PyData
@ San Luis
16-18 Oct 2017

Addressing Space Weather Monitoring data handling problem

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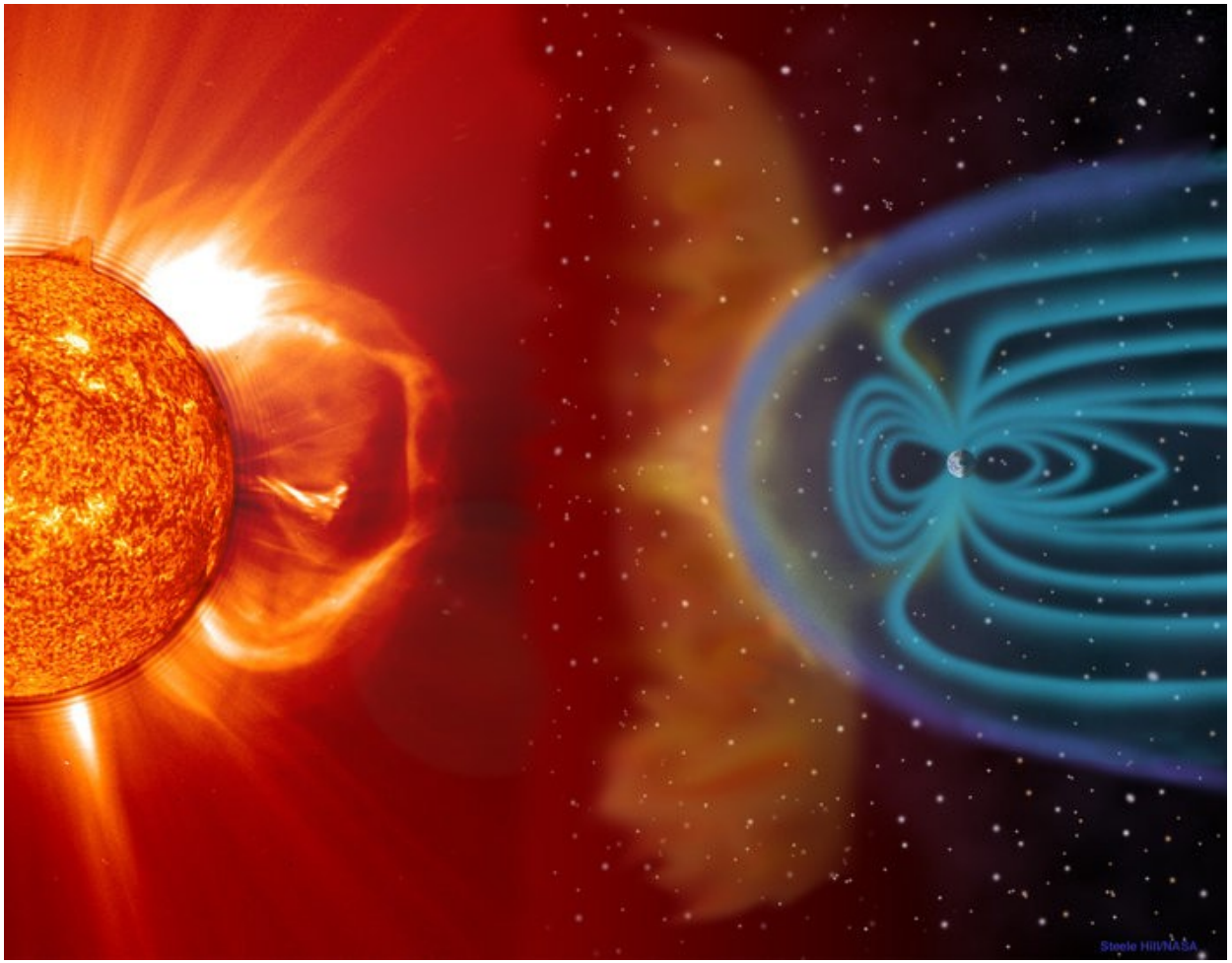
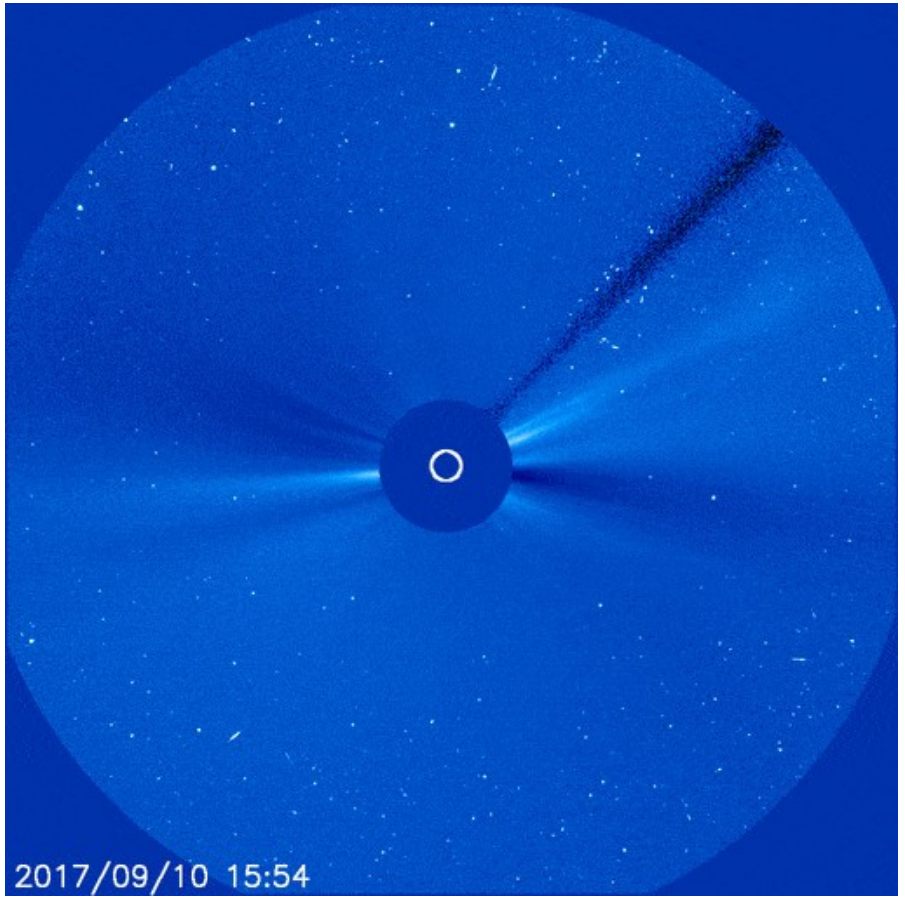
The problem

