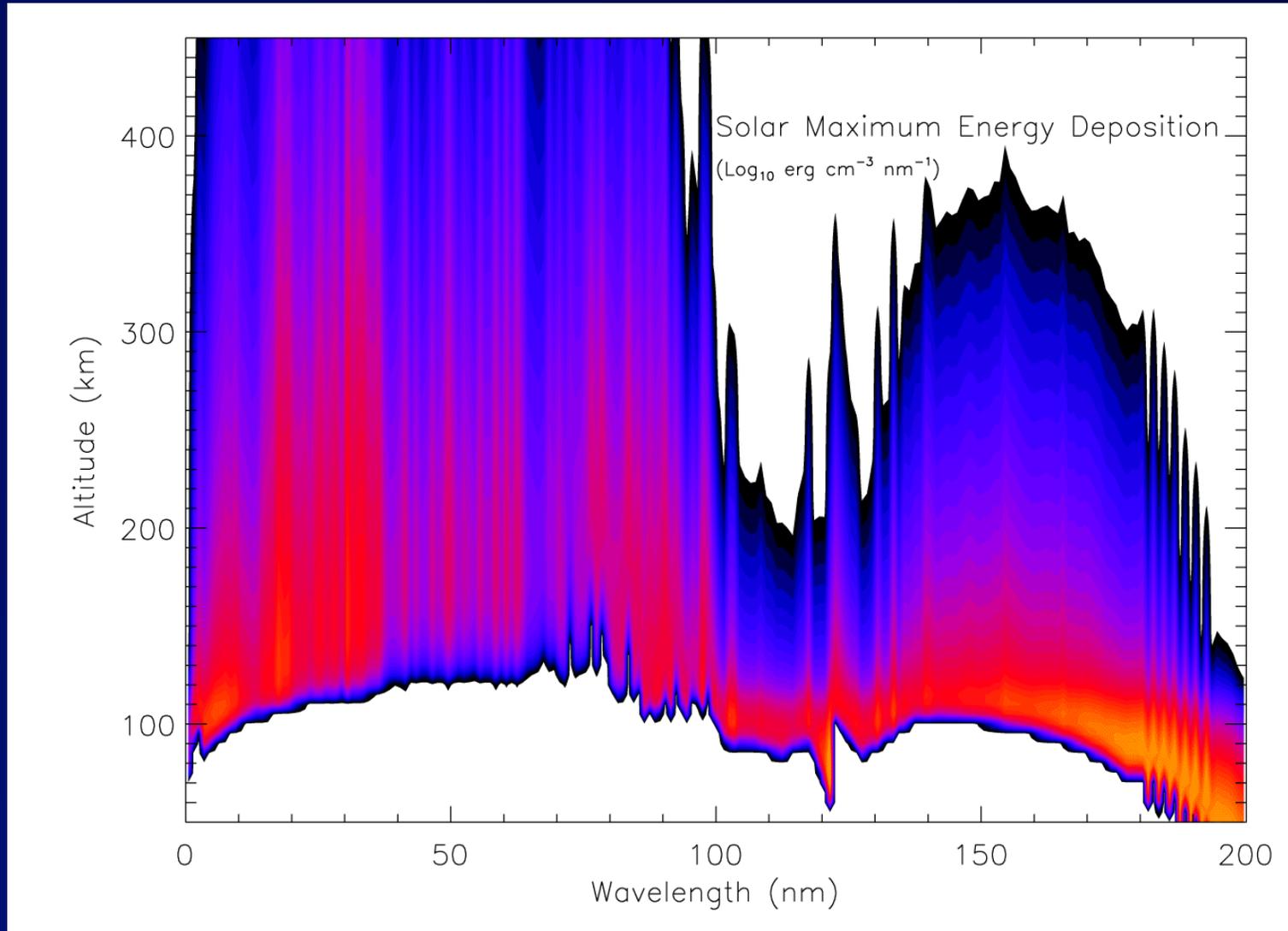


Absorption in Atmosphere



