



# Monitoring Van Allen Radiation Belts using EU Galileo satellites: Observations and Data Products of energetic particle fluxes

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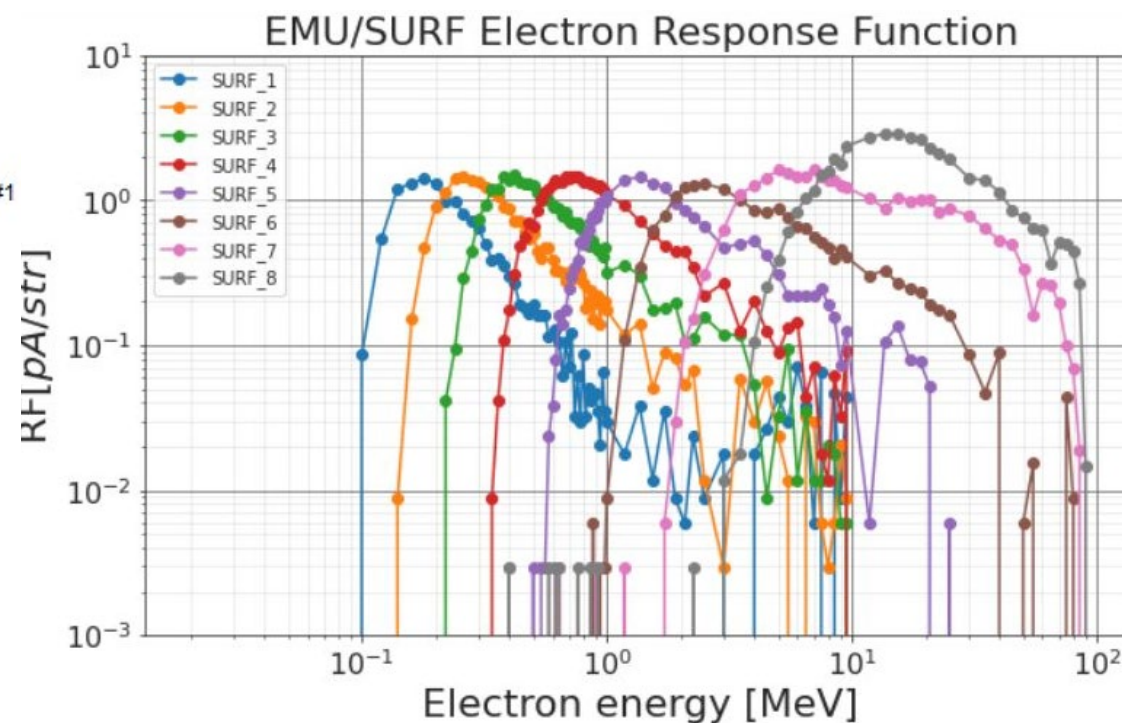
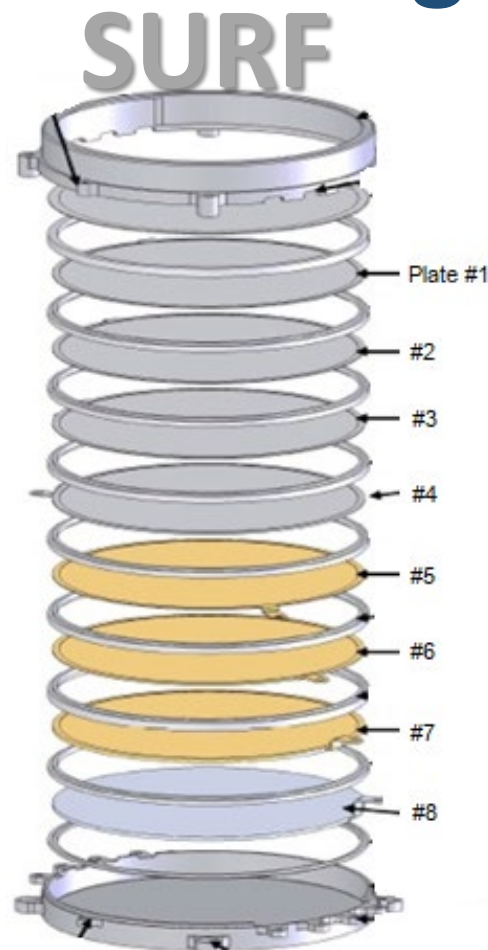
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Cross Calibration of EMU Dataset, ESA Contract 4000135823/21/NL/GLC/mkn  
SSA P3-SWE-X Space Environment Nowcast & Forecast Dev ESA Contract "4000131381/20/D/CT





# EMU/SURF charge collecting plates



## Environmental Monitoring Unit

- SURF charge collecting plates
- Proton Telescopes (8)
- Heavy Ion Telescope
- RADFETS (4)
- Designed for use in the Galileo orbit
- Built by RUAG, Switzerland
- SURF design based on the heritage of CREDO and Merlin - QinetiQ UK.

