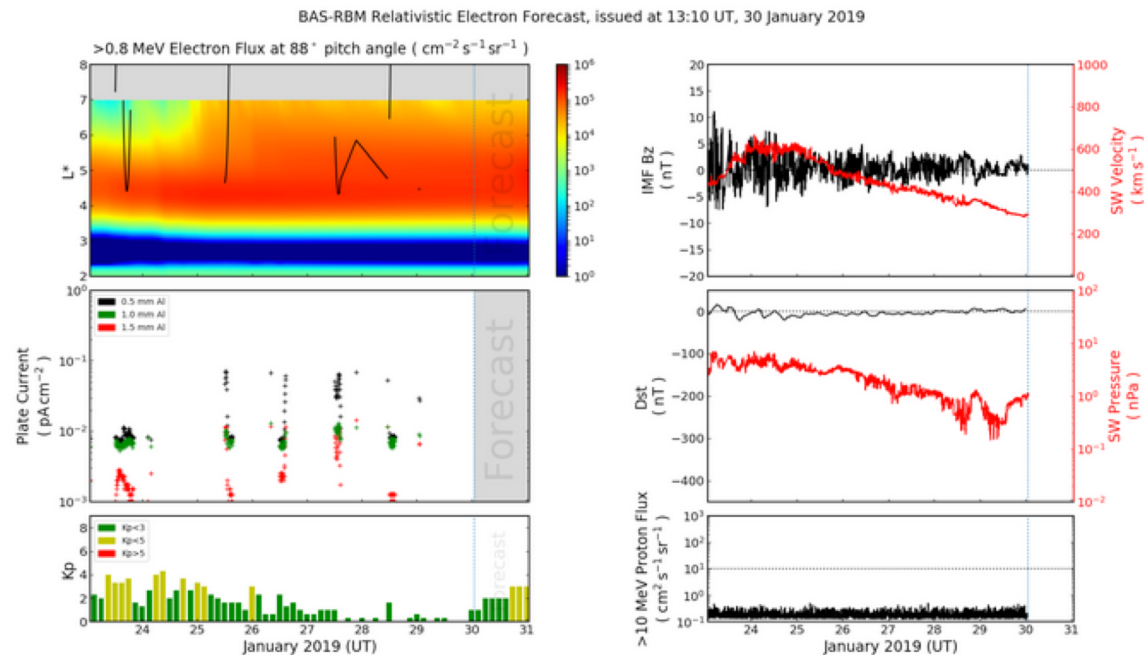
17/06/2019 | Slide 5

# Example: Satellite Risk Prediction and Radiation Forecasts

## Satellite Risk Prediction and Radiation Forecasts

	Risk Indicators		Environmental	
	Internal Charging	Total Ionising Dose	BAS - Radiation Belt Model Forecast	Model Results Expected For
GOES-15	4	1	<a href="#">view plots</a>	<a href="#">view geos</a>
GOES-14	4	1	<a href="#">view plots</a>	
GIOVE-A	4	1	<a href="#">view plots</a>	
Slot Region 8000 km	1	1	<a href="#">view plots</a>	
Acknowledgements				

