



EnKF-Salammô data assimilation tool: Progress in the framework of the MAARBLE EU-project

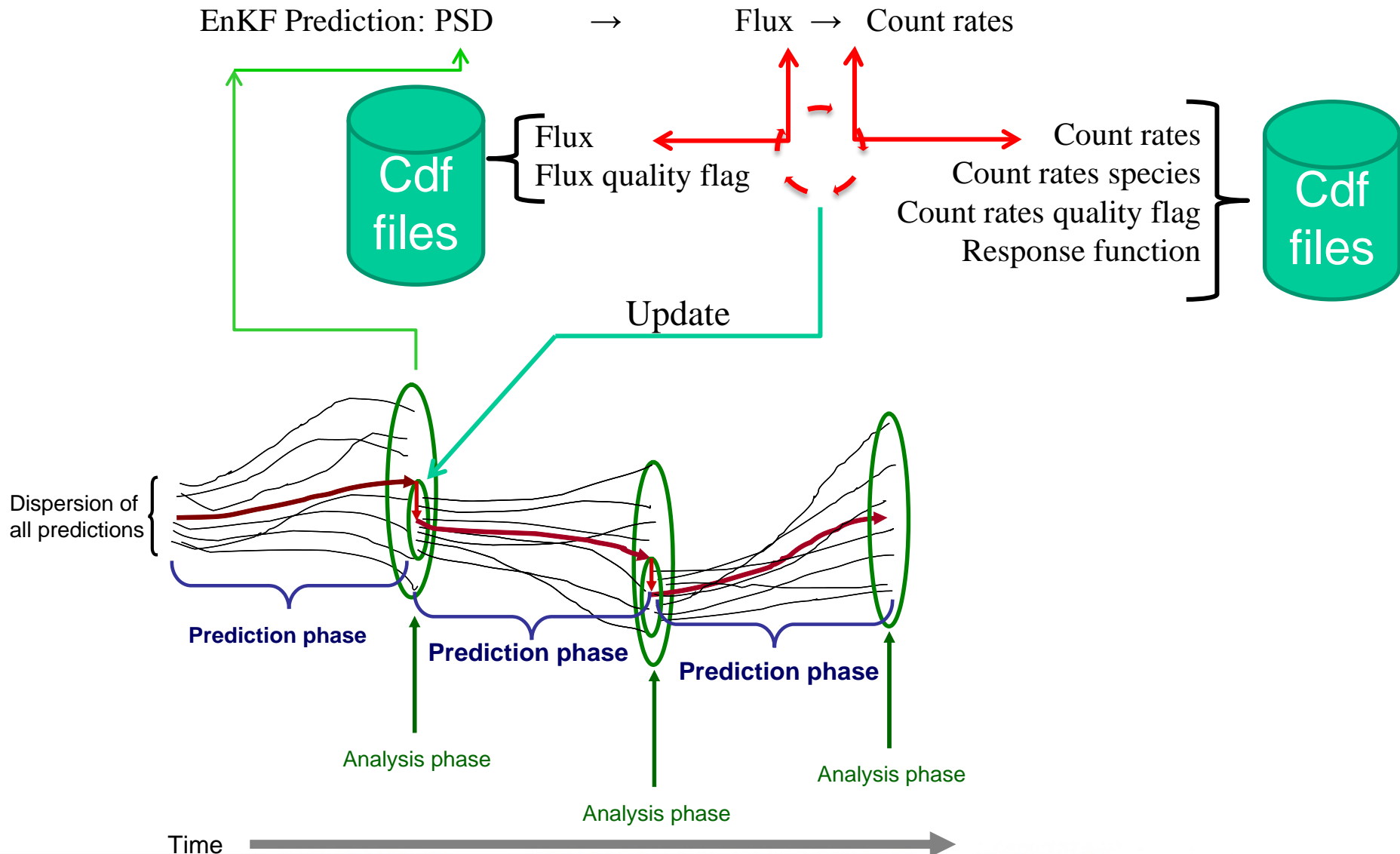
S. Bourdarie, V. Maget, D. Lazaro, I. Sandberg, D. Turner



Outline

- Introduction
- Uncertainties in physical processes
- Validation against test data set
- Conclusions