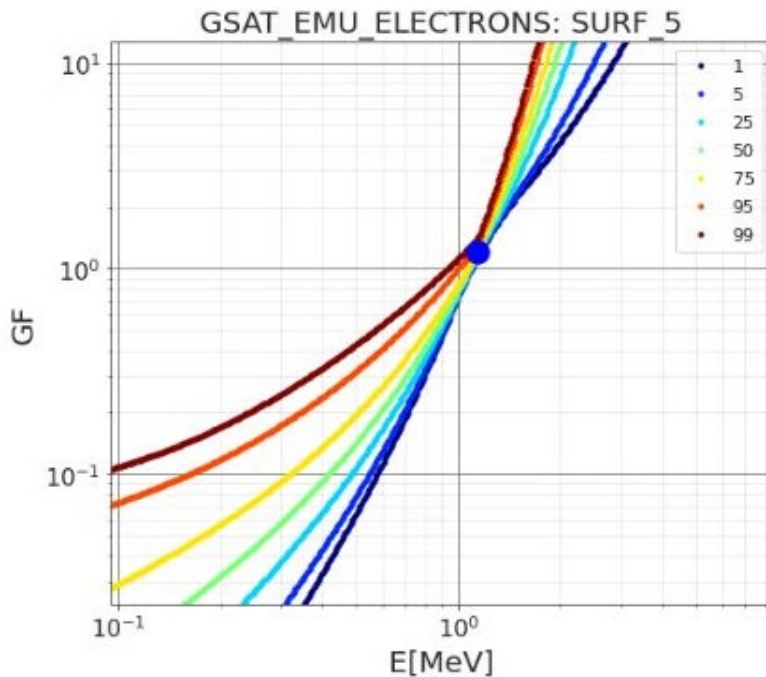
## GSATs/EMUs:

