



PRediction Of Geospace Radiation Environment and Solar wind parameterS

Work Package 7

- Tasks
- Deliverables
- Activities

Task 7.1 Outline

The models for Dst and Kp, developed in WP 3 will be implemented at USD. Initially the models will be driven using real time solar wind data from ACE/DSCOVR. Once their operation has been verified, the data interfaces will be modified to accept input from the SWIFT MHD solar wind simulation being developed in WP 2. A similar set of steps will be carried out to the models of AE when they become available. The activities of WP 6 will result in a number of NARMAX models for GEO and for the flux of high energy electrons in the radiation belts. The forecasts of these models will be displayed on the project web site, together with facilities to download the numerical values.

Task 7.1 Activity

Models are implemented at the developer institute

- Always run latest model
- Compatibility between data sources

Plots of results presented on PROGRESS web site

Access to numerical data added (where possible)

Task 7.2 Overview

The VERB-NARMAX and VERB-IMPTAM models will be installed at USD and tested. Initially they will be driven using solar wind parameters from ACE/DSCOVR and forecasts of geomagnetic indices from the models developed in WP 3 and implemented at USD. This output of these models will provide forecasts of the particle environment throughout the radiation belt region.

Task 7.2 Activity

The VERB-NARMAX and VERB-IMPTAM models remain with the developers

- Ease of maintenance

Results in the form of plots and numerical data are downloaded from the developers web site and displayed on the PROGRESS web site

Provision of user access to numerical data is ongoing

Task 7.3 Overview

The VERB-NARMAX and VERB-IMPTAM models, provide forecasts of the flux of electrons at various energies within the inner magnetosphere. This task will use these forecasts to determine the path integrated electron fluxes in various energy ranges encountered along the orbital path of a satellite.

Task 7.3 Activity

- A tool has been created to calculate the fluxes of electrons along a user selected satellite's trajectory.
- Currently uses electron fluxes from VNC (Task 6.3)
- IMPTAM fluxes will be added soon.

Task 7.4 Overview

In order to disseminate the results of the forecasts in a timely an email circular will be generated and circulated. It is envisaged that this circular will be distributed when forecasts show evidence of potentially hazardous conditions. The exact triggering factors will be defined as a result of meetings of the stakeholder advisory board. Subscription to the email list will be performed from the project web site.

Task 7.4 Activity

- A panel containing observations and forecasts for the geomagnetic indices Kp, Dst, and AE has been added to the web site.
- The values are colour coded to allow users to see immediately if hazardous conditions are ongoing/expected.
- When potentially hazardous conditions are identified an email may be issued to members who register at the web site.



Results menu



The University of Sheffield.



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Results

PROGRESS

Current Conditions

Geomagnetic indices	[+]
Electron flux forecasts	[+]
Statistical wave models	
Orbit Tool	
Solar wind	

The smooth functioning of the European economy and the welfare of its citizens depends upon an ever-growing set of services and facilities that are reliant on space and ground based infrastructure. Examples include communications (radio, TV, mobile phones), navigation of aircraft and private transport via GPS, and service industries (e.g. banking). These services, however, can be adversely affected by the space weather hazards. The forecasting of space weather hazards, driven by the dynamical processes originating on the sun, is critical to the mitigation of their negative effects.

Dst (nT)	<input type="checkbox"/>
Latest quicklook	
Kyoto	9
Forecast Dst	
IRF-Dst-2017 (ANN)	5.7
Kp	<input type="checkbox"/>
Latest quicklook	
GFZ	0.7
Forecast Kp	

Results	
Geomagnetic indices	[-]
Lund Dst	
Lund Kp	
Lund AE	
Sheffield Kp	
Sheffield Dst	
Electron flux forecasts	[+]
Statistical wave models	
Orbit Tool	
Solar wind	



Models of Kp, Dst, and AE geomagnetic indices from IRF Lund based on neural nets

Models of Kp, and Dst geomagnetic indices from USFD based on full NARMAX

These models are the outcome of activities related to Work Package 3

Results	
Geomagnetic indices	[+]
Electron flux forecasts	[-]
NARMAX	[-]
Periods	[+]
Energies	[-]
2MeV	
800keV	
475keV	
275keV	
150keV	
75keV	
40keV	



Results from full NARMAX (USFD) models of the electron fluxes at GEO

See results by Time or Energy

These models are the outcome of activities related to Work Package 6

IMPTAM	[-]
IMPTAM real-time	[-]
IMPTAM vs Goes13 (old)	
IMPTAM vs Goes15 (new)	
Maps	[-]
Equatorial	
Radial	
Spectrograms	[-]
GOES 15	
MEO	
Van Allen Probes	
IMPTAM forecast	[+]



Options to view results of IMPTAM real time view of the inner magnetosphere at keV energies

These models are the outcome of activities related to Work Package 5

IMPTAM	[-]
IMPTAM real-time	[+]
IMPTAM forecast	[-]
Spectrograms	[-]
GOES 15	
MEO	
Van Allen Probes	



Options to view results of IMPTAM forecast
view of the inner magnetosphere at keV
energies

These models are the outcome of activities
related to Work Package 5

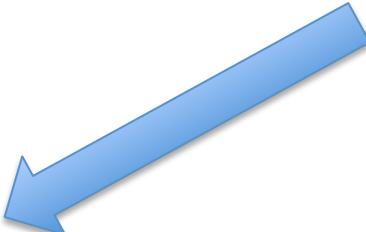
IMPTAM	[+]
VERB	[-]
VERB RB forecast	
VNC	[-]
VNC RB forecast	
Statistical wave models	



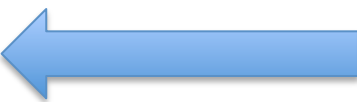
Options to view results of VERB and VNC forecast view of the inner magnetosphere at higher energies (keV-MeV)

These models are the outcome of activities related to Work Package 6

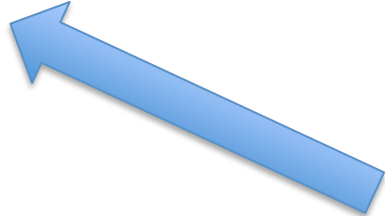
VNC	[+]
Statistical wave models	
Orbit Tool	
Solar wind	



Statistical wave models, developed within WP4 to quantify the role of plasma wave modes on the evolution of the electron distribution.



Orbit tool, developed within WP7, to investigate the fluxes of electrons around satellite orbits.



Forecast of the solar wind parameters at L1 from AWSoM/SWIFT resulting from activities in WP2.