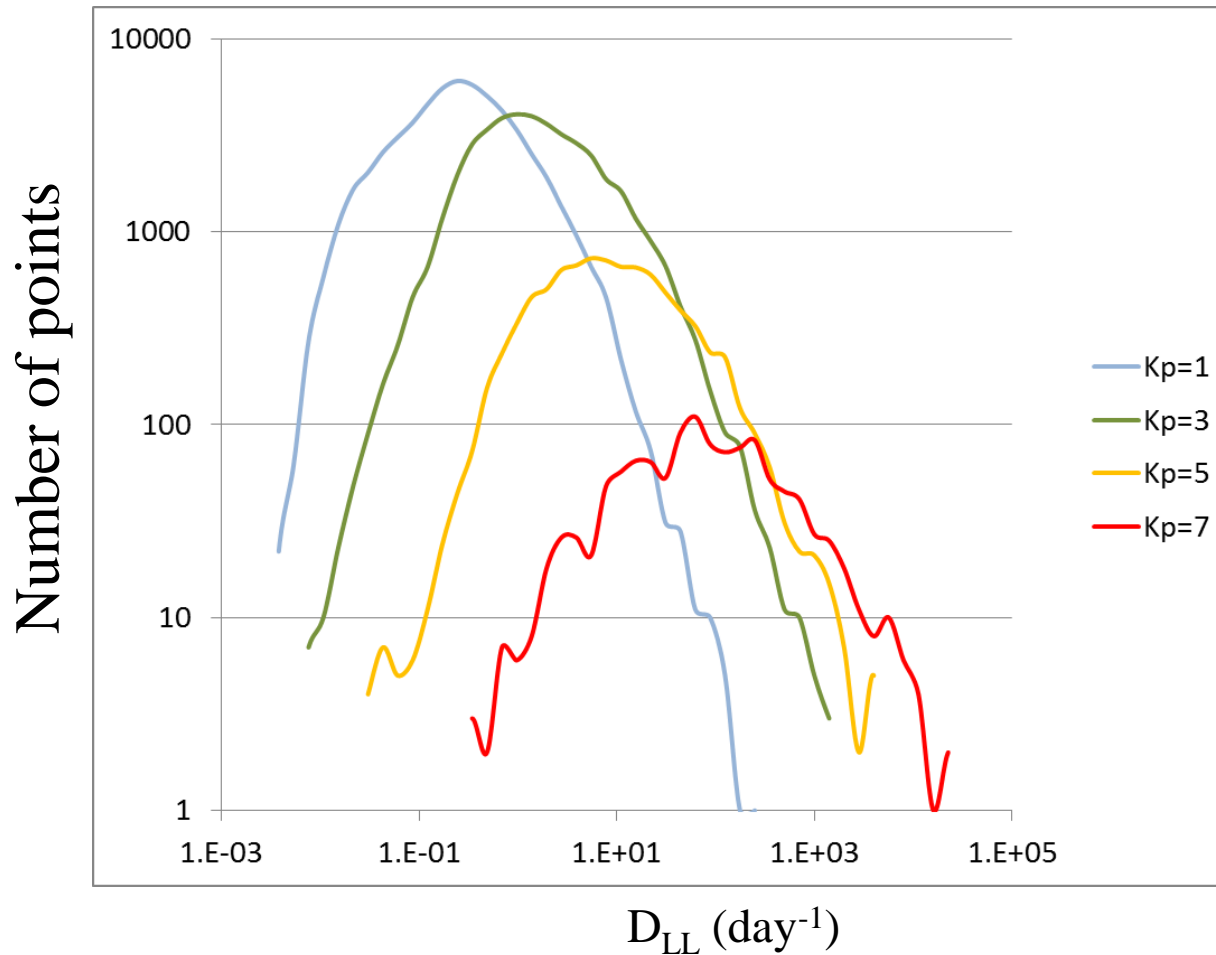
Data assimilation concept



Uncertainties in physical processes

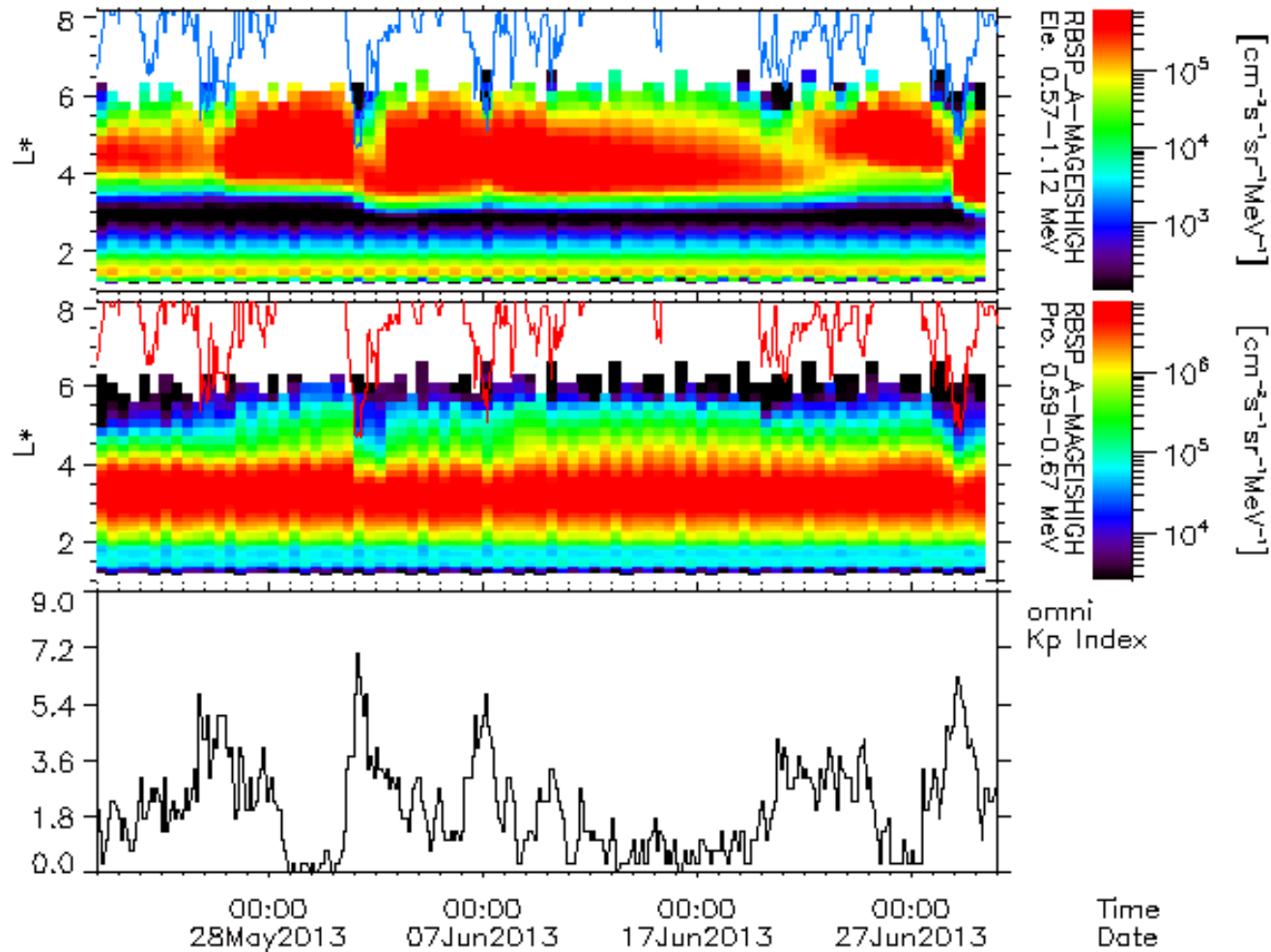
Radial diffusion

Radial diffusion distributions @ GEO



Uncertainties in physical processes

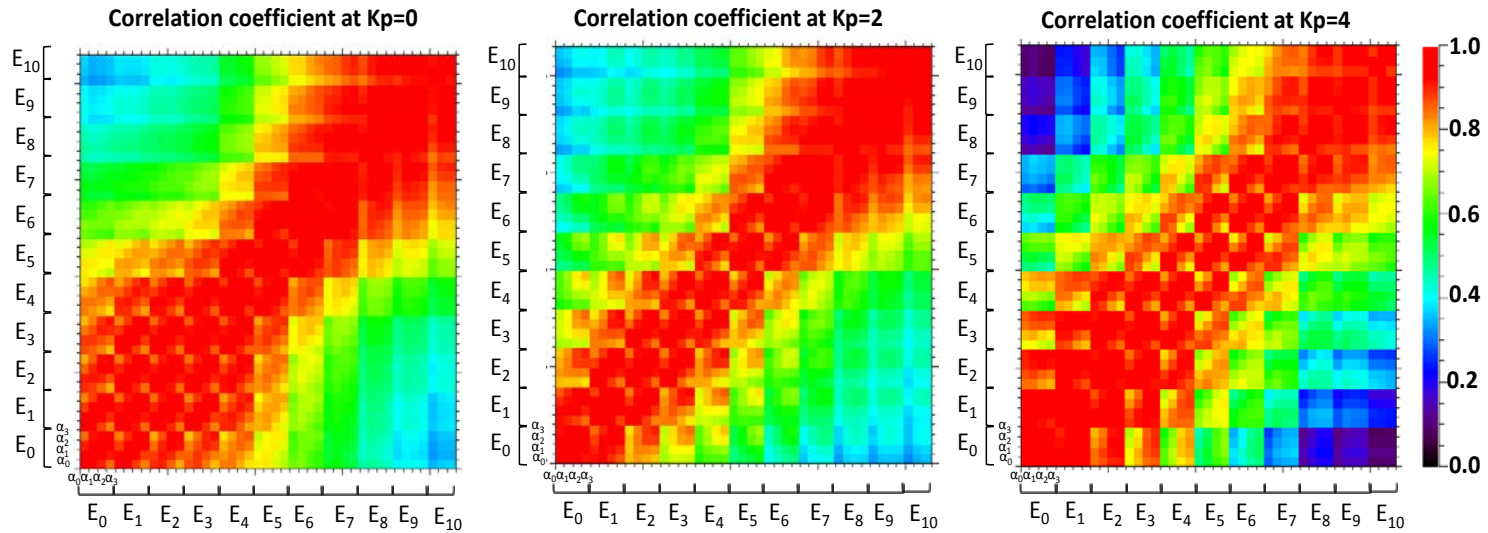
Drop outs (magnetopause shadowing)



