

SPACE WEATHER

How does it affect us?

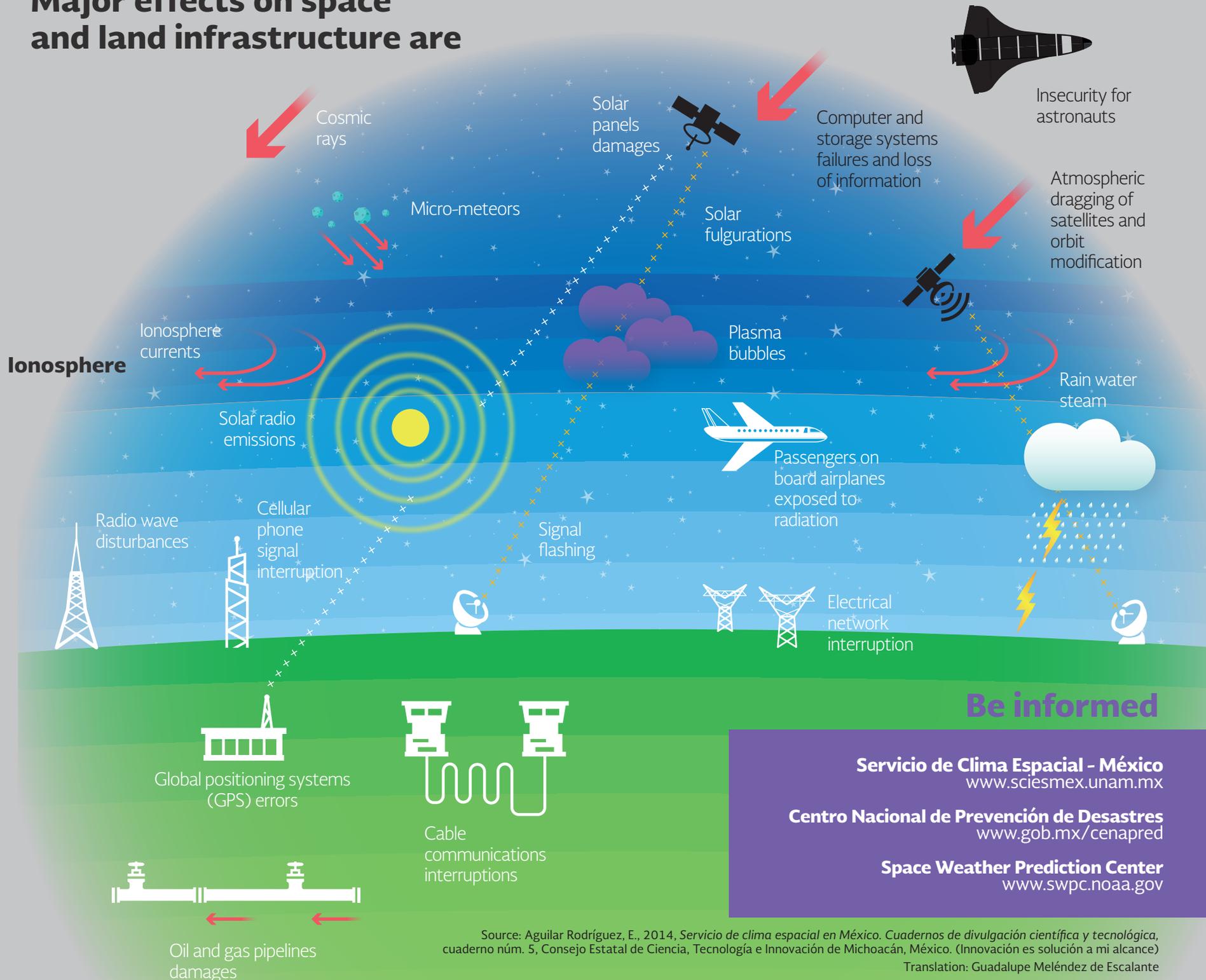
What is it?

It is a global phenomenon produced by solar activity that may create problems to our technology

Phenomena associated to space weather changes

- 1 Coronal mass ejections**
 A cloud of electrically charged particles departing the solar atmosphere
Effect
 Satellite orbit failure and damage to high tension electrical currents (blackouts)
- 2 Solar fulgurations**
 The sun produces X, gamma, and ultraviolet rays, visible light, infrared, microwave, and radio waves
Effect
 Telecommunications' interferences, global positioning systems failures
- 3 Solar energetic particles**
 Protons, neutrons, and electrons that are accelerated by solar fulgurations
Effect
 Satellite component damage, harmful radiation to astronauts, and transpolar flight passenger problems

Major effects on space and land infrastructure are



Be informed

Servicio de Clima Espacial - México
www.sciesmex.unam.mx

Centro Nacional de Prevención de Desastres
www.gob.mx/cenapred

Space Weather Prediction Center
www.swpc.noaa.gov

Source: Aguilar Rodríguez, E., 2014, *Servicio de clima espacial en México. Cuadernos de divulgación científica y tecnológica*, cuaderno núm. 5, Consejo Estatal de Ciencia, Tecnología e Innovación de Michoacán, México. (Innovación es solución a mi alcance)
 Translation: Guadalupe Meléndez de Escalante



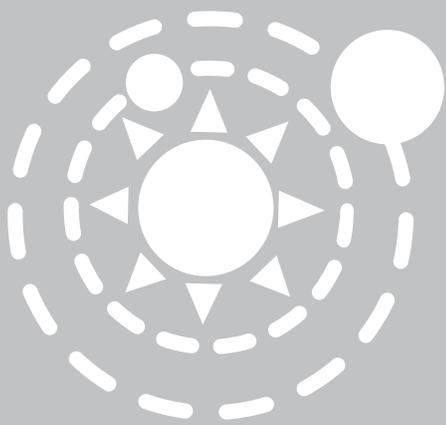
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Space weather, a solar phenomenon

Space weather events are natural phenomena affecting considerable sections of the world that could, ultimately, affect all the planet

Effects of major solar storms registered:

Carrington Event (1859).

The most intense solar storm registered in history, recorded by Richard Carrington. Produced several Aurora Borealis that were visible near the Equator areas, such as the Caribbean and Colombia

United States (1921).

Damage was recorded on telegraph lines west of the Mississippi. The New England Railroad Central Station was destroyed by fire caused by short circuits

Quebec, Canada (1989).

A blackout left six million people with no electrical power for nine hours. Several New Jersey power transformers were short-circuited

Halloween Storm (2003).

Solar flares and coronal mass ejections interrupted telecommunications. Aurora Borealis could be seen in the South of Texas and Mediterranean countries. There were blackouts in Sweden. Warnings were issued for airlines to avoid flights at high altitudes

Distance between the various atmosphere layers and the Earth

Solar wind can impact the magnetosphere with a speed of 400 to 600 km/second

10000 km
Exosphere or magnetosphere

1000 km



Ionosphere

Aurora Borealis

60 km

Mesosphere

50 km

Stratosphere

6-20 km

Troposphere

Towards a public policy

Legislation



During 2014, the Civil Protection General Law acknowledges, for the first time, the existence of astronomic phenomena and the need to create and promote public policies related to such risks

Organization



Mexico has established a task force composed by Federal Public Administration agencies and entities to prepare diagnosis on the possible consequences of this phenomenon, and the vulnerability of various sectors

Monitoring and warning



Our country has the Mexican Space Weather Service (SCIESMEX) at UNAM. It is entrusted with collecting and distributing real time information on the Sun's conditions that may affect operation and trustworthiness of technological systems