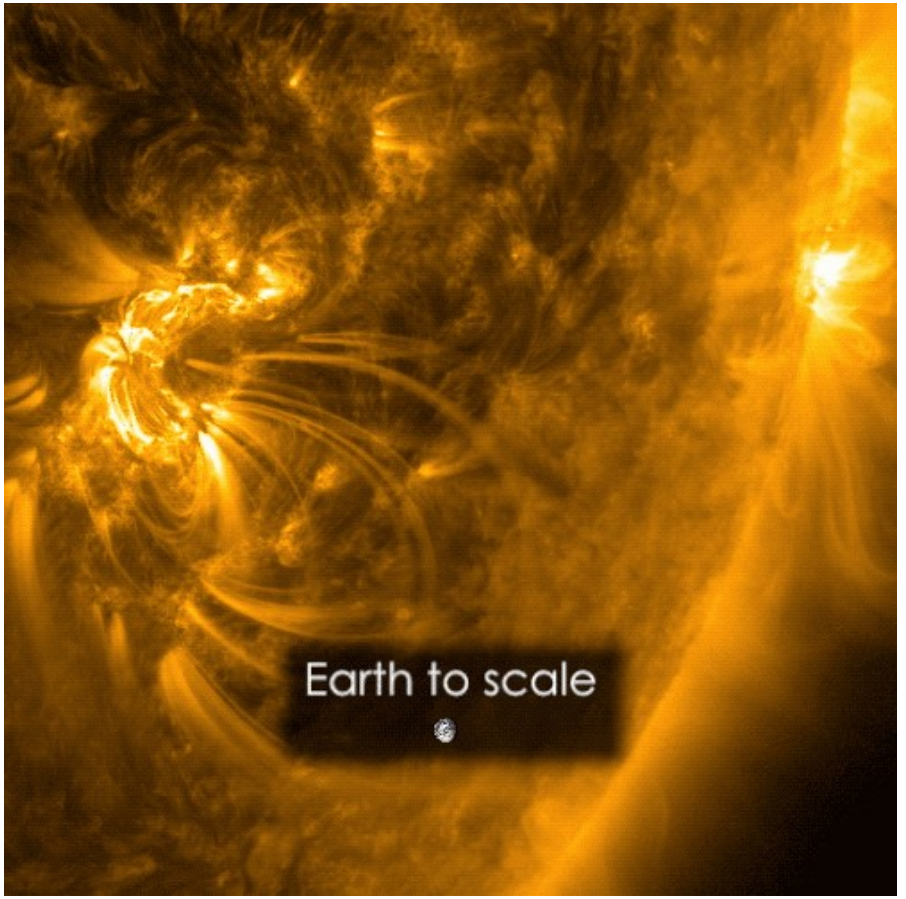
Monitoring space weather conditions



https://svs.gsfc.nasa.gov/

Space Weather (SW)





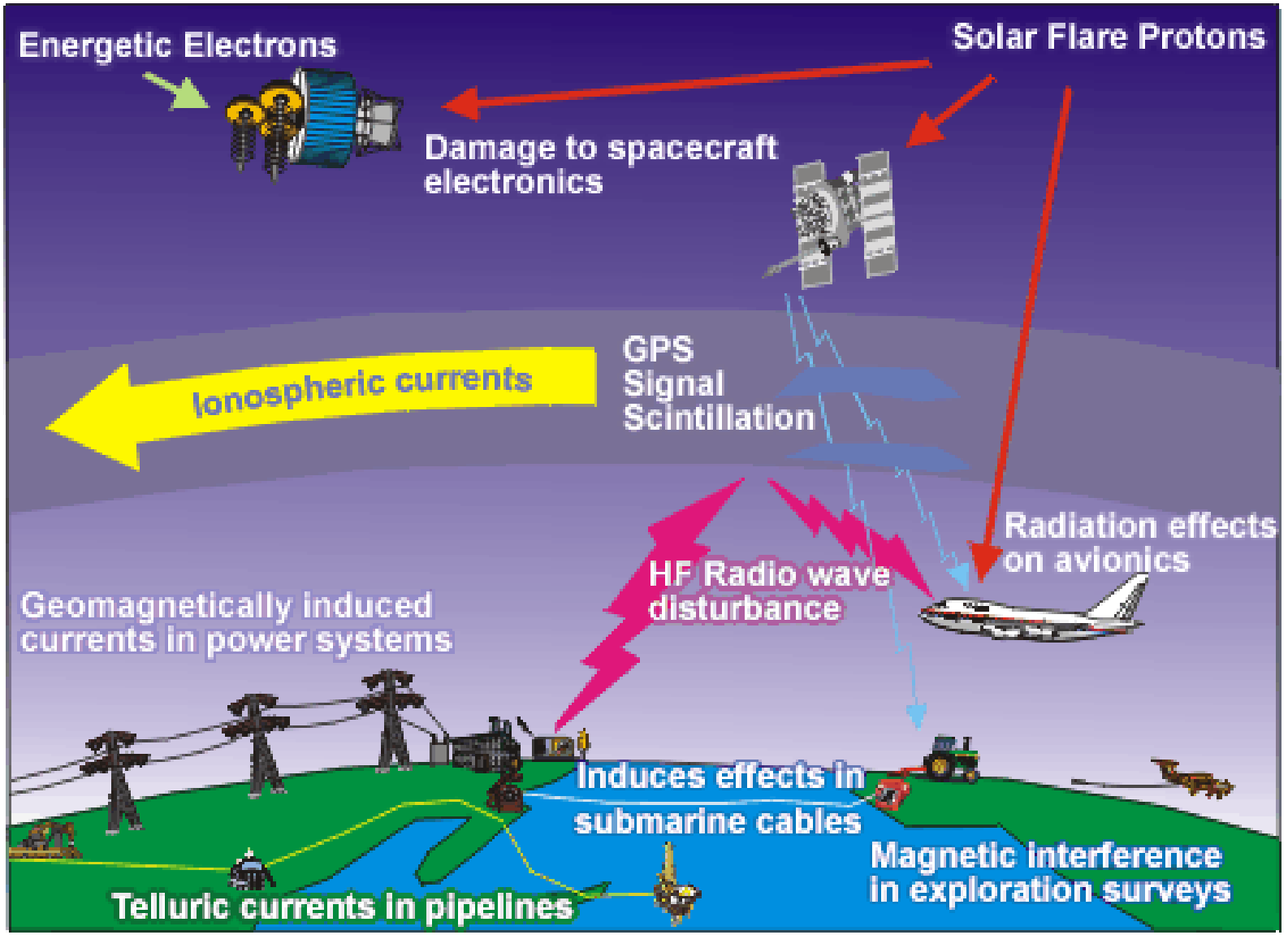
https://svs.gsfc.nasa.gov/

Space Weather (SW)

