



# Operational space weather developments in the UK

D. Jackson (1), R. B. Horne (2)

*(1) Met Office, UK*

*(2) British Antarctic Survey, UK*

The research leading to these results was partly funded by the European Union Seventh Framework Programme (FP7/2007-2013) under grant agreement No 606716 SPACESTORM

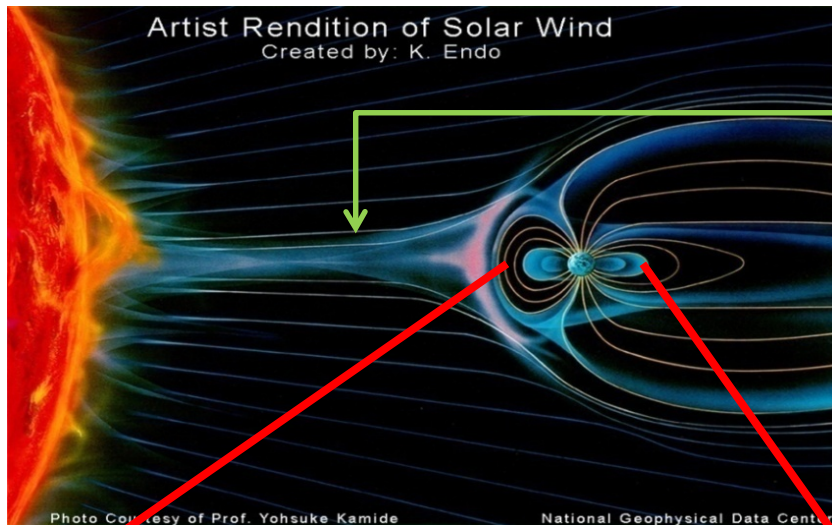
40<sup>th</sup> COSPAR Scientific Assembly, 2-10 August 2014, Moscow



