

# Pilot Project for Space Weather Applications: Geosynchronous Environment for Identification of Satellite Hit Anomalies (GEISHA)

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## Outline

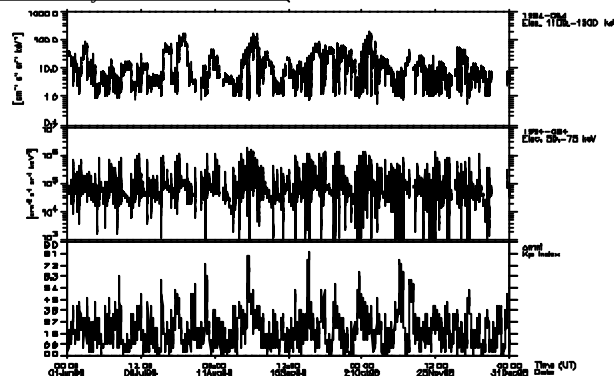
- Introduction
- The product
- Application to spacecraft anomaly analysis
- Prototype for a space weather product
- Conclusions and prospects.

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## Introduction

### GEO: A dynamic environment

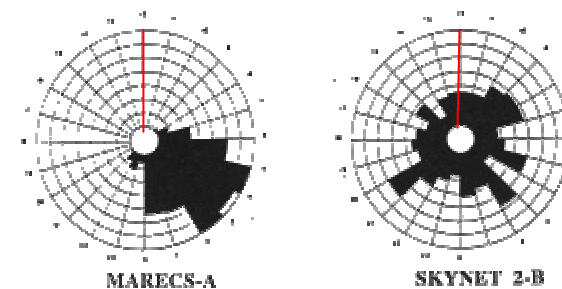


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## Introduction

### Anomaly at GEO: local time distribution



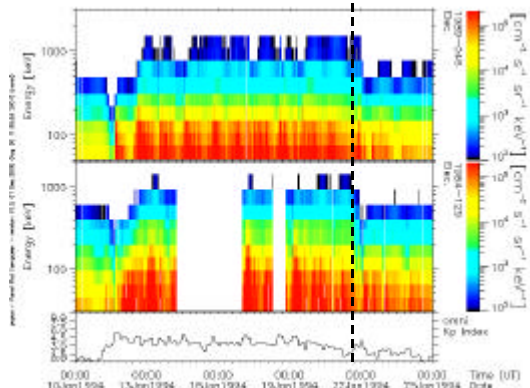
D'après J.P. Catani, 1986

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## Introduction

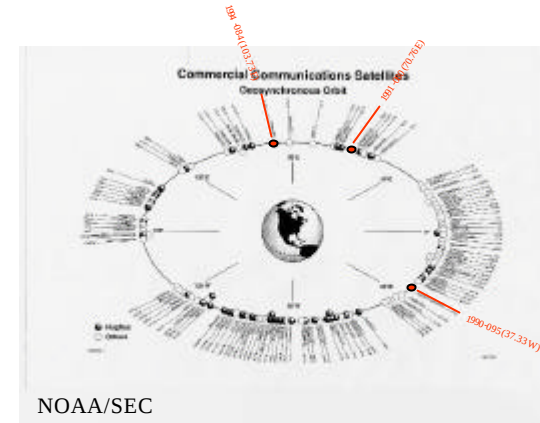
January 21, 1994 Anik E1-E2 and Intelsat K



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## Introduction

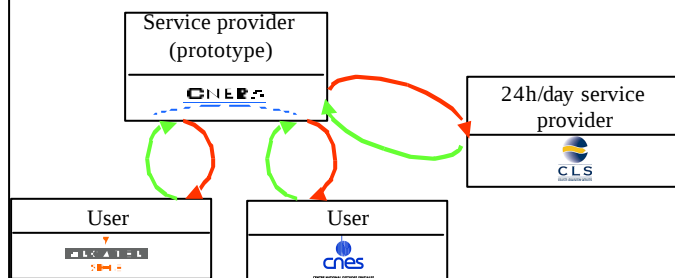


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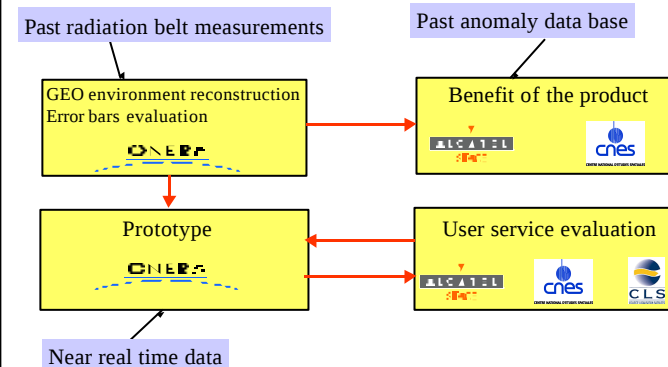
## The consortium