Effects on earth

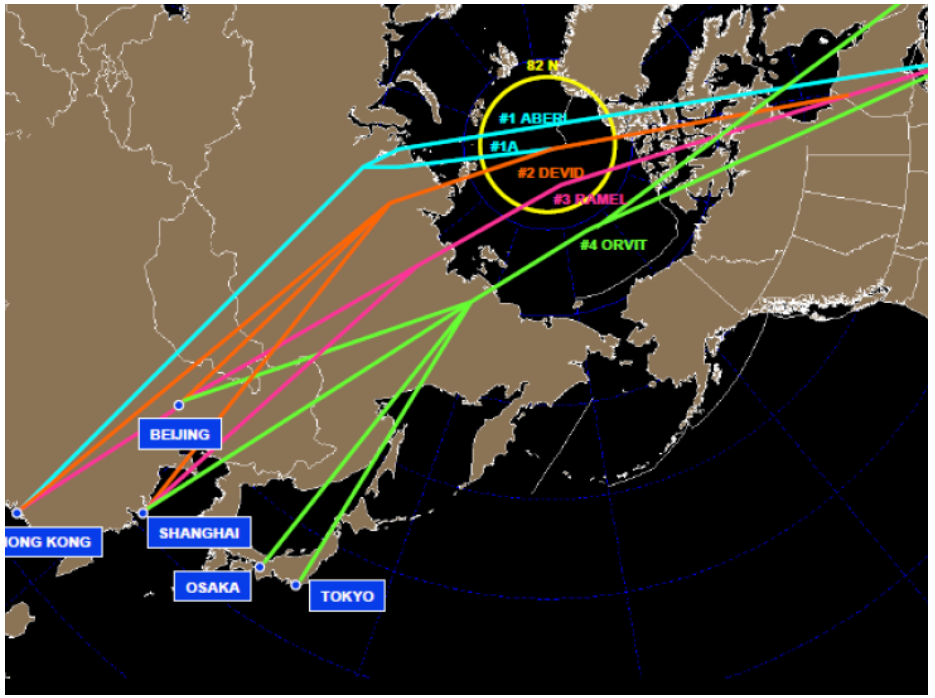
Space Weather (SW)

Impact on modern society daily life



Space Weather (SW)

Impact on modern society daily life

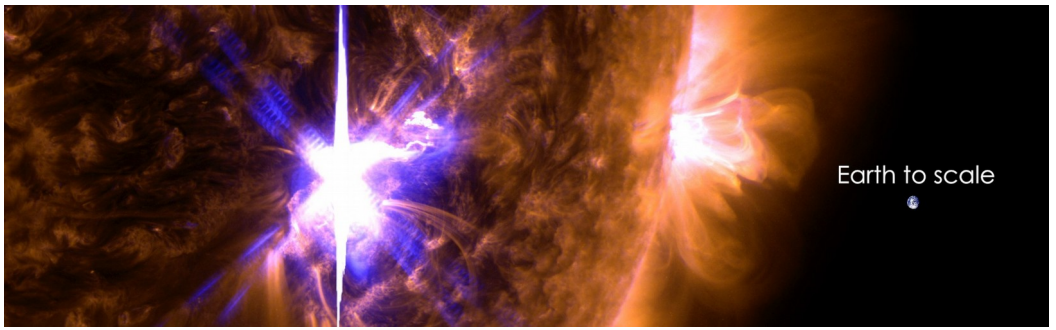


Campetella, SMN

March 1899
Quebec
9 hs without power

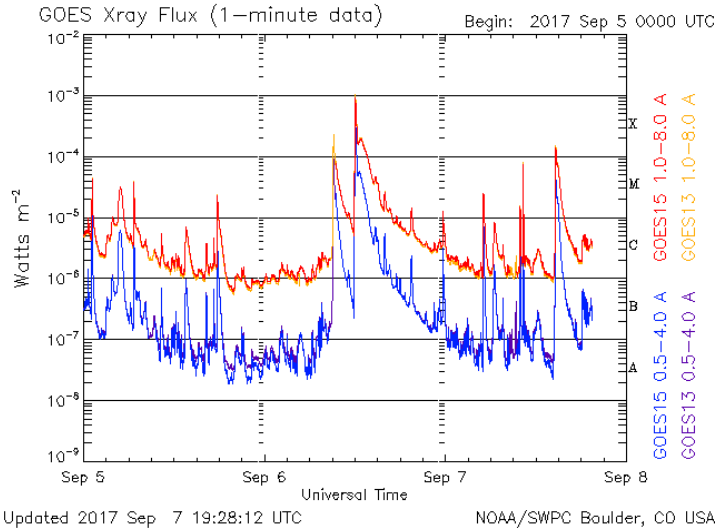
Space Weather (SW)

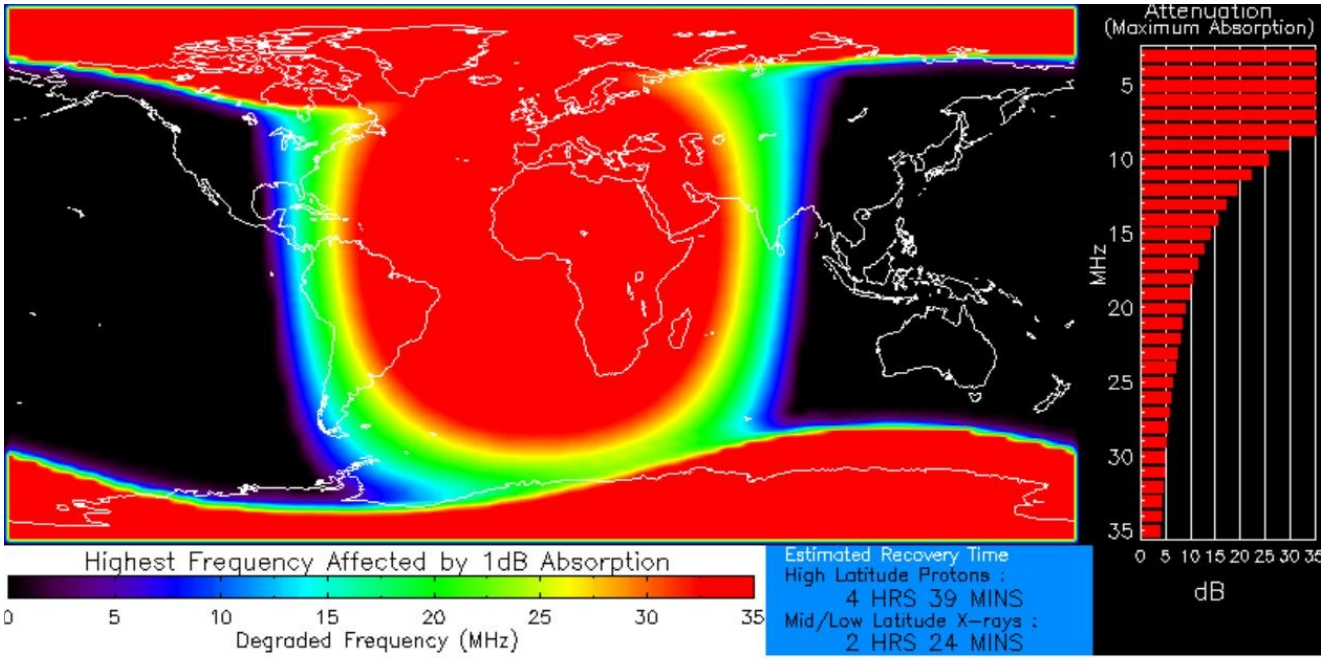
Impact on modern society daily life



Radio blackout due to a flare

Flare x8.2
06/09/2017





Strong X-ray flux
Product Valid At : 2017-09-06 12:04 UTC

Minor Proton Flux
NOAA/SWPC Boulder, CO USA

Space Weather (SW)

Impact on modern society daily life

11/09/2017 - 18:23 | Clarin.com | Sociedad

Exploración espacial

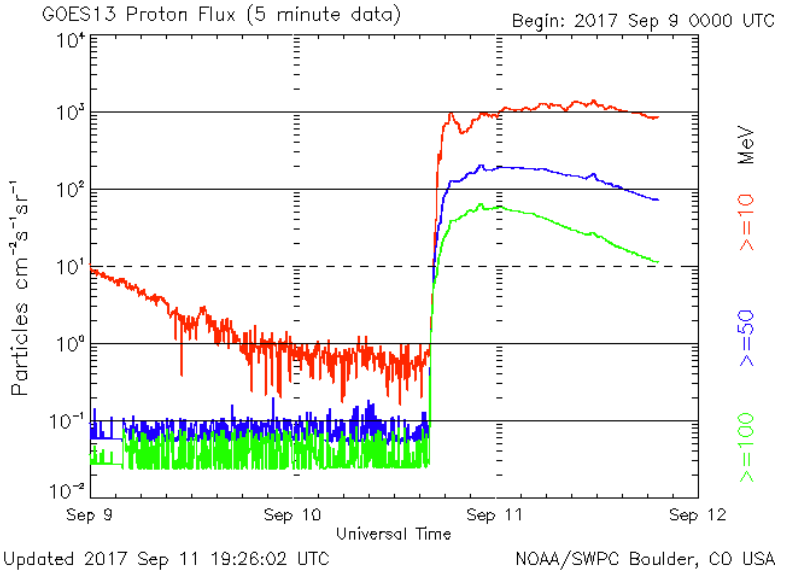
Los astronautas de la Estación Espacial Internacional tuvieron que "esconderse" de una erupción solar

Se resguardaron dentro de un refugio en la plataforma para resguardarse de la radiación.

Los astronautas se refugiaron por la radiación solar.

Los astronautas de la Estación Espacial Internacional (EEI) se vieron obligados a esconderse en un **refugio especial** dentro de la plataforma del peligroso impacto de una potente erupción solar que tuvo lugar este domingo

Proton storm
10/09/2017



Space Weather (SW)

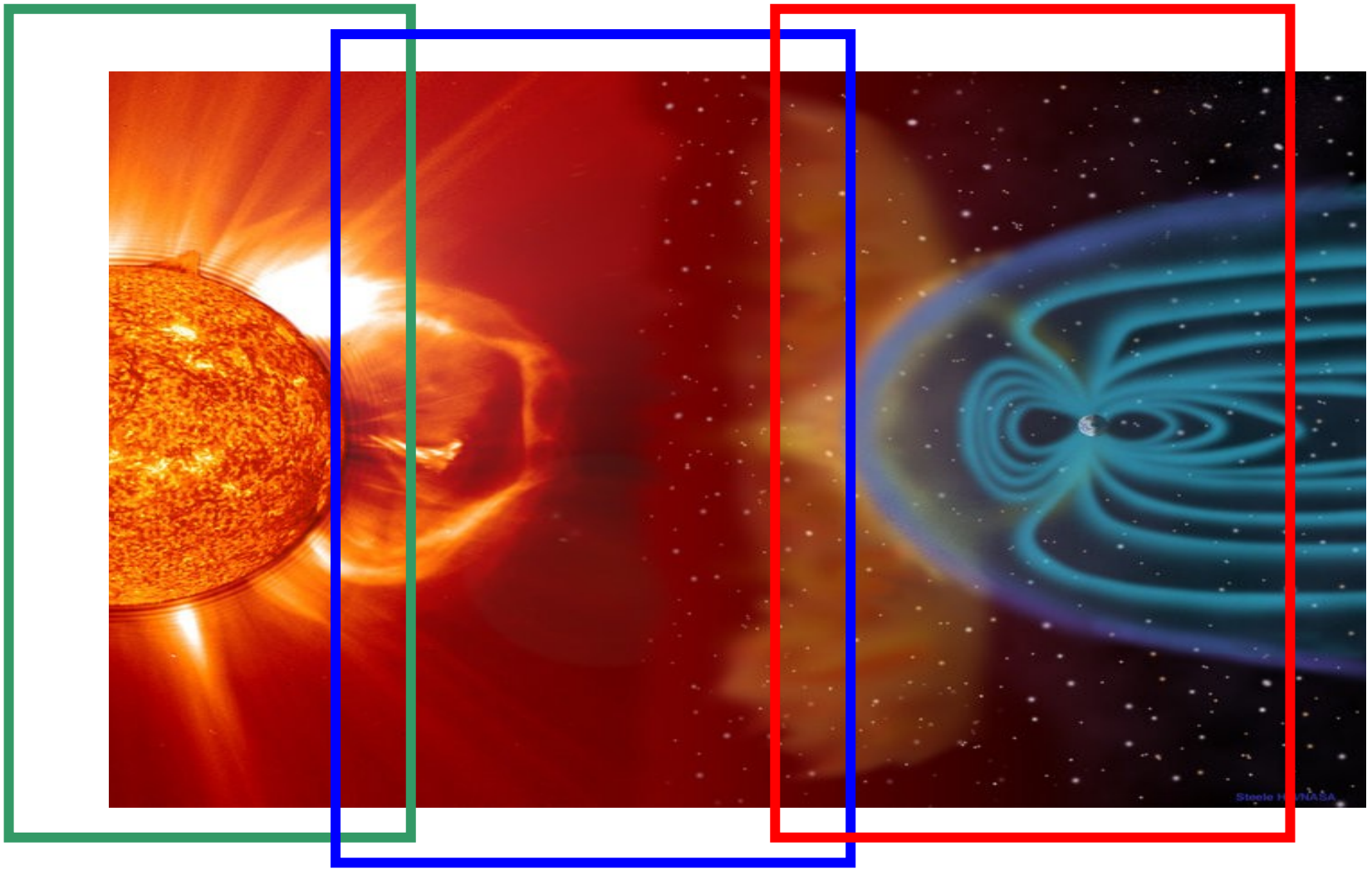
How to approach this problem

1- Monitoring solar activity, interplanetay medium and earth enviroment by means of space probes and groud based instruments.

2- Performing complex simulations in order to nowcast and forecast. Usually implementing physics and empiricall models.

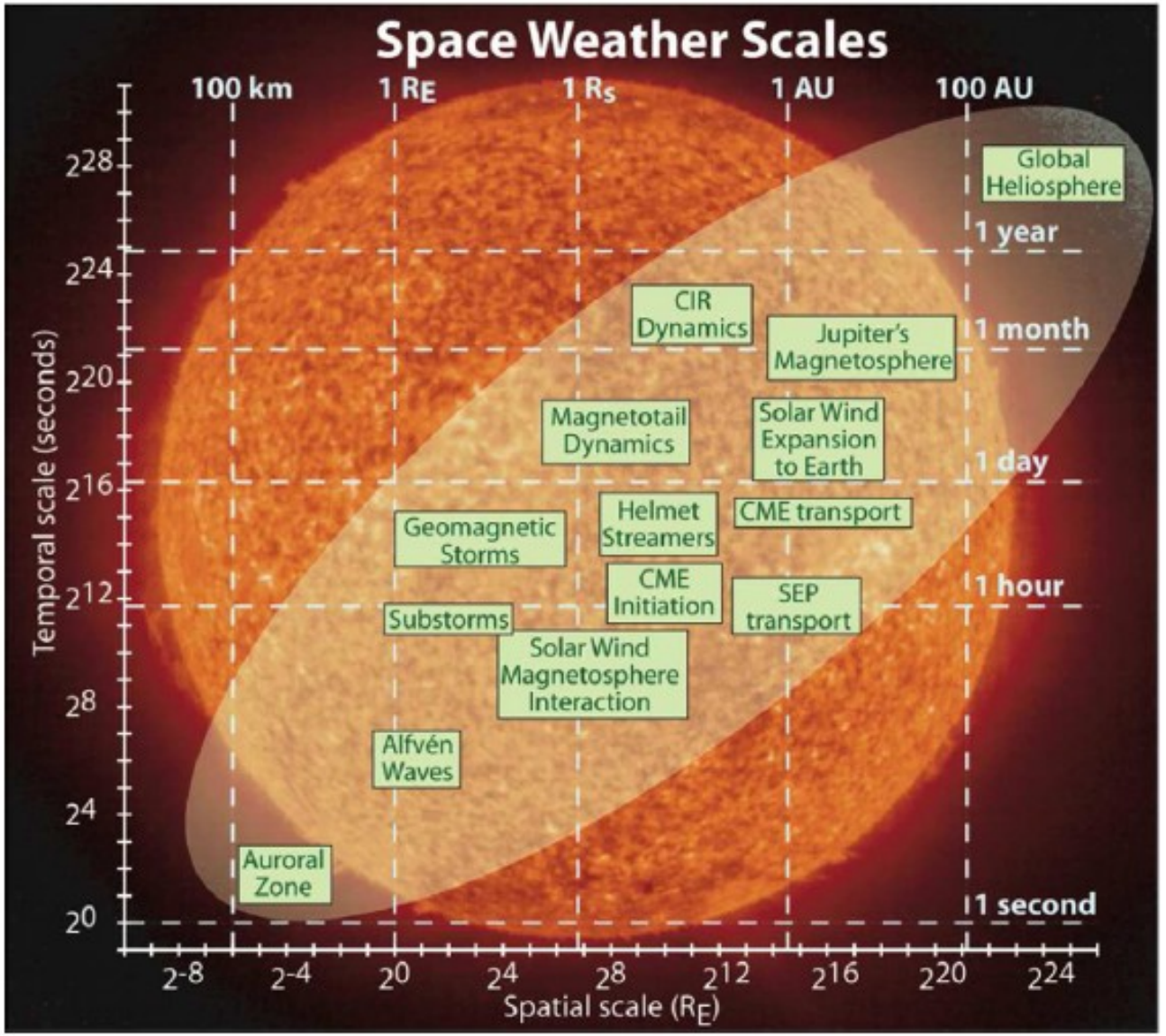
Space Weather (SW)

How to obtain measurments



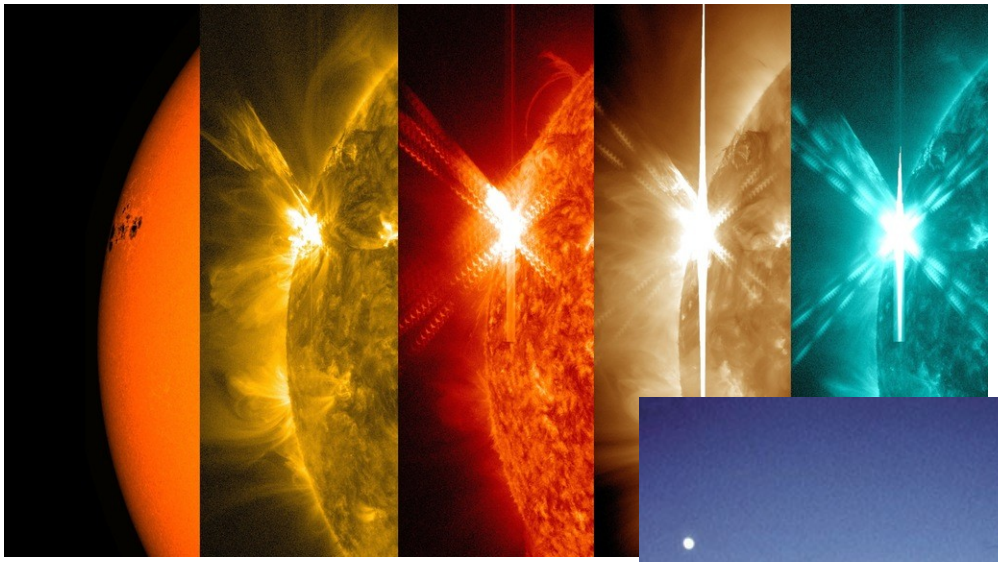
Space Weather (SW)

Scales ...

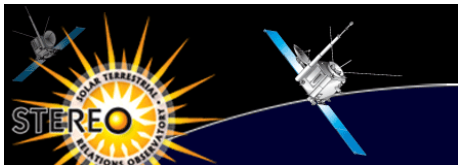


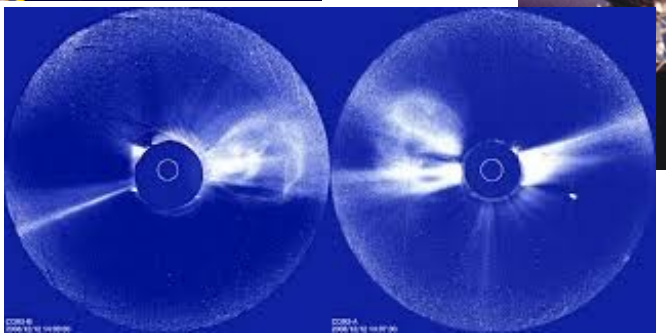
Toth et al, 2012

Space Weather (SW)

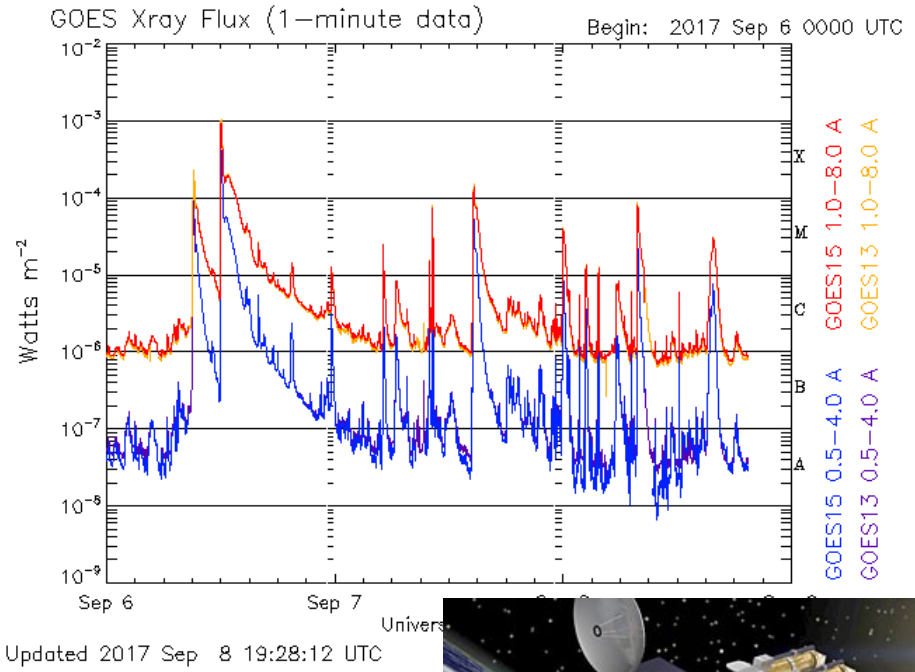


Sun activity:
Space probes and ground radars
Difficult to cover all sun activity
Communications
Calibration
Data formats



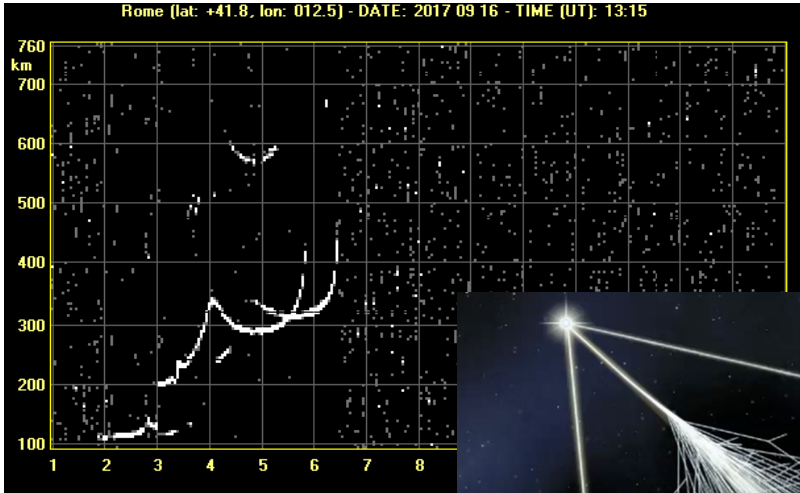


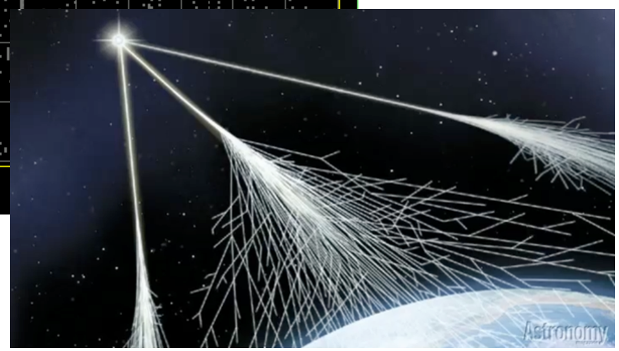
Space Weather (SW)



Interplanetary medium:
Space probes
Communications
Calibration (algorithms)
Data formats

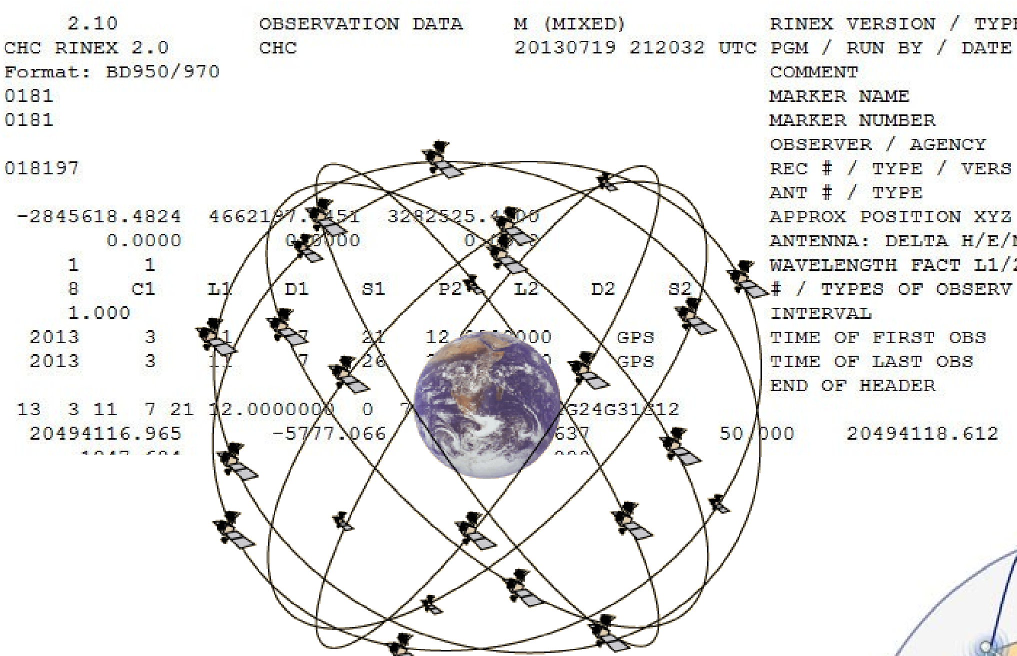
Space Weather (SW)





Earth enviroment:

- Space probes and ground based instruments
- Poor globe coverage
- Communications
- Calibration (algorithms)
- Data formats
- Data avability
- Deployment, mantainance and operation of instruments

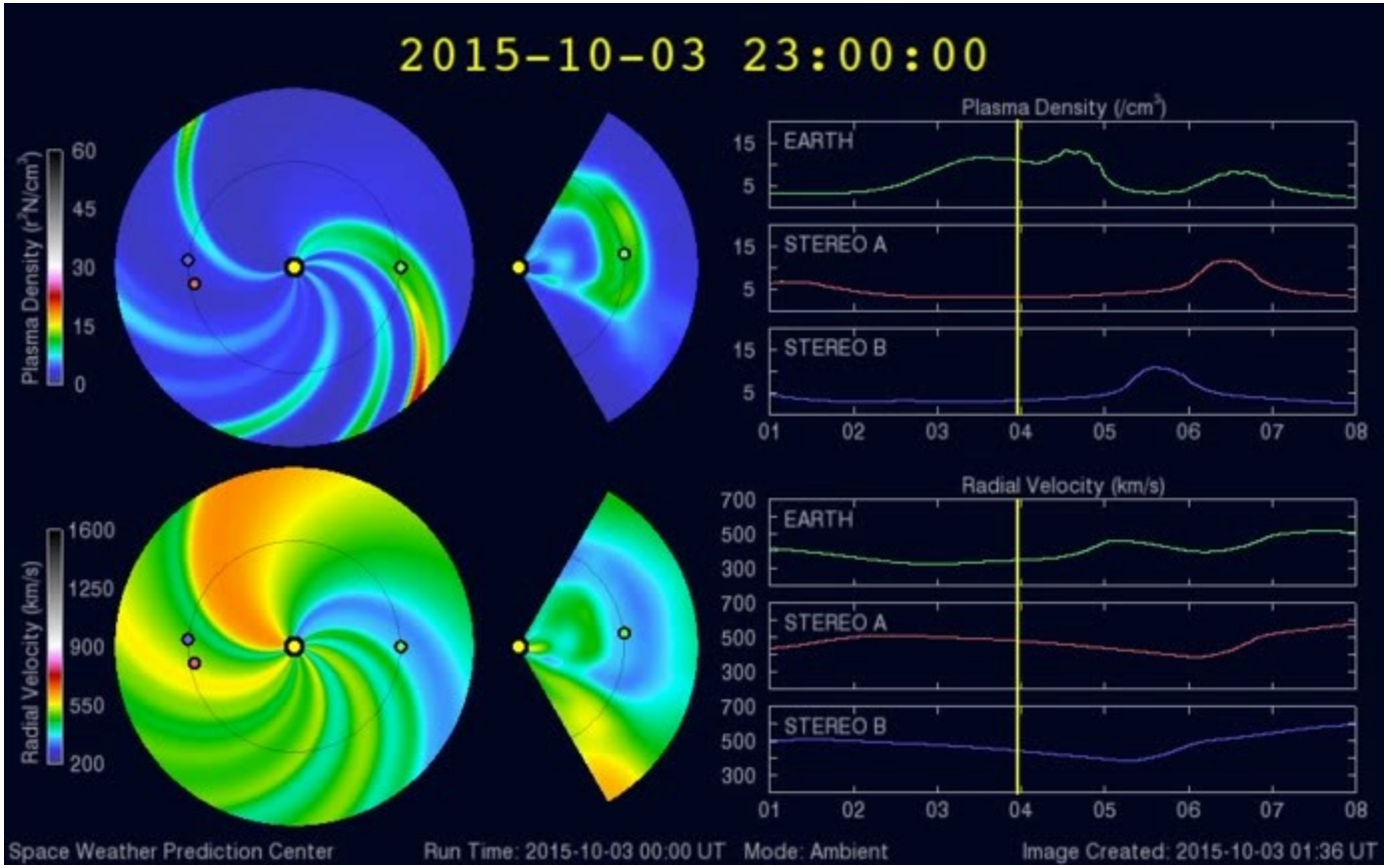


Observatorio Tucumán de Alta Atmósfera Terrestre en Baja Latitud

Space Weather (SW)

Nowcasting and forecasting:

- Physics (?)
- Historic data analysis
- Validation
- Data assimilation



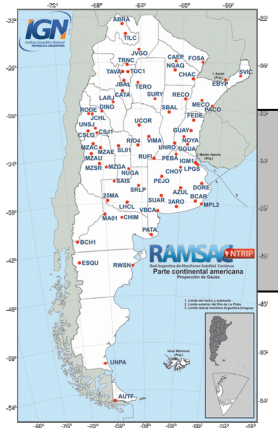
Space Weather (SW)

Multidisciplinar
and
colaborative
task!

Tucuman Space Weather Monitoring Center

Data Source

DBs
WEB



Instruments
networks

Local instruments
(LTC)

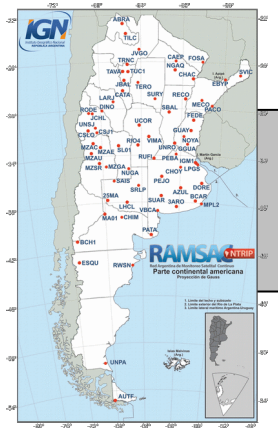
Simulations
Output

**monitoring
SW**

Tucuman Space Weather Monitoring Center

Data Source

DBs
WEB



Instruments
networks

Local instruments
(LTC)

processing

LAB(CC)

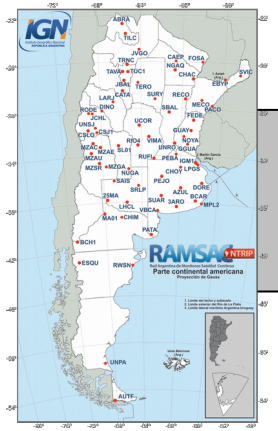
**monitoring
SW**

Simulations
Output

Tucuman Space Weather Monitoring Center

Data Source

DBs
WEB



Instruments
networks

Local instruments
(LTC)

Simulations
Output

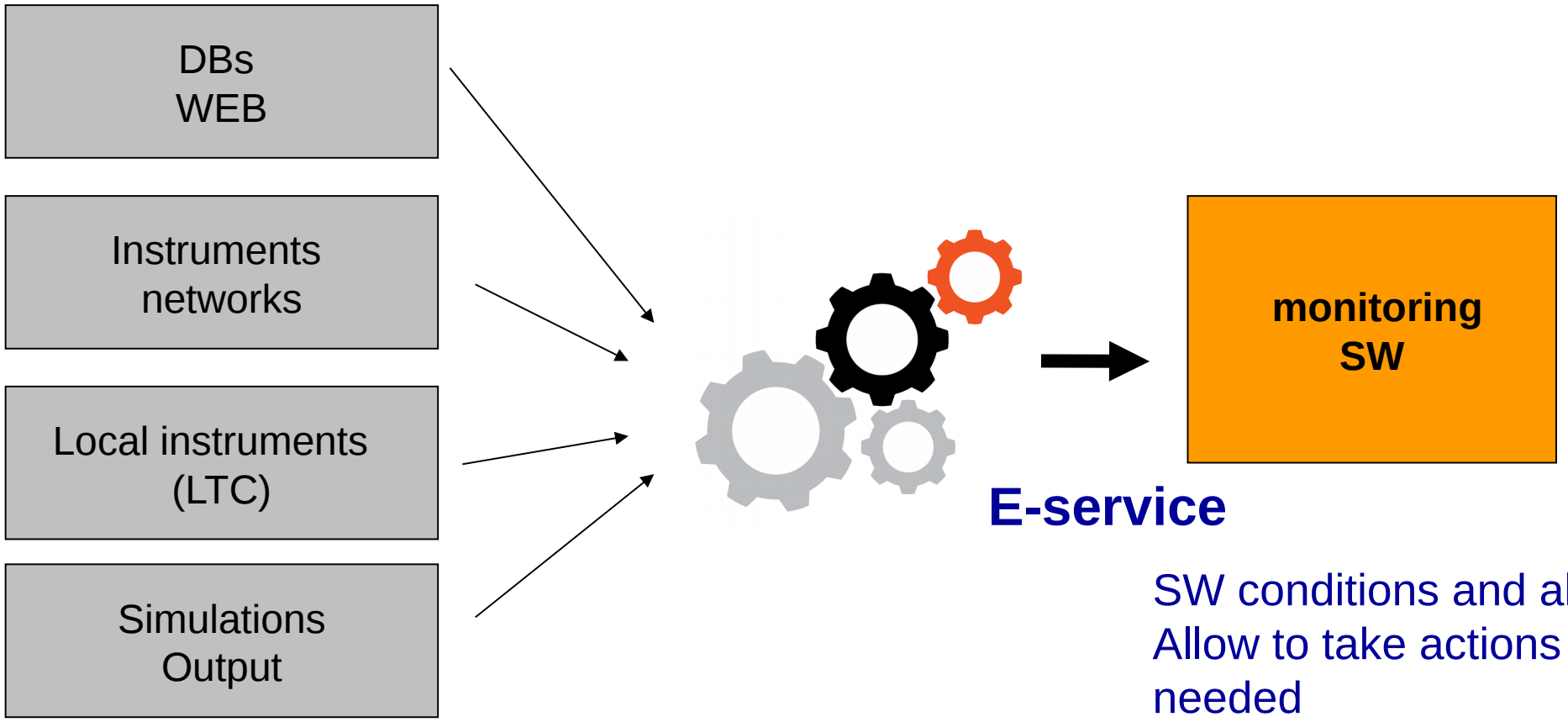
**monitoring
SW**

E-service

R2O!
Service delivery
Reliability and robustness
Client driven
(flexibility and
communication)
Customer support

Sistema de Monitoreo de SW

FUENTES DE DATOS



E-service

SW conditions and alerts.
Allow to take actions If needed

Managing data

2. Data organization

- Pre- proccesing
- Cleaning data
- Data access
- Data storage
- Filtering

1. Data acqusition

- Heterogeneous data
- Different and complex data source
- Reliability
- Structure of data (?)
- Big data (?)

3. Analyze data

- Algorithms
- Queries
- Data mining?
- Semantics behind data

4. Decide

- Interpretation
- Service delivery

What we have done so far

Always in progress

Data acqusition

- From web
- From instrument network such as RAMSAC
- Own instruments (conennectivity problems as always)

2. Data organization

- Pre- proccesing (specific cases)
- Cleaning data
- Data access
- Filtering

Data visualization

- Open access to SW products (in progress)

Some final comments

Finally researchers in the field and in our country are thinking about DATA

Our big problem

So much to do in the future

Evaluation on the quality of the service ...

Thank you