ILMATIETEEN LAITOS  
METEOROLOGISKA INSTITUTET  
FINNISH METEOROLOGICAL INSTITUTE

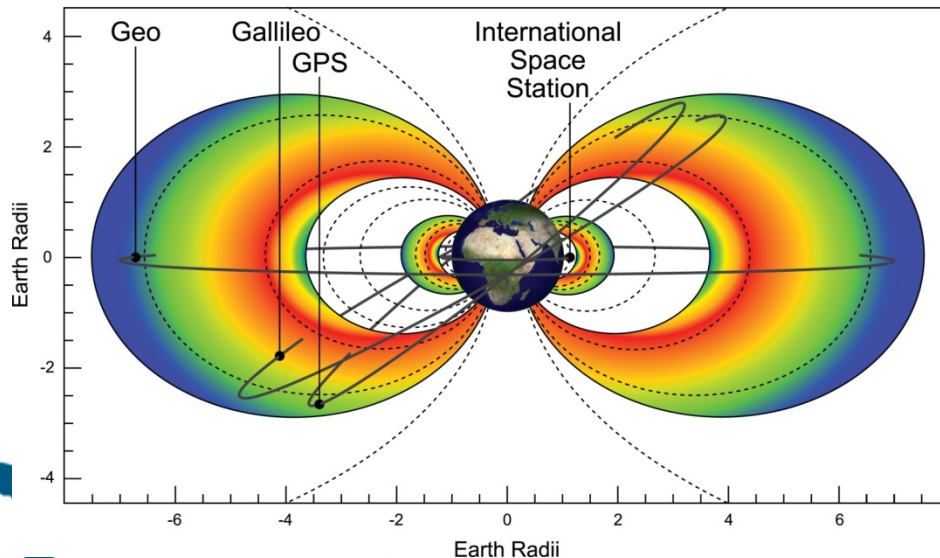


# Forecasting the Electron Radiation Belts

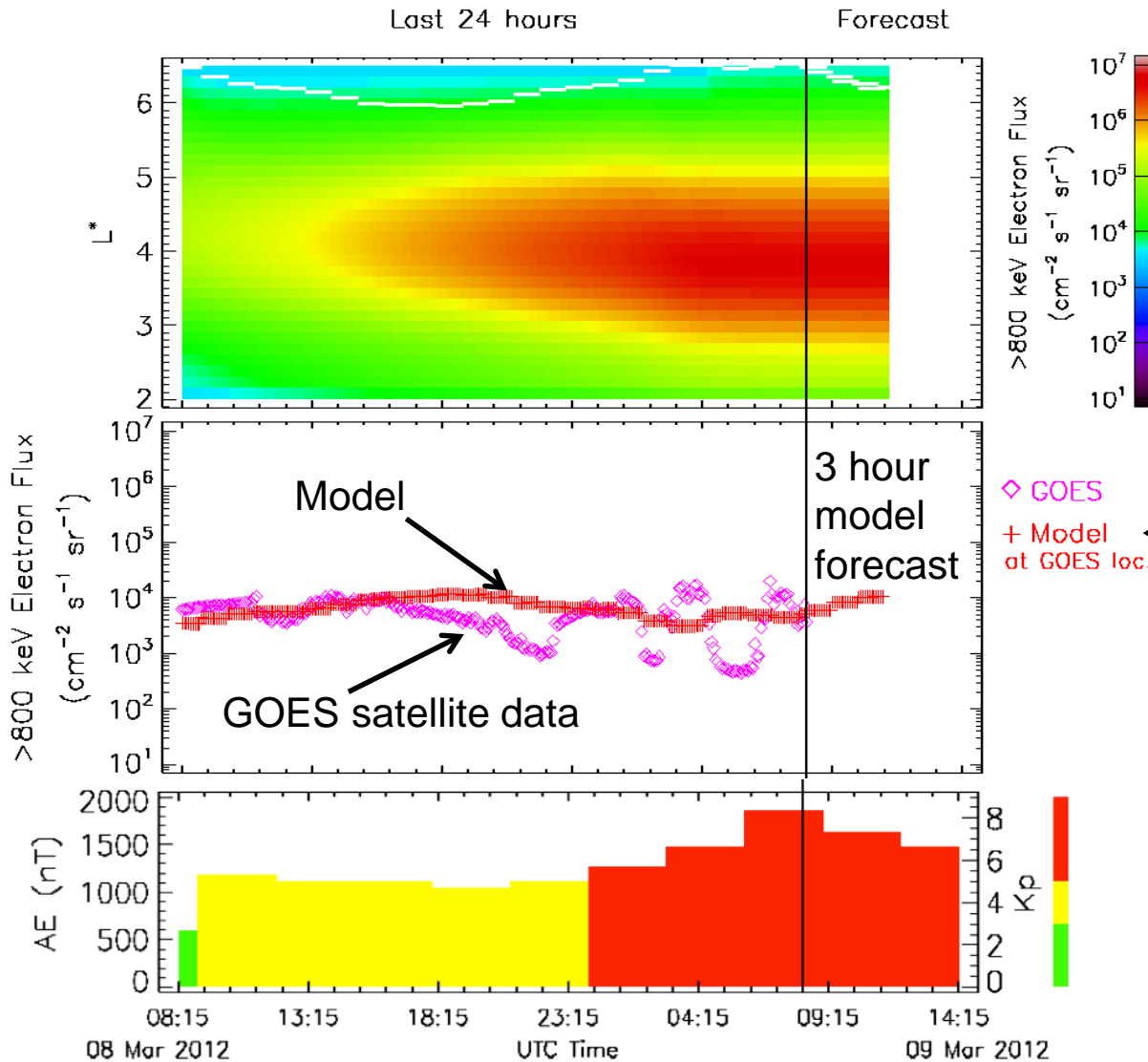


- Data from ACE is used to drive the BAS Radiation Belt Model
- Gives ~45 minutes warning
- Plus time for information to reach high energy electrons – hours to days
- Forecast MeV electron flux
- Calculate the 24hr fluence and a risk of internal satellite charging