- GSAT207
  - 17/11/2016
- GSAT215
  - 12/12/2017



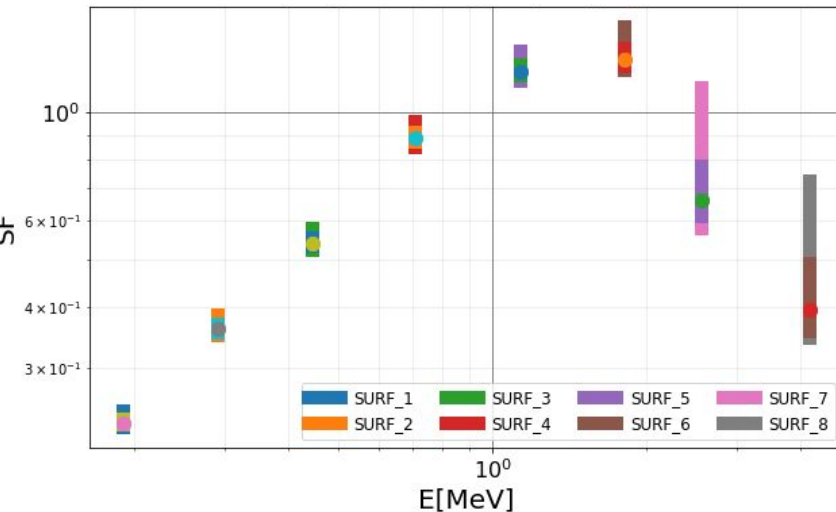
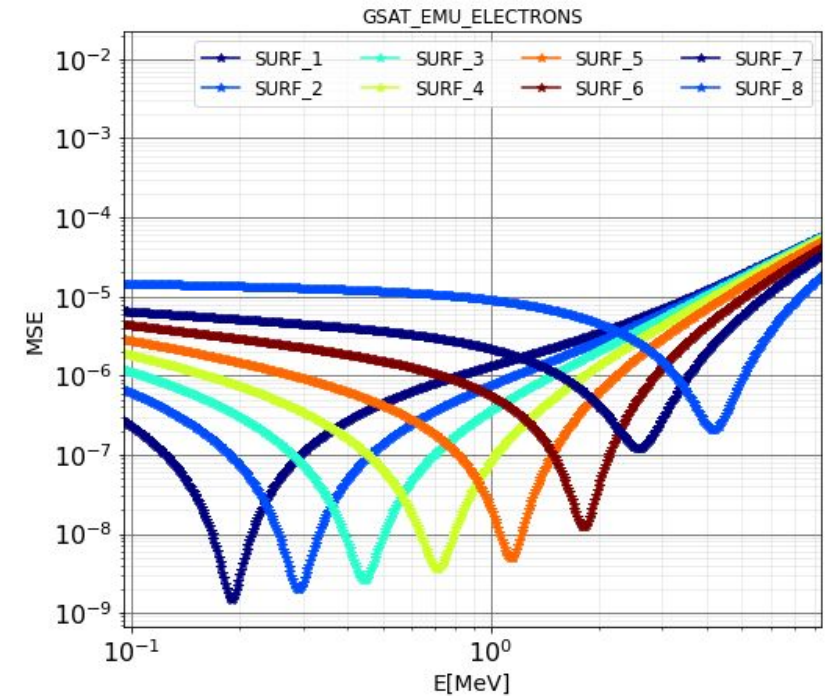
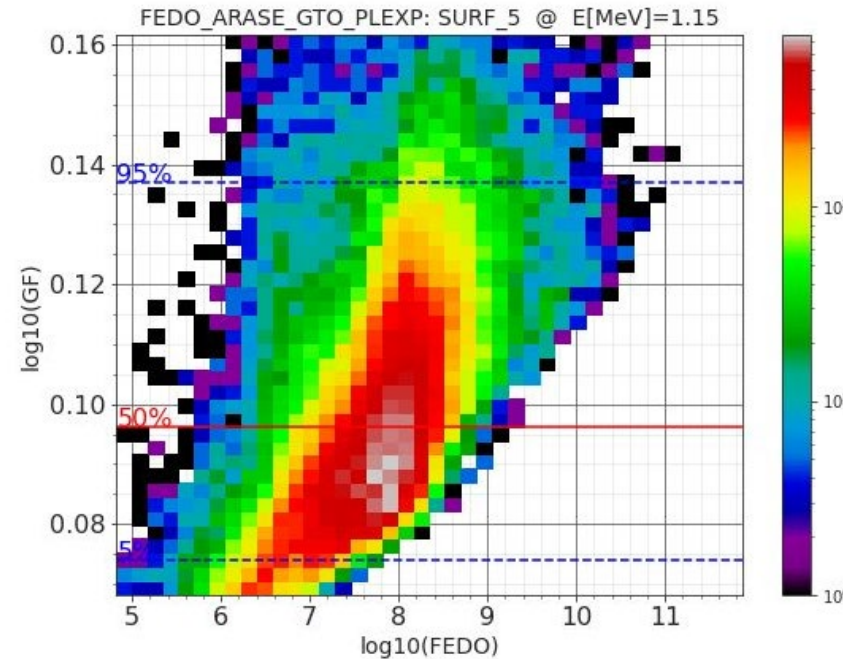
# Data Driven Bow-Tie Analysis

- Historical Arase measurements\*
- Fitted with exponential cutoff power law spectrum