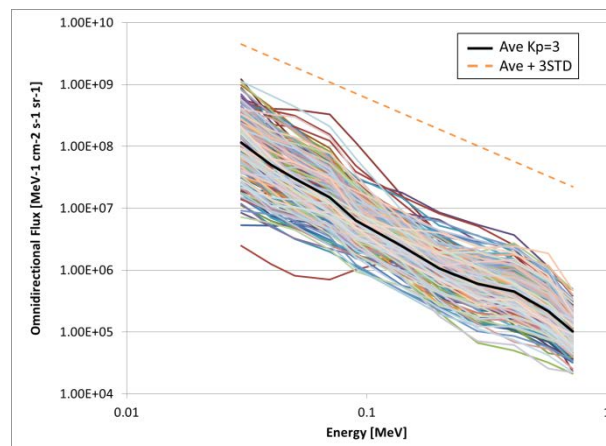
Uncertainties in physical processes

Boundary condition @ $L^*=8$ (poster from Maget et al.)

Correlation matrix



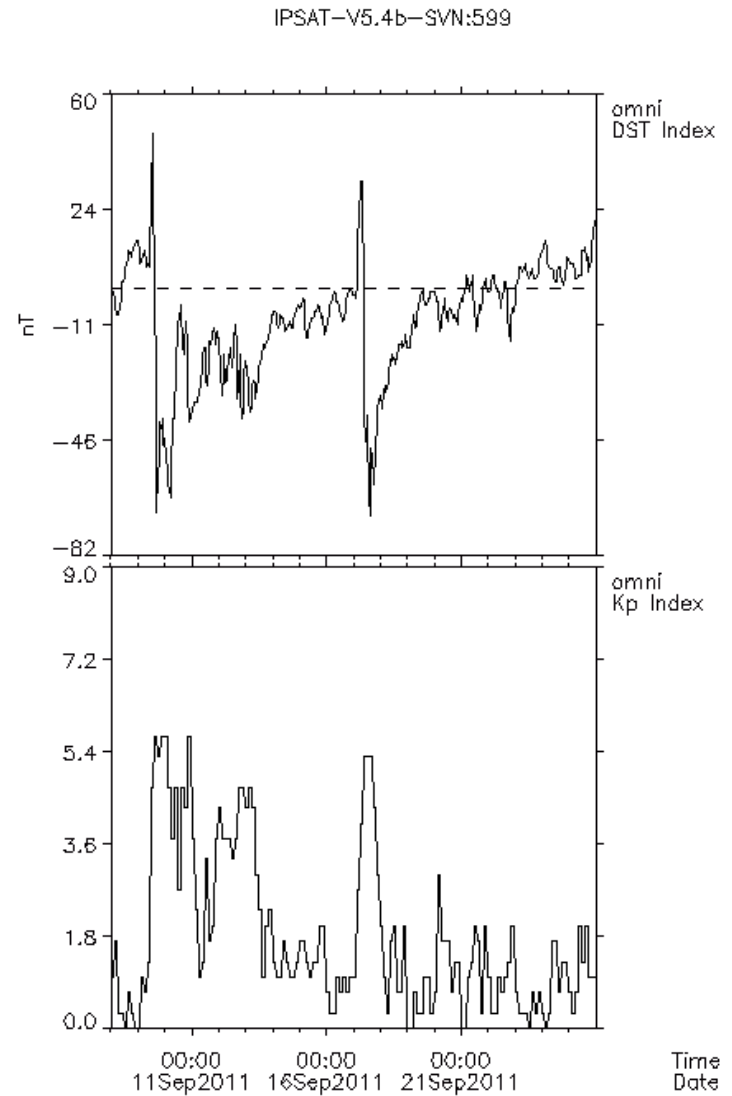
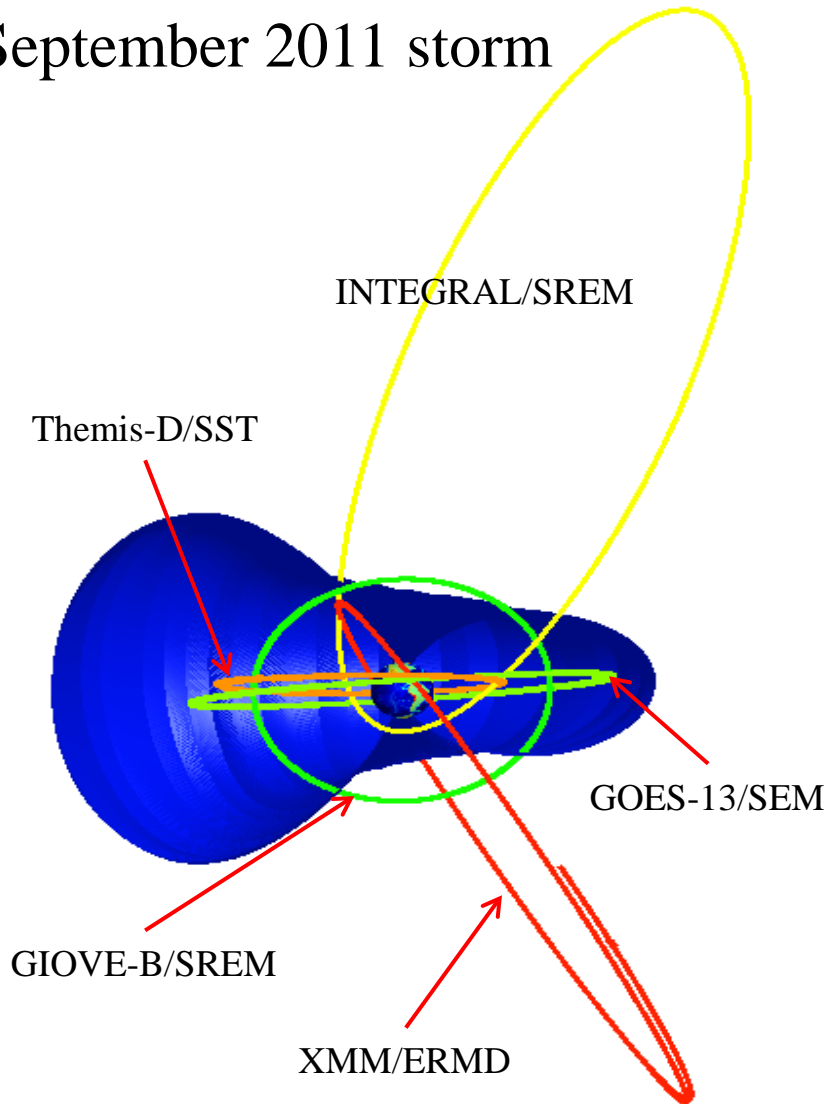
THEMIS/SST: 31 keV, 41 keV, 52 keV, 65.5 keV, 92 keV, 139 keV, 203.5 keV, 293 keV, 408 keV, 565.5 keV and 719.5 keV



