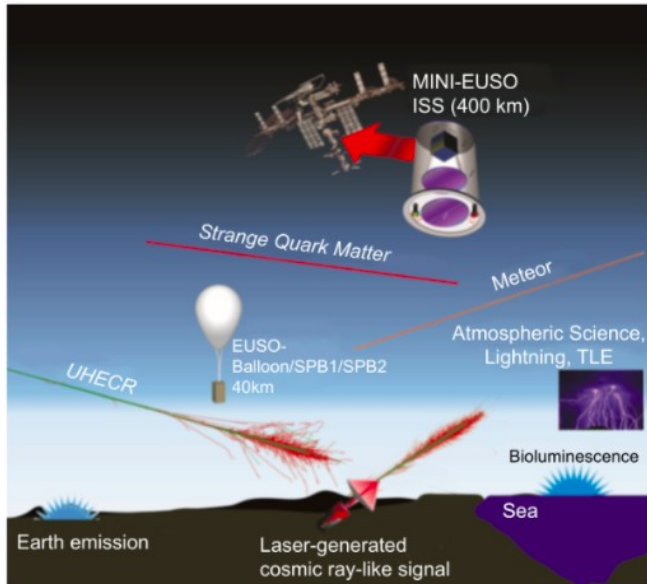# Simulation studies for the Mini-EUSO detector

Hiroko Miyamoto, F. Fenu, D. Barghini, M. Battisti, A. Belov, M. Bertaina, F. Bisconti, R. Bonino, G. Cambiè, F. Capel, M. Casolino, A. Cellino, I. Churilo, T. Ebisuzaki, C. Fugelsang, A. Golzio, P. Gorodetzky, F. Kajino, P. Klimov, M. Manfrin, L. Marcelli, W. Marszal, M. Mignone, E. Parizot, P. Picozza, L.W. Piotrowski, Z. Plebaniak, G. Prévot, E. Reali, M. Ricci, N. Sakaki, K. Shinozaki, G. Suino, J. Szabelski Y. Takizawa
on behalf of the JEM-EUSO collaboration
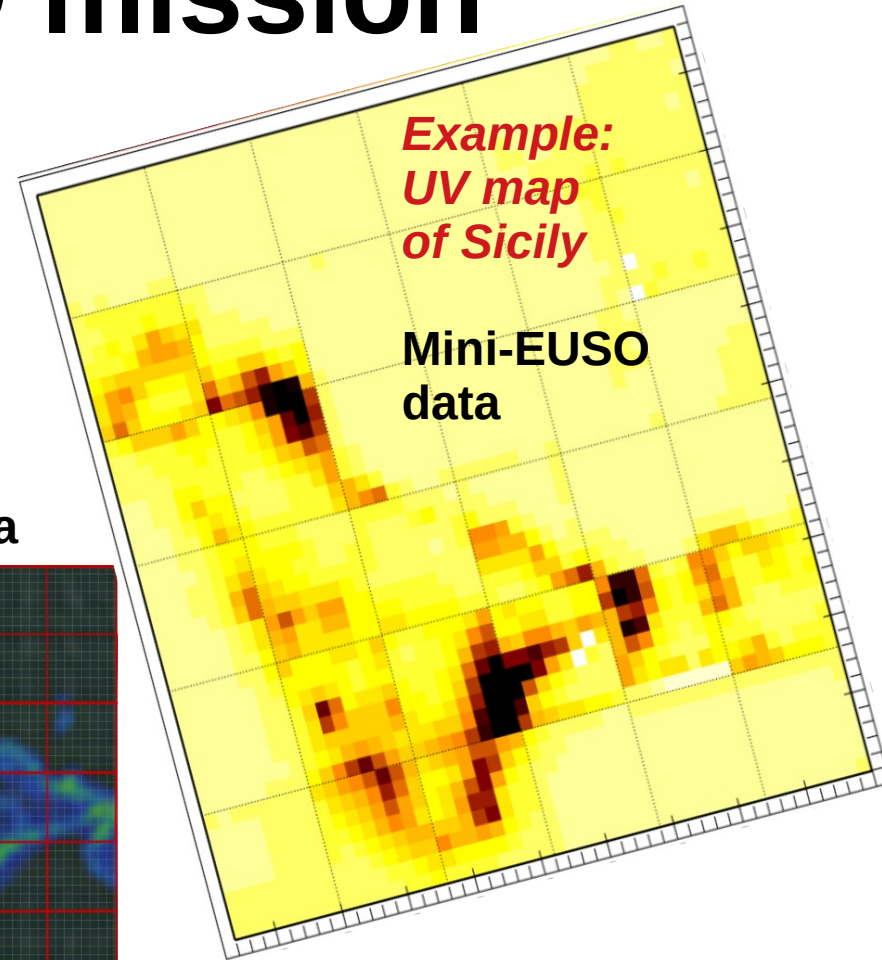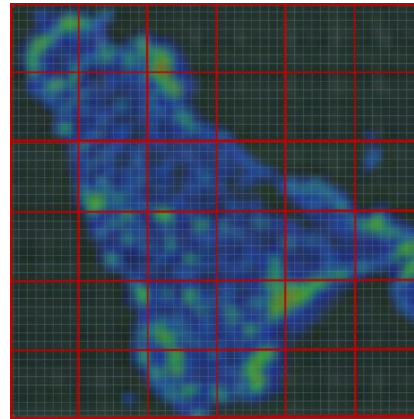
The Mini-EUSO mission

Mini-EUSO is a detector of the JEM-EUSO program launched in 2019

It is placed on a UV transparent window of the Zvezda module of the ISS

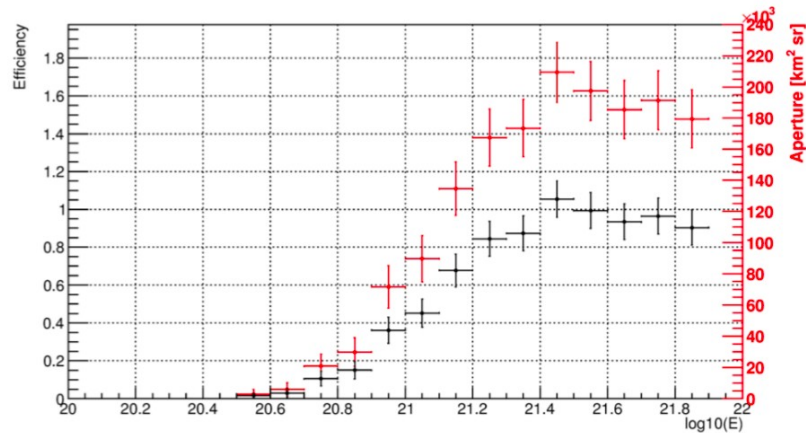Main objective: mapping the Earth emission in the UV

DMSP data

Example: UV map of Sicily

Mini-EUSO data

More than 50 hours of acquisition
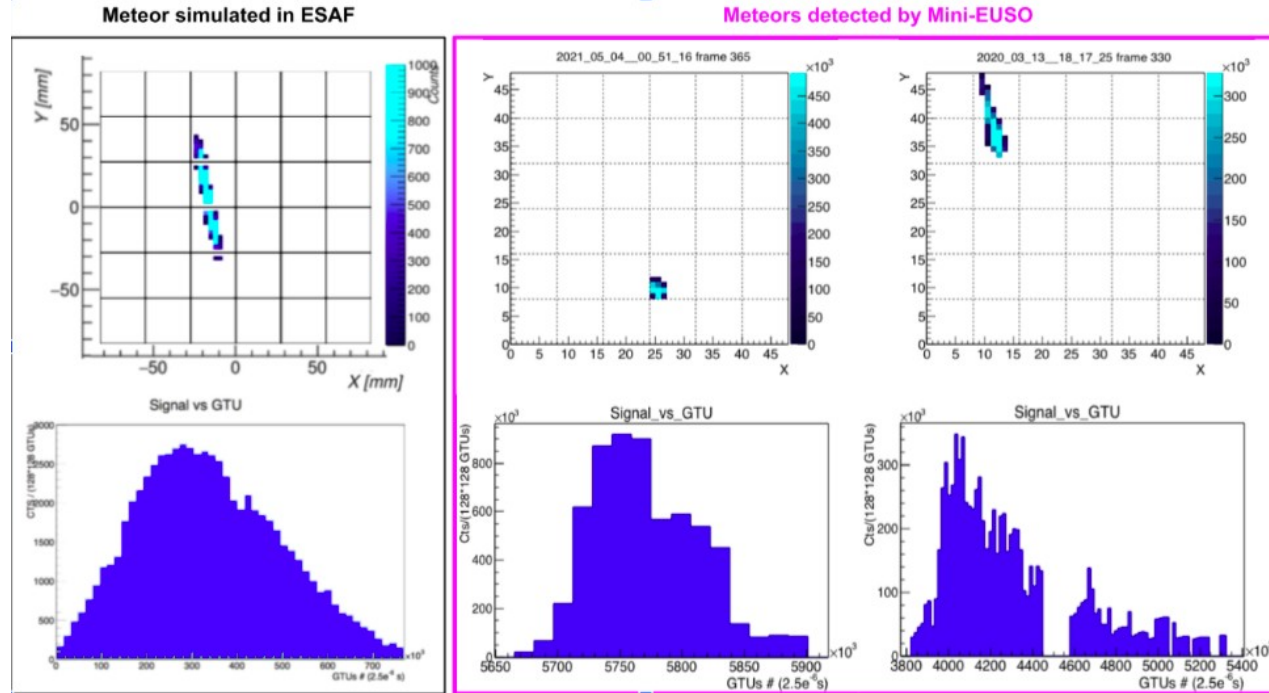
2

Simulations for Mini-EUSO

Simulations of the Mini-EUSO detector are fundamental in the data analysis process

1) Energy threshold estimation for cosmic rays

Energy threshold above 10^{21} eV

2) Simulations of meteors
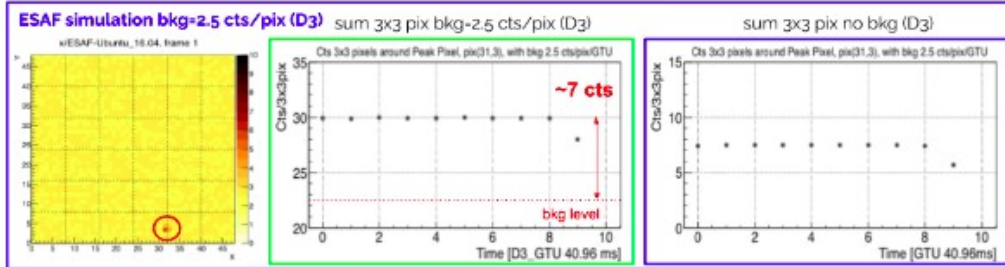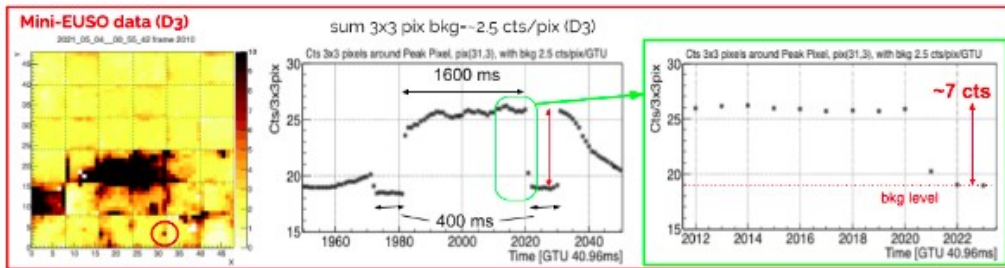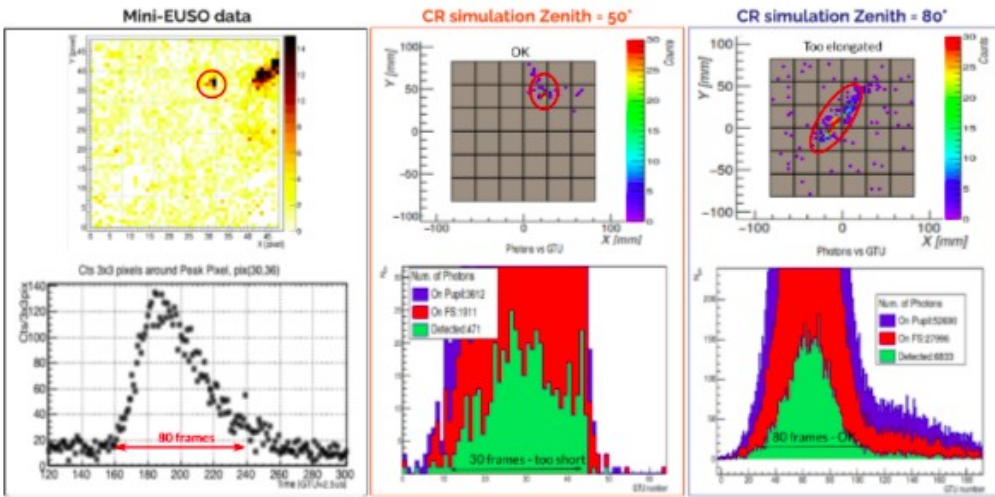

ESAF simulation software used

3

Studies of ground transient sources

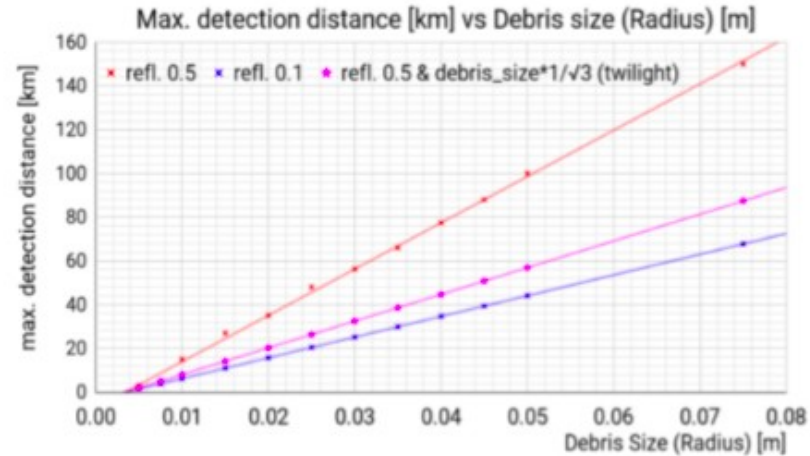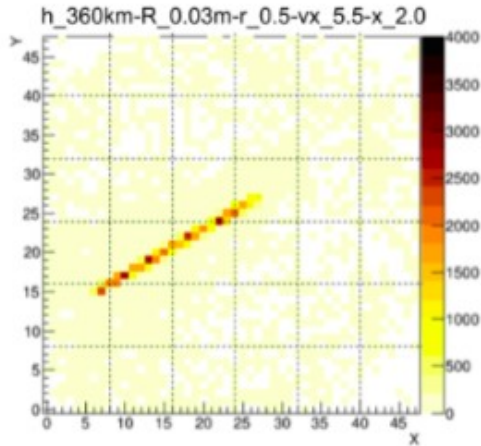Mini-EUSO a wide variety of ground based transient sources

Flashers intentionally placed in the Mini-EUSO field of view

Studies on the luminosity of such events very important for calibration purposes

Comparison of luminosity with cosmic ray equivalent

4

Space debris simulations

h_360km-R_0.03m-r_0.5-vx_5.5-x_2.0

Max. detection distance [km] vs Debris size (Radius) [m]

Mini-EUSO can be used as a space debris monitor

Threshold of detection for a specific size

10 cm diameter object visible from 40 to 100 km

Slow mode trigger algorithms optimized for debris detection

5

Thanks a lot for your attention