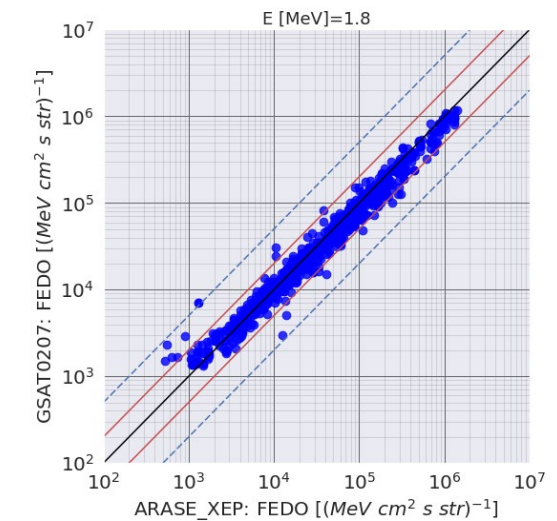
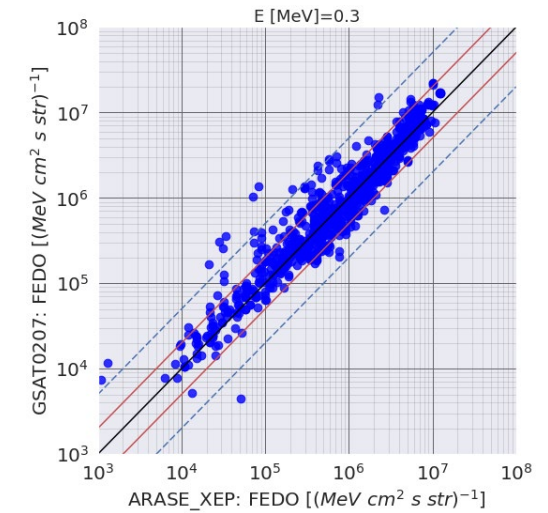
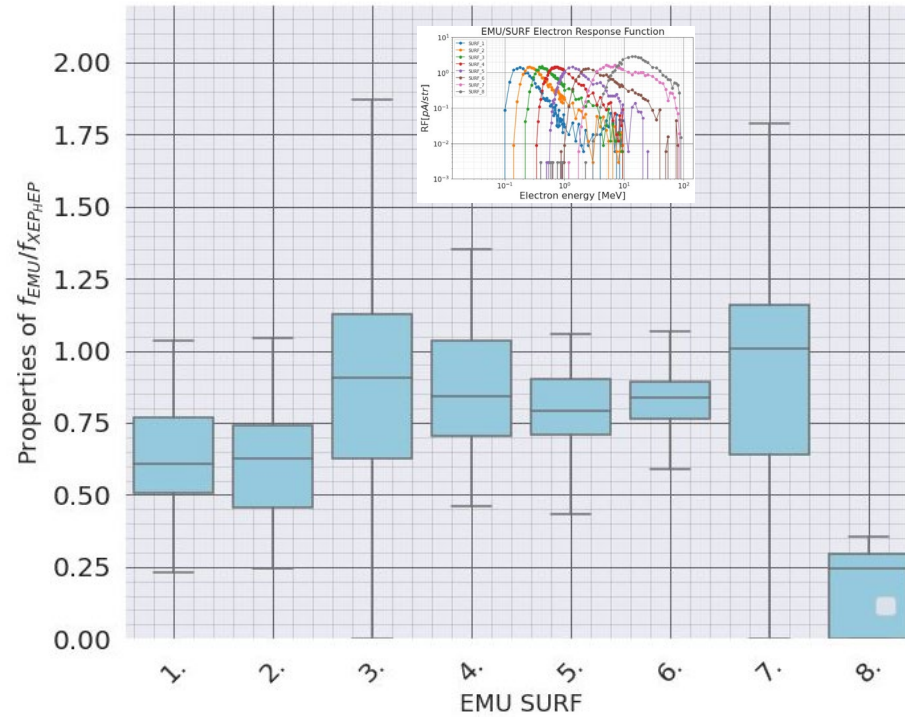
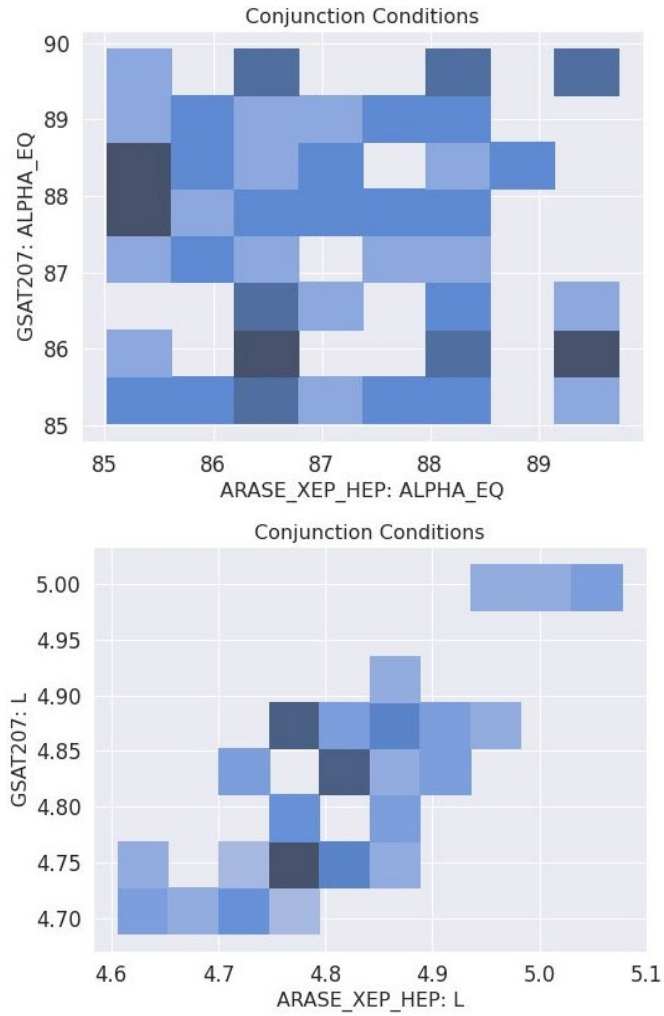
\* Thanks to Prof. Y. Miyoshi and to Arase [ERG] XEP and HEP teams

$$GF(E_i, t) = \frac{\int_0^{\infty} RF(E) f(E) dE}{f(E)}$$



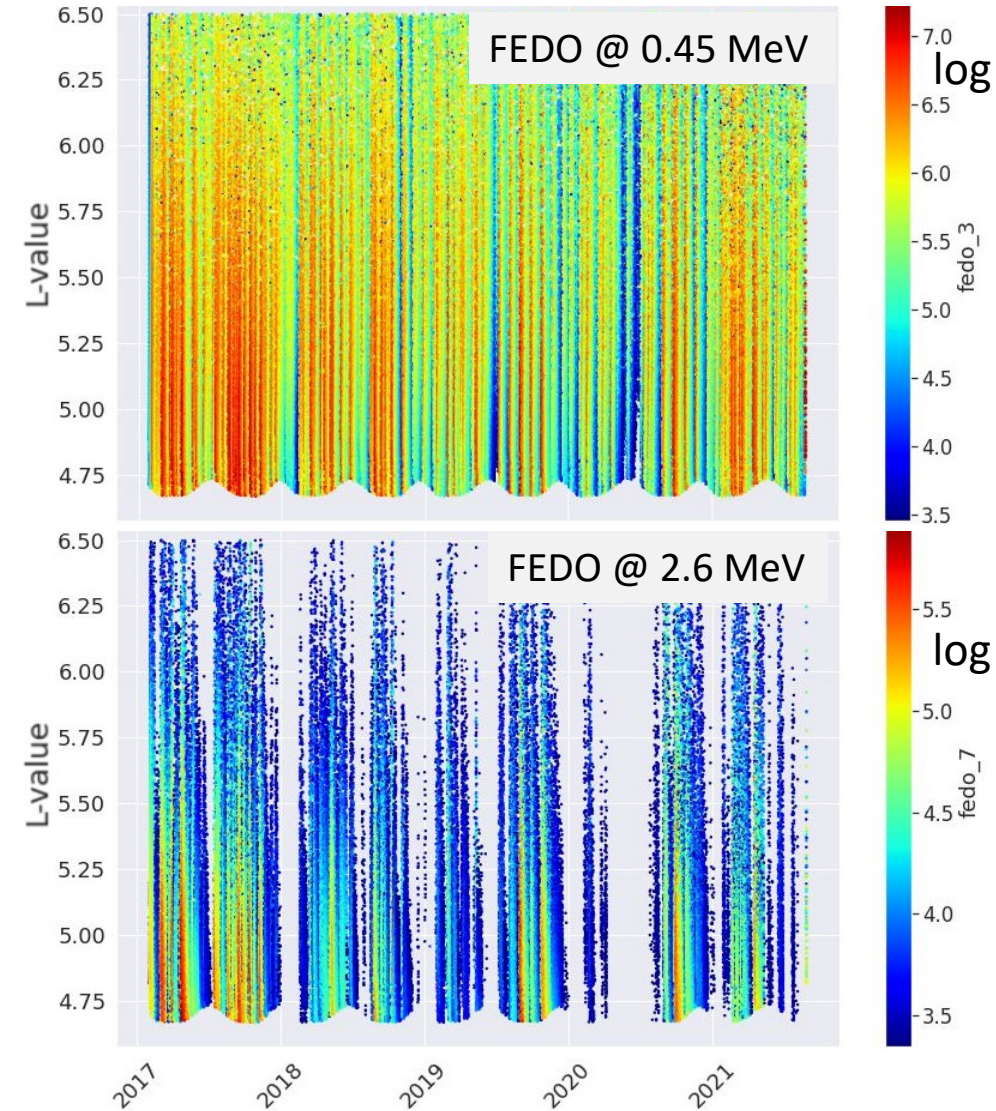
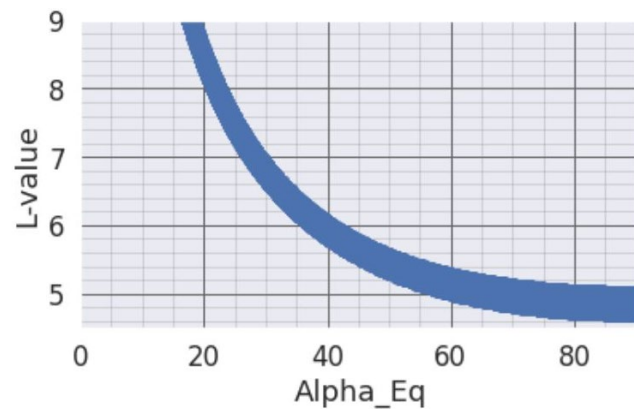
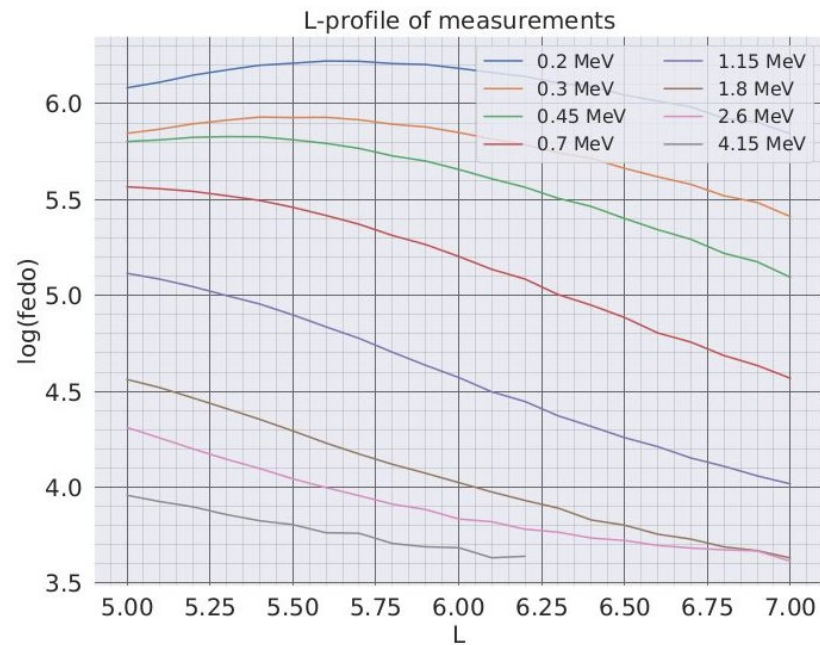
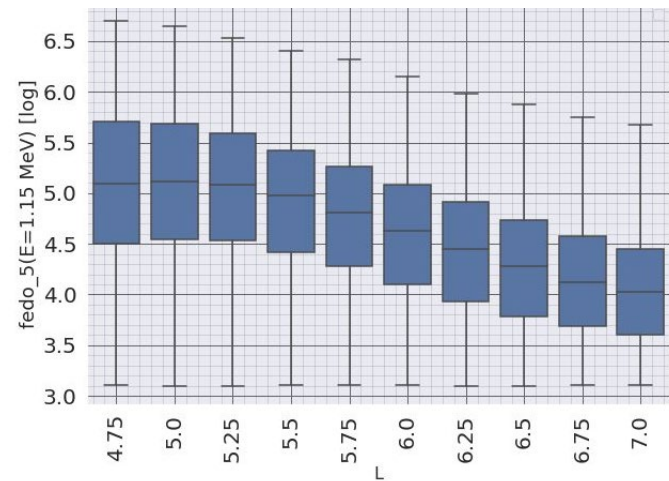
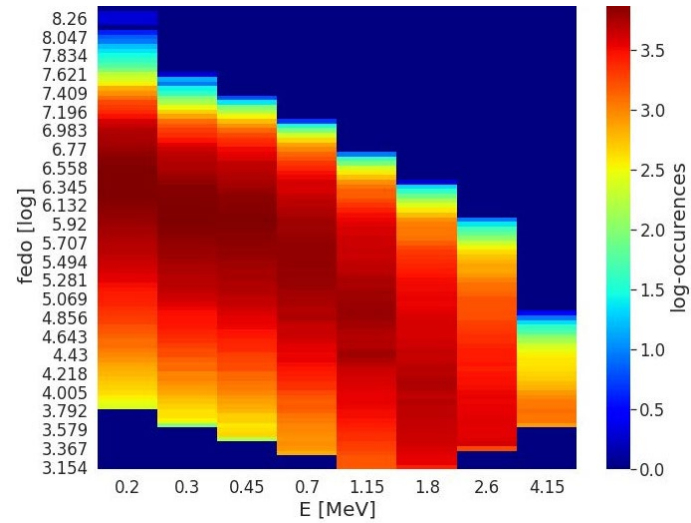


# Validation with Arase flux measurements



Solar Proton Contamination: NEGLIGIBLE!

# Summary plots



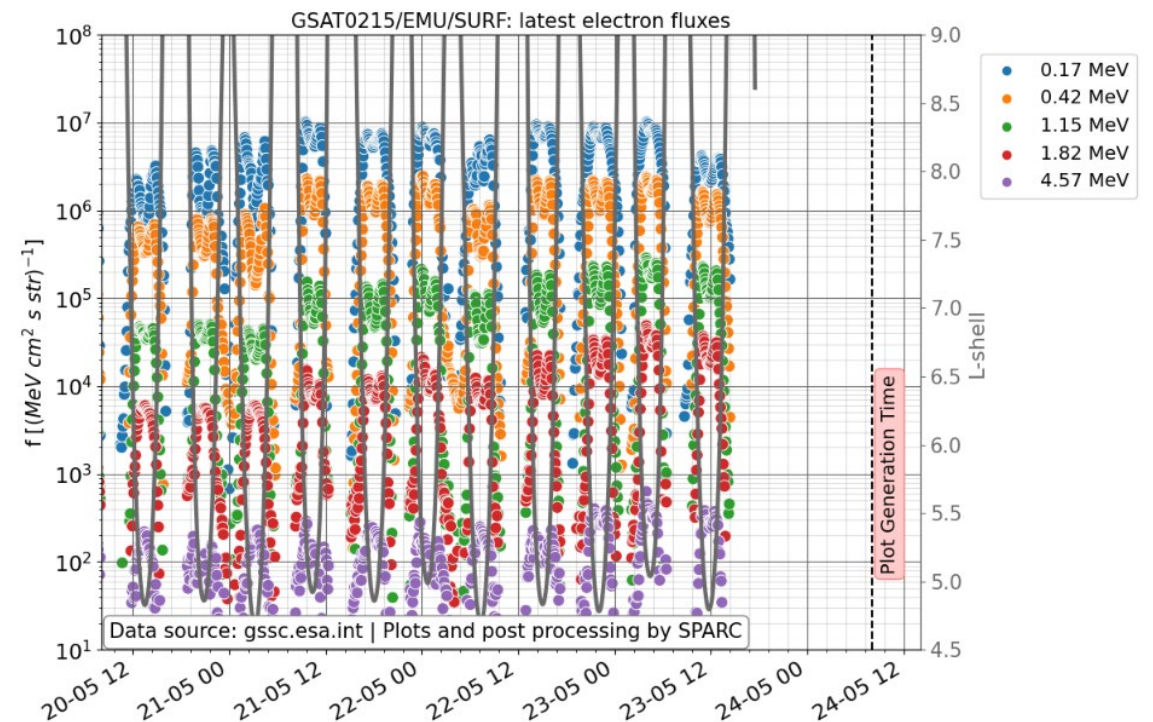


# GSAT/EMU flux datasets

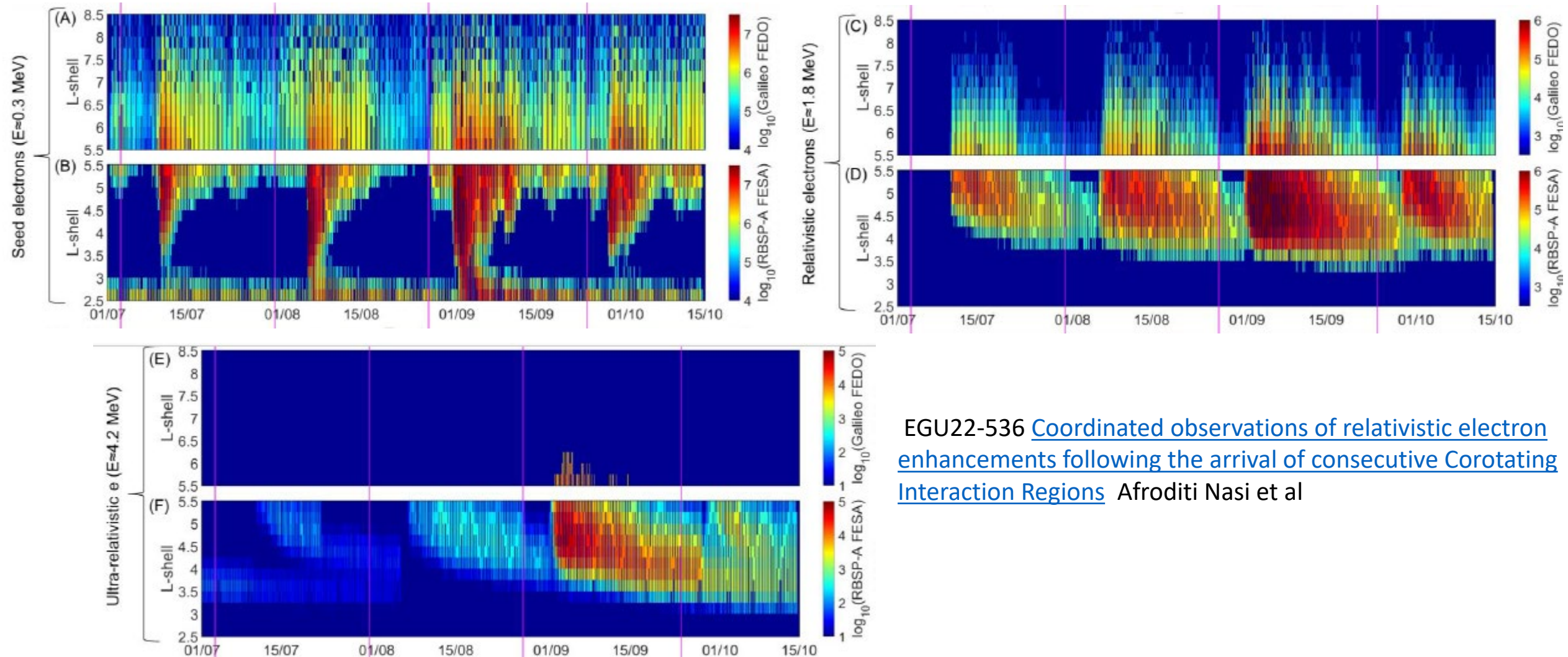


Request Access: <https://gssc.esa.int/contact/>  
<https://gssc.esa.int/activities/gssc-datasets/>

- Lev 1 Ver 1: Available to beta testers
- Lev 1 Ver 2: To be released within summer (0.2-4.2 MeV)
- Lev 2 Ver 1: To be released within 2022



# Relativistic electrons observations



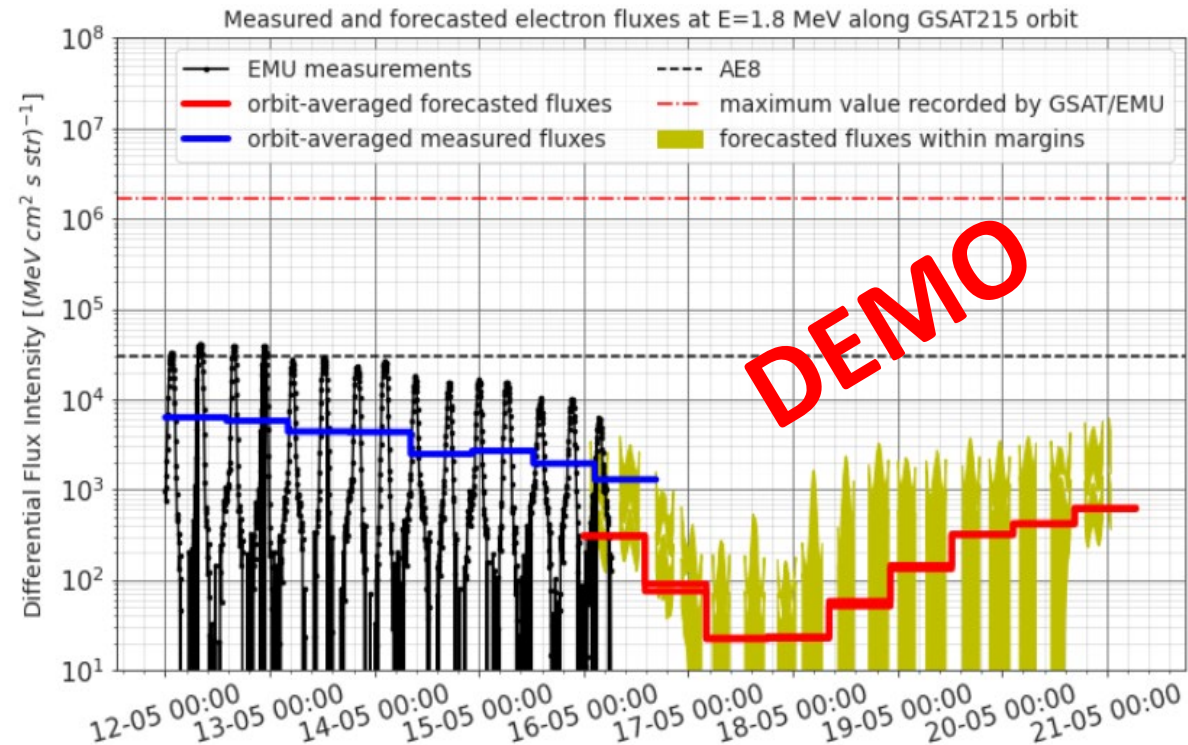
EGU22-536 [Coordinated observations of relativistic electron enhancements following the arrival of consecutive Corotating Interaction Regions](#) Afroditi Nasi et al



# GSAT/EMU measurements in nowcasting and forecasting models

Reliable GNSS MEO electron flux data are vital for the development/validation of forecasting/specification space radiation environment/weather models.

- **EU Horizon 2020 SafeSpace:**  
*Coordinated by NKUA, Greece (I. A. Daglis)*
- **ESA SSA P3-SWE-X Space Environment Nowcast and Forecast Development:**  
*Lead by ONERA, France (Vincent Maget)*



EGU22-6518 [Advanced Prediction of the Outer Van Allen Belt Dynamics and a Prototype Service: the H2020 SafeSpace project](#)  
I A. Daglis and the SafeSpace Team