200 spectra drawn using the multi-variate Monte Carlo sampling

Validation against test data set

September 2011 storm



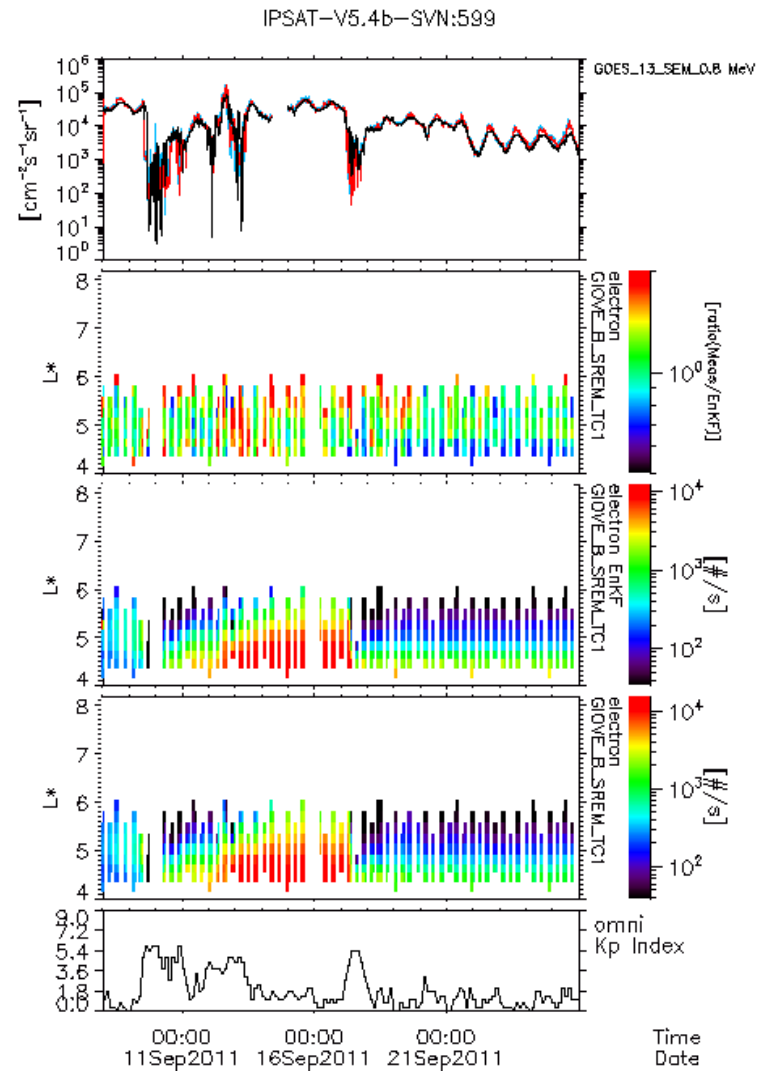
Validation against test data set

Scenario 1:

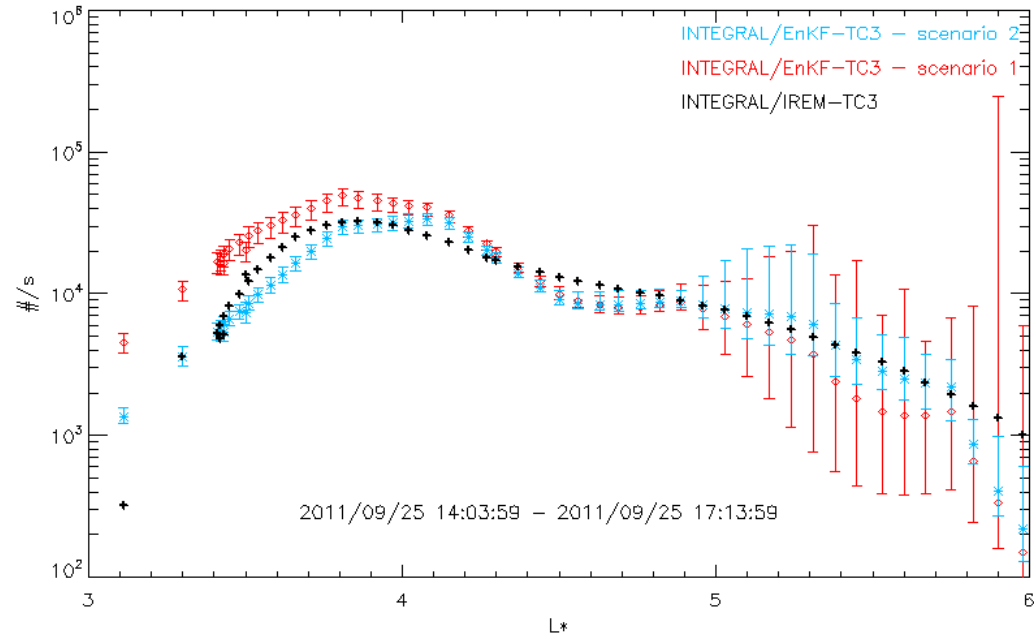
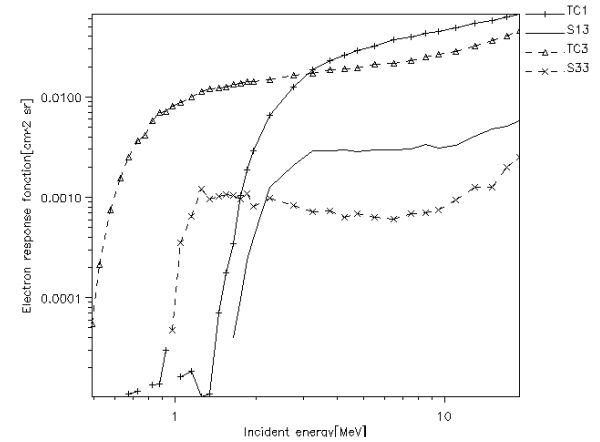
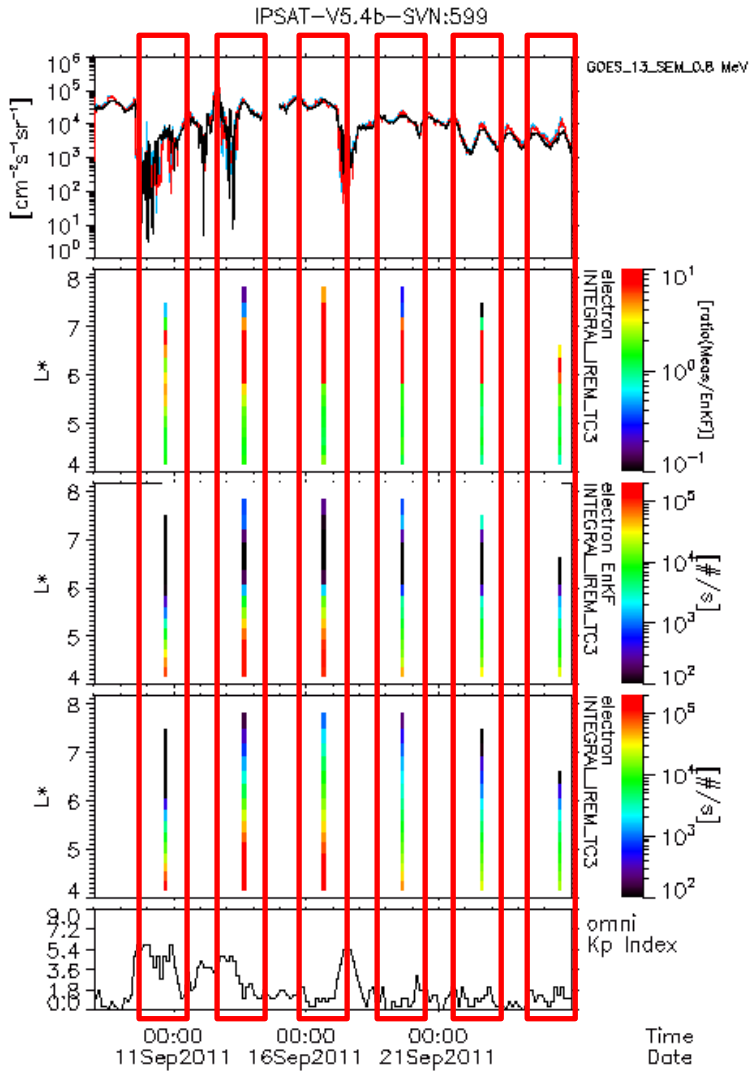
- Data ingested: GIOVE-B/SREM and GOES13
- Test data set = INTEGRAL/IREM
THEMIS-D/SST
XMM/ERMD

Scenario 2:

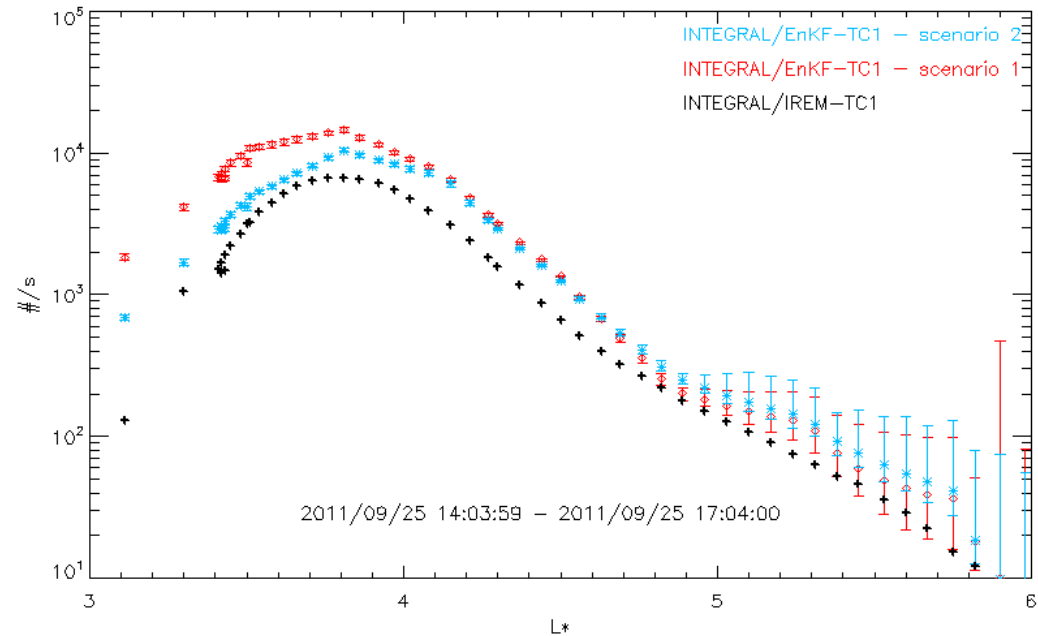
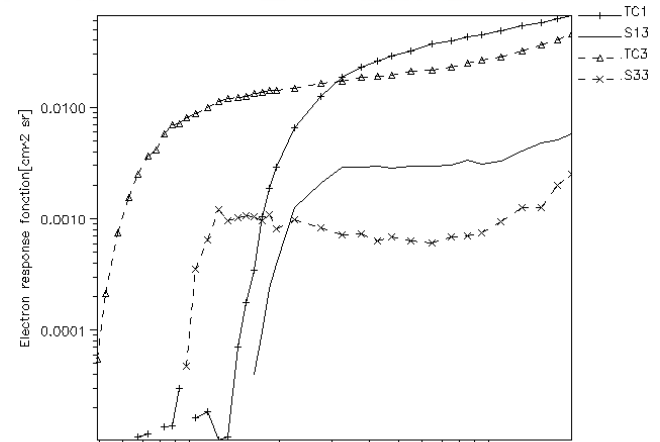
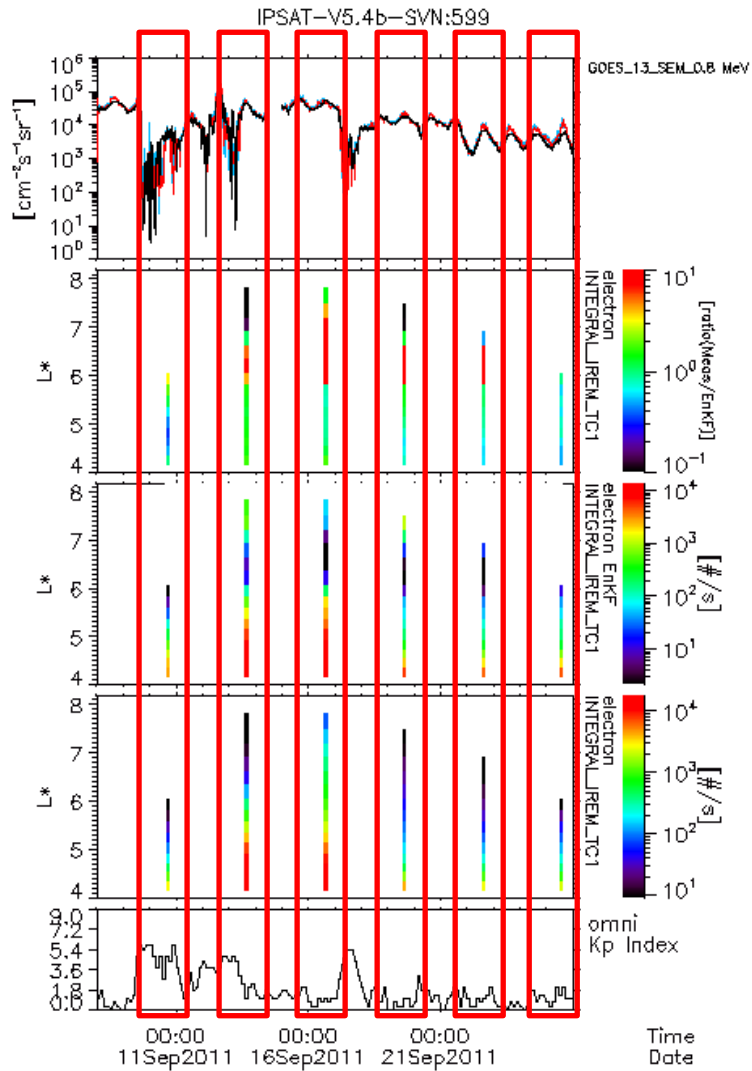
- Data ingested: GIOVE-B/SREM
GOES13
INTEGRAL/IREM
- Test data set = THEMIS-D/SST
XMM/ERMD



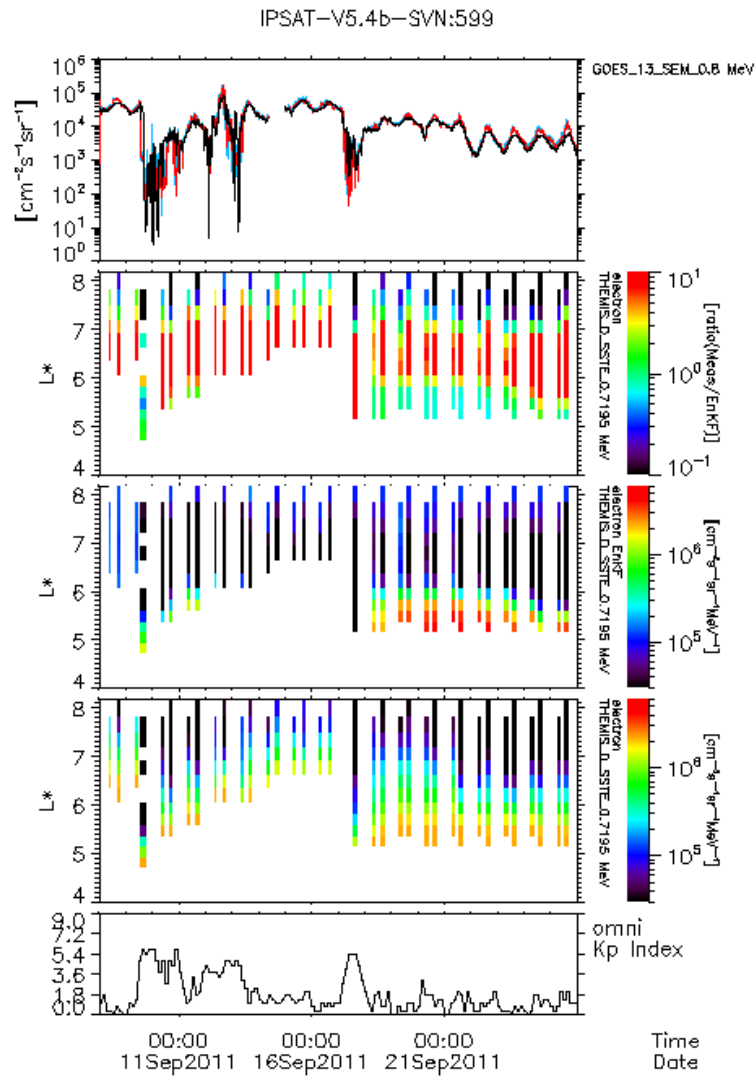
Validation against test data set



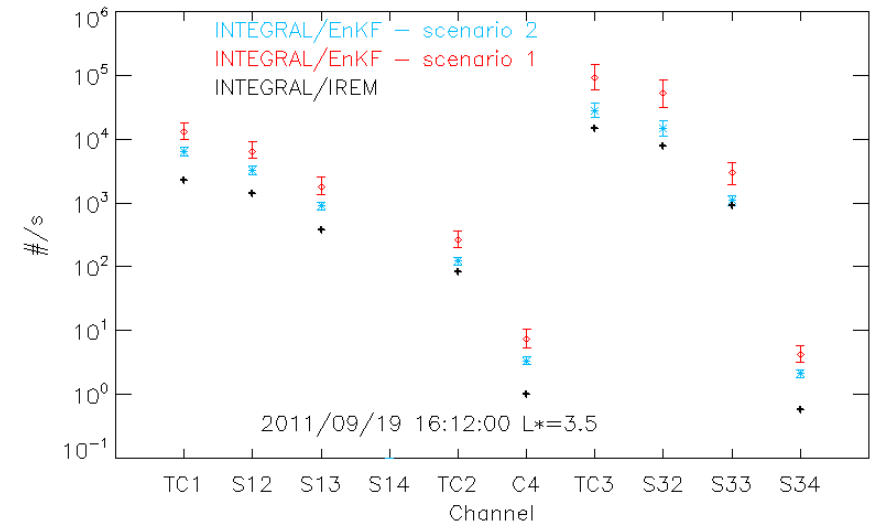
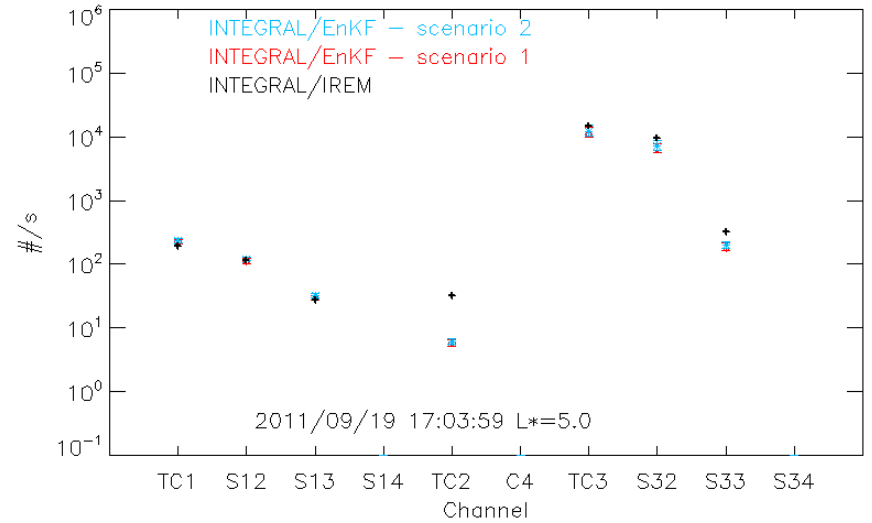
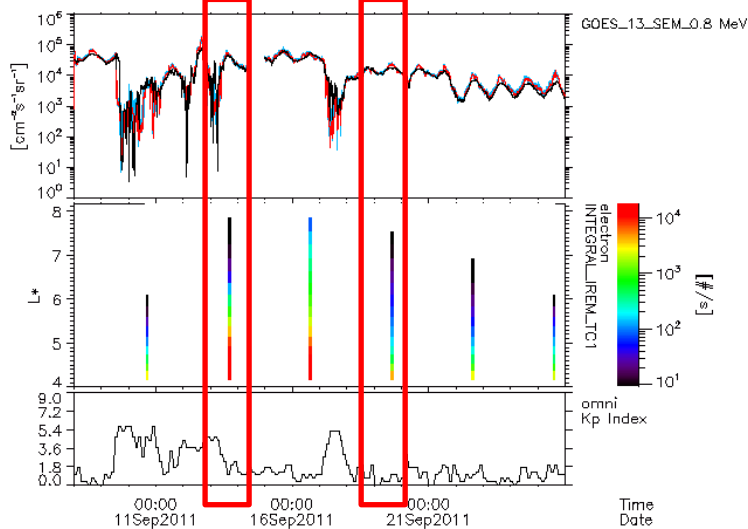
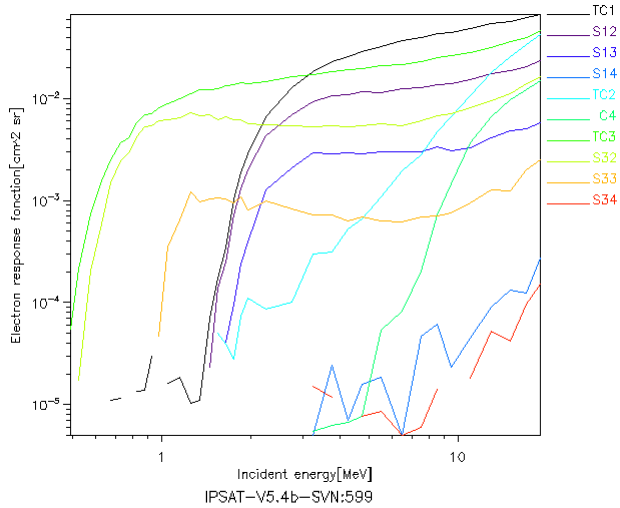
Validation against test data set



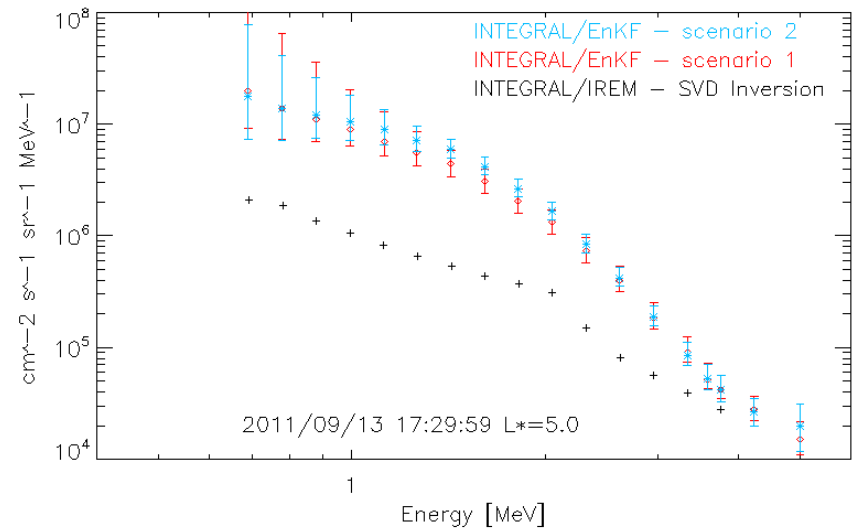
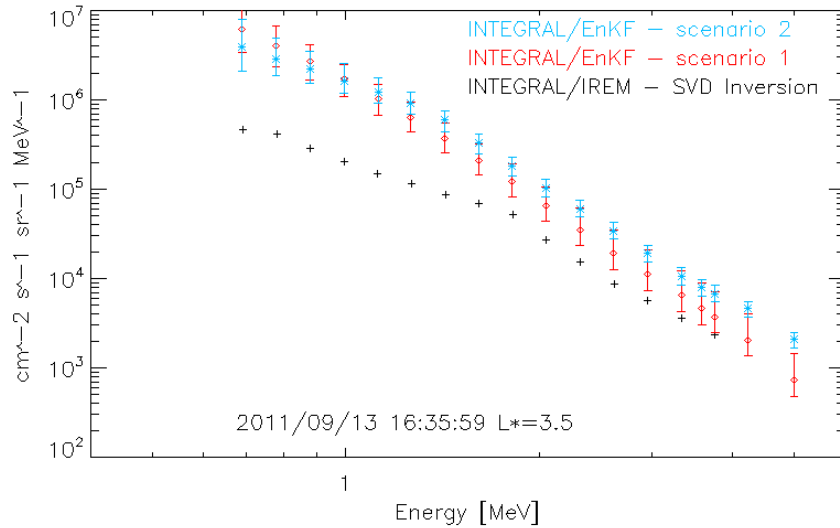
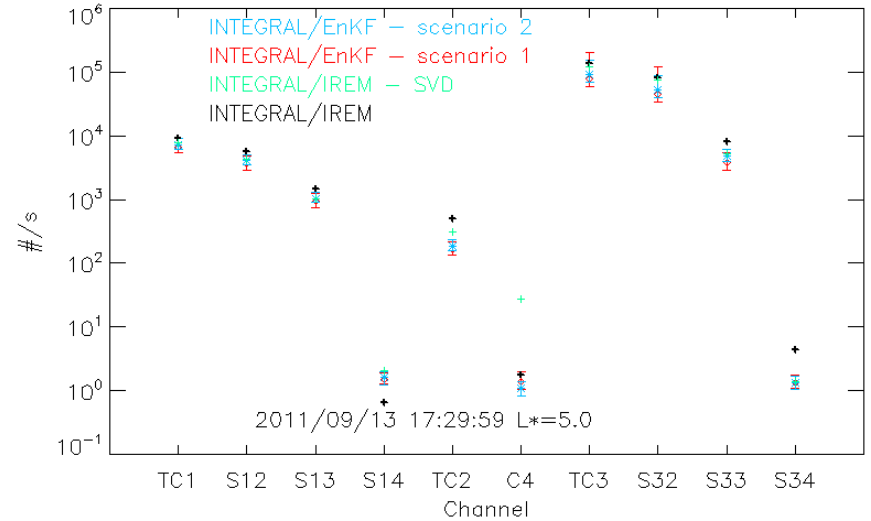
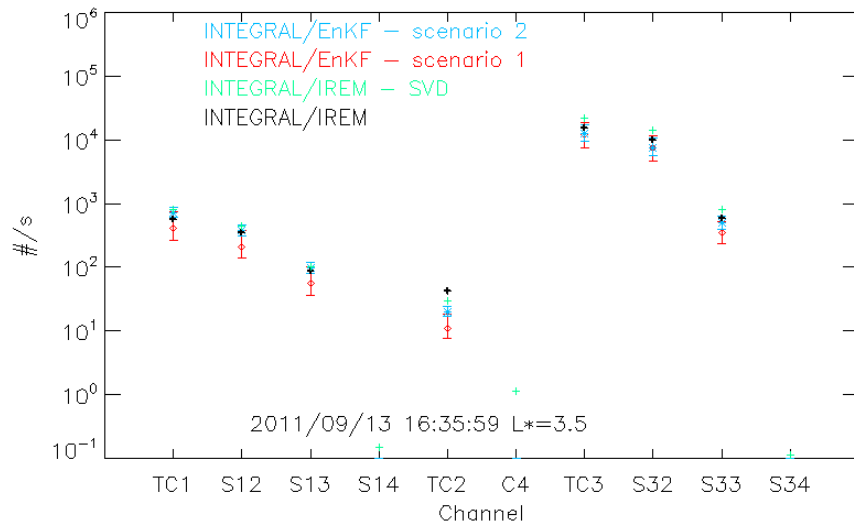
Validation against test data set



Validation against test data set



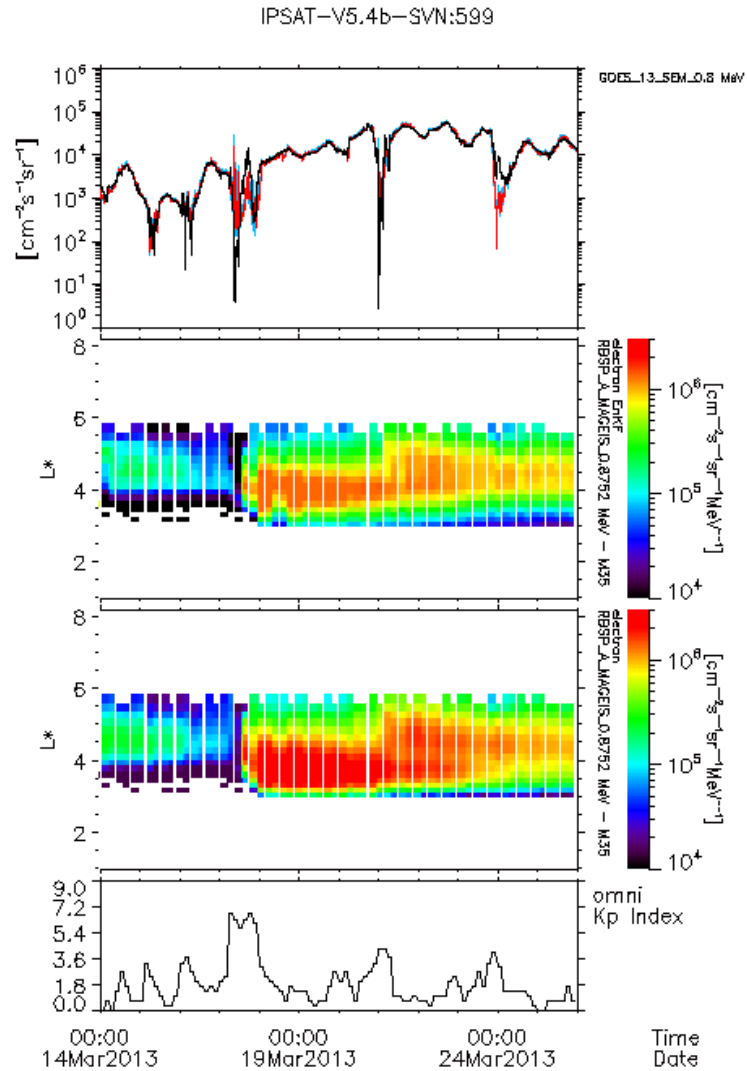
Validation against test data set



Validation against test data set

Scenario 1:

- Data ingested: RBSP_A/MAGEIS
GOES13



Conclusions

- MAARBLE has allowed to improve the data assimilation tool
 - Assimilation of count rates
 - Uncertainties on radial diffusion coefficients
 - Uncertainties on drop out due to magnetopause shadowing
 - Uncertainties on boundary condition (Themis-SST)
- Validation has been performed during the September, 2011 storm
 - INTEGRAL/IREM count rates could be retrieved
 - The Kalman filter provides uncertainties on results
 - The challenging region of the slot where there are steep gradients is well defined by the data assimilation tool.