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## The study

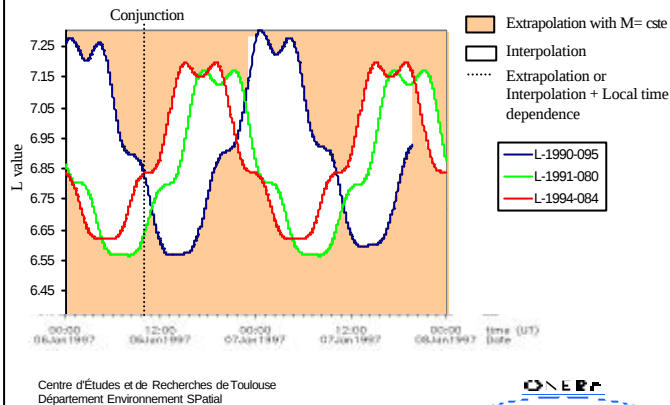


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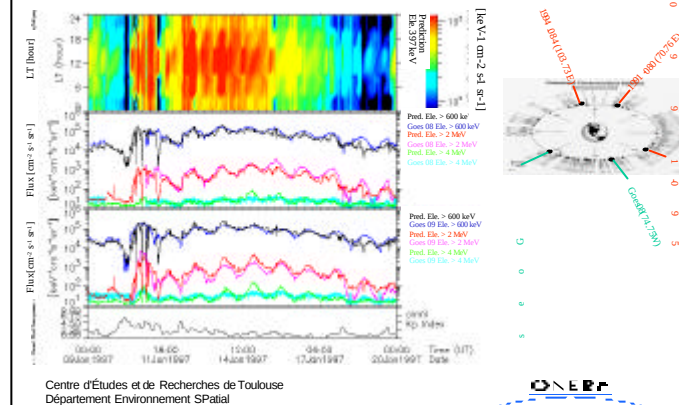
## Interpolation between measurements

Epoch: January, 6-7 1997

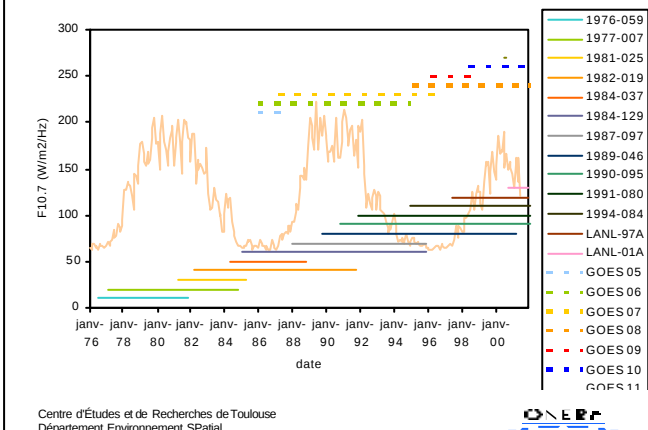


## Interpolation between measurements

Comparison: Prediction/GOES 08 & 09

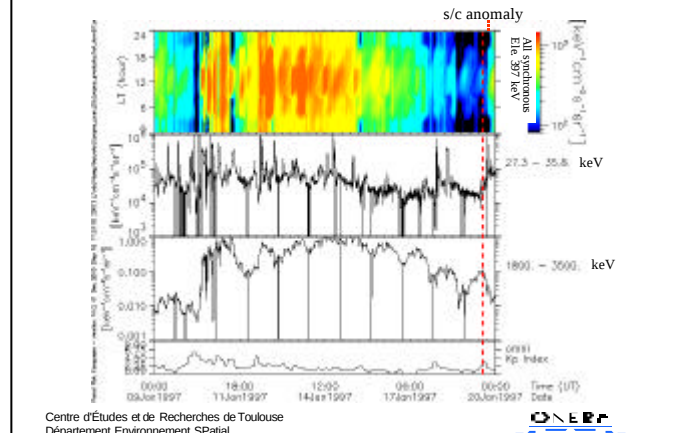


## Accuracy / error bars



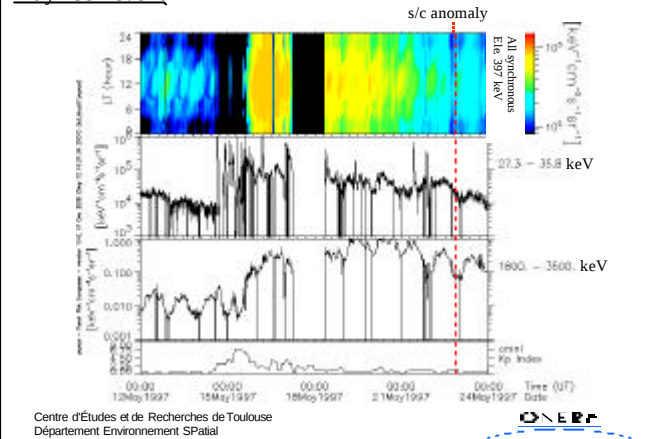
## Application to spacecraft anomaly analysis