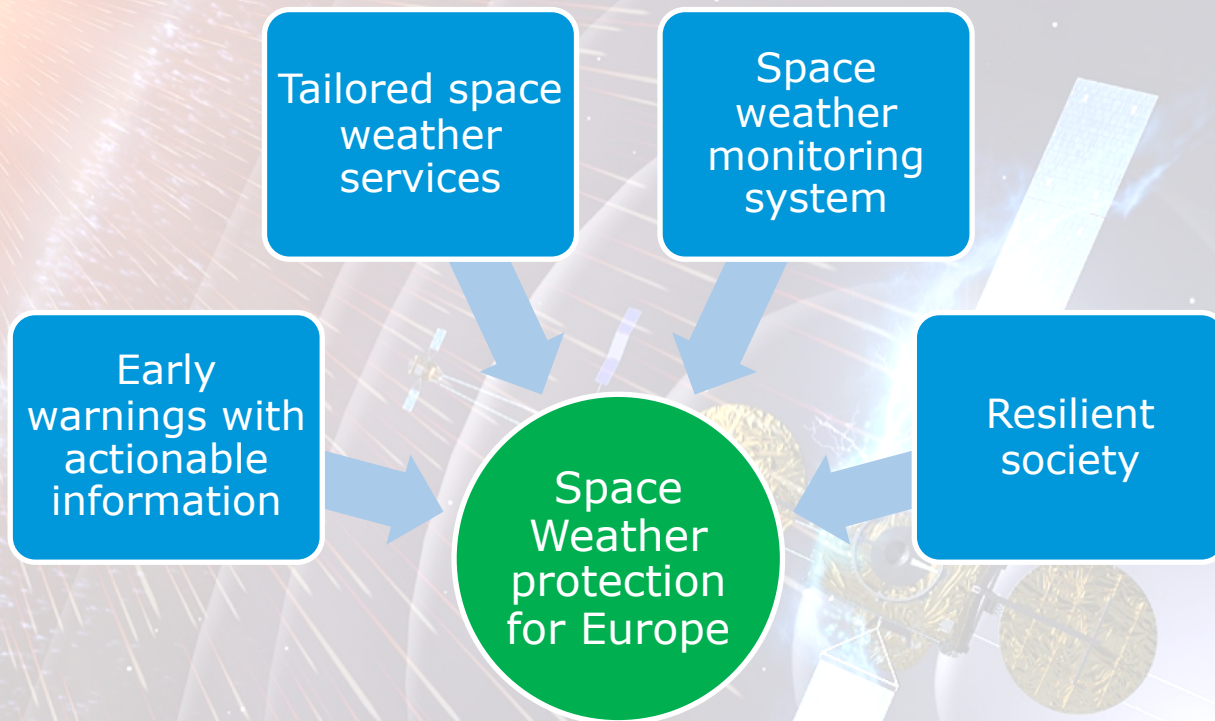
Time now : 30th January 2019 16:33 UT  
Version 0.02.001





# Space Weather and Space Safety

# Space Weather System Objectives by 2030





# Enhanced Space Weather Monitoring System

## Missions to solar wind

L5



Forecasting  
&  
Event detection

L1



## Impact & State Monitoring

Ground based measurements

+

D3S:

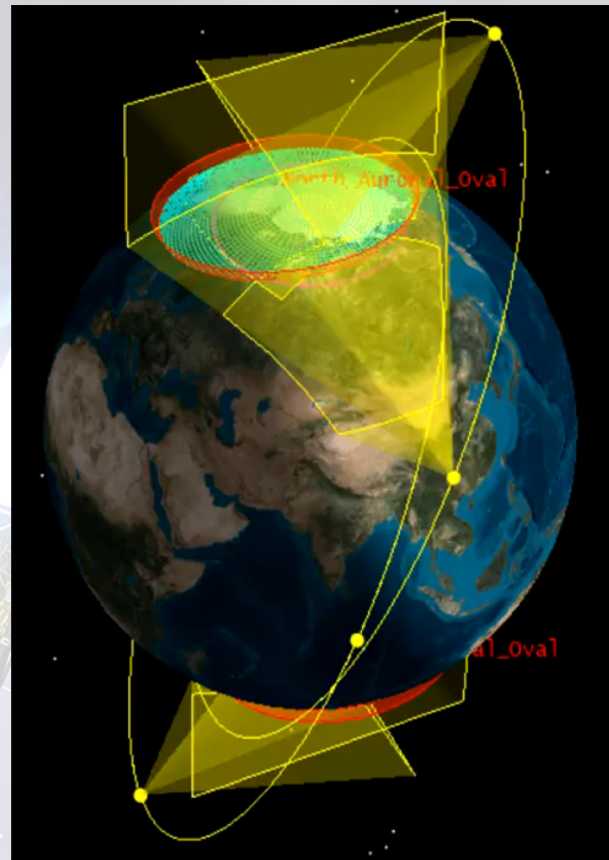


Hosted payloads  
SmallSat missions

# Dedicated SmallSat Missions

- Phase 0 study completed in November 2017
- A possible concept for SmallSat constellation
  - Auroral monitoring main objective
  - Number of other measurements
    - Low and medium energy particles
    - Plasma environment
    - Local magnetic field
    - Ionospheric electron density
    - Thermospheric neutral density
    - Microparticles
- Phase A/B studies in 2019
- Studies on using  $\mu$ sats, cubesats, ...

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# Lagrange Mission to L5

# Lagrange measurements

- Solar disk magnetic field
- EUV imaging
- Solar X-ray flux
- Solar wind characteristics
- Interplanetary magnetic field
- Solar proton, electron and ion flux

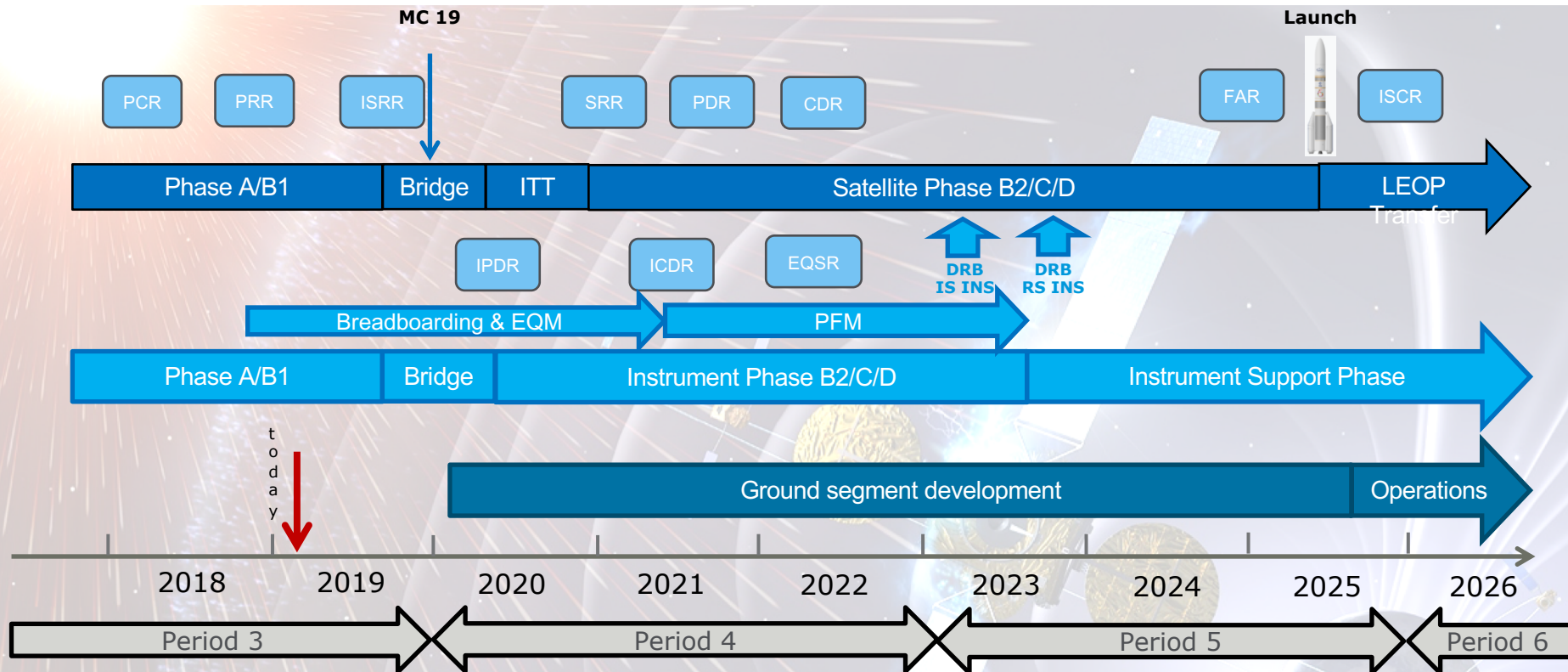
Heliospheric imaging

Wide-angle coronagraphy





# Lagrange Mission Roadmap



**THANK YOU**

**[swe.ssa.esa.int](http://swe.ssa.esa.int)**

**[www.esa.int](http://www.esa.int)**

*[@esaspaceweather](https://twitter.com/esaspaceweather)*