Satellite orbits and the van Allen radiation belts



# Example – Forecast of >800 keV electrons



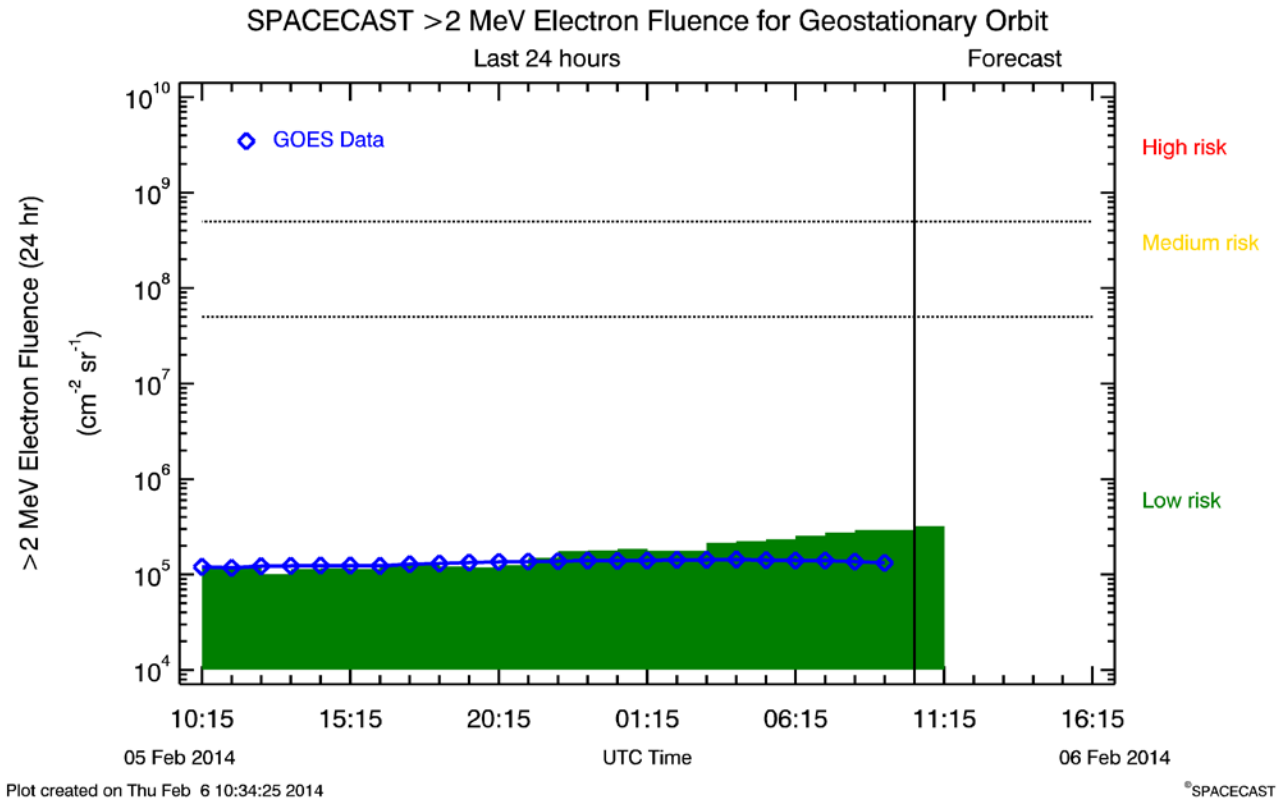
- We use the BAS Radiation Belt Model to forecast the whole outer electron radiation belt

- Results compared against GOES data at GEO

- Updated every hour
- 24/7, automatic
- Provided to the UK Met Office

# Risk of Internal Satellite Charging - ESD

- Model results are converted into a risk index
- Risk levels are based on previous satellite anomalies at geostationary orbit



# British Antarctic Survey – Space Weather

- Forecasting – risk for satellites
  - Magnetic local time effects
  - Coupling to the solar wind
  - Coupling to the atmosphere
  - Better models for electron source, transport, acceleration and loss
  - Coupling to the plasmopause
- Severe Space Weather
  - Determining the radiation environment for satellites
  - Modelling different scenarios
  - Atmospheric heating – Joule heating, winds, waves using magnetometers and polar radars
- Solar variability effects
  - Precipitation, chemistry, winds waves



**British  
Antarctic Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