January 1997 event



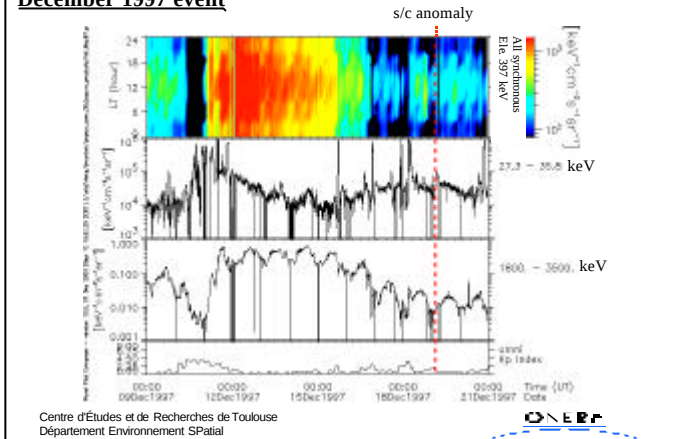
## Application to spacecraft anomaly analysis

### May 1997 event



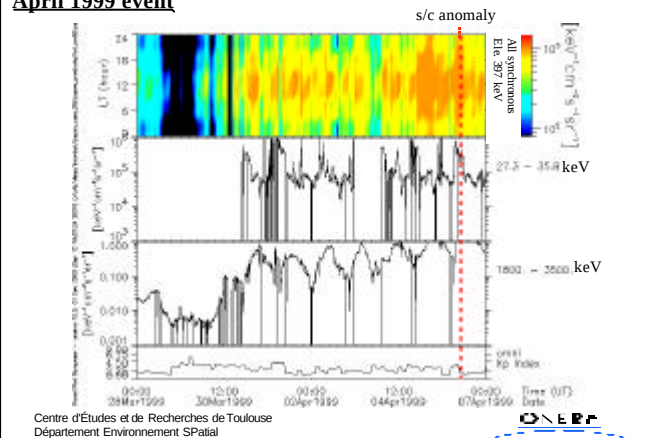
## Application to spacecraft anomaly analysis

### December 1997 event

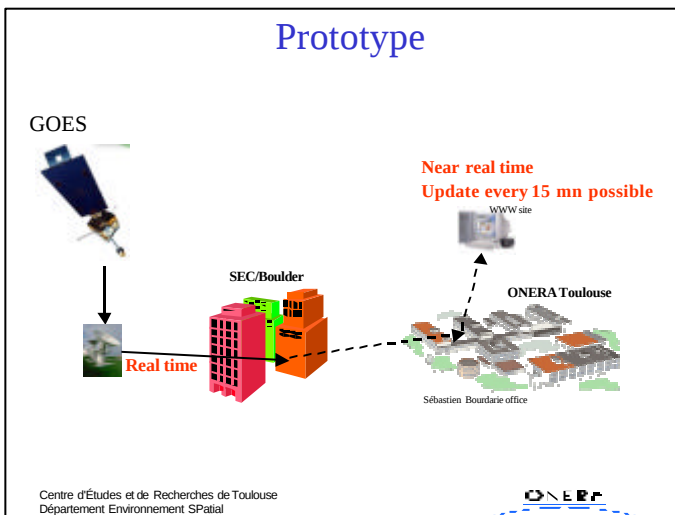


## Application to spacecraft anomaly analysis

### April 1999 event



## Prototype



## Conclusions

- Electron flux have been restored at GEO at all longitudes in the energy range 30 keV-25.8 MeV.
- Combining both observations and theory allows to have:
  - a better prediction for the day-night asymmetry
  - a better accuracy when few measurements are available with a poor distribution in longitude
- The method has been successfully validated by comparing prediction with GOES 08 and 09 measurements
- The method has been applied to four different storms
  - flux have been restored along spacecraft orbit which have suffered an anomaly
  - it has been confirmed each time that an electrostatic discharge has occurred due to deep dielectric charging
- GOES data will be used to apply the technique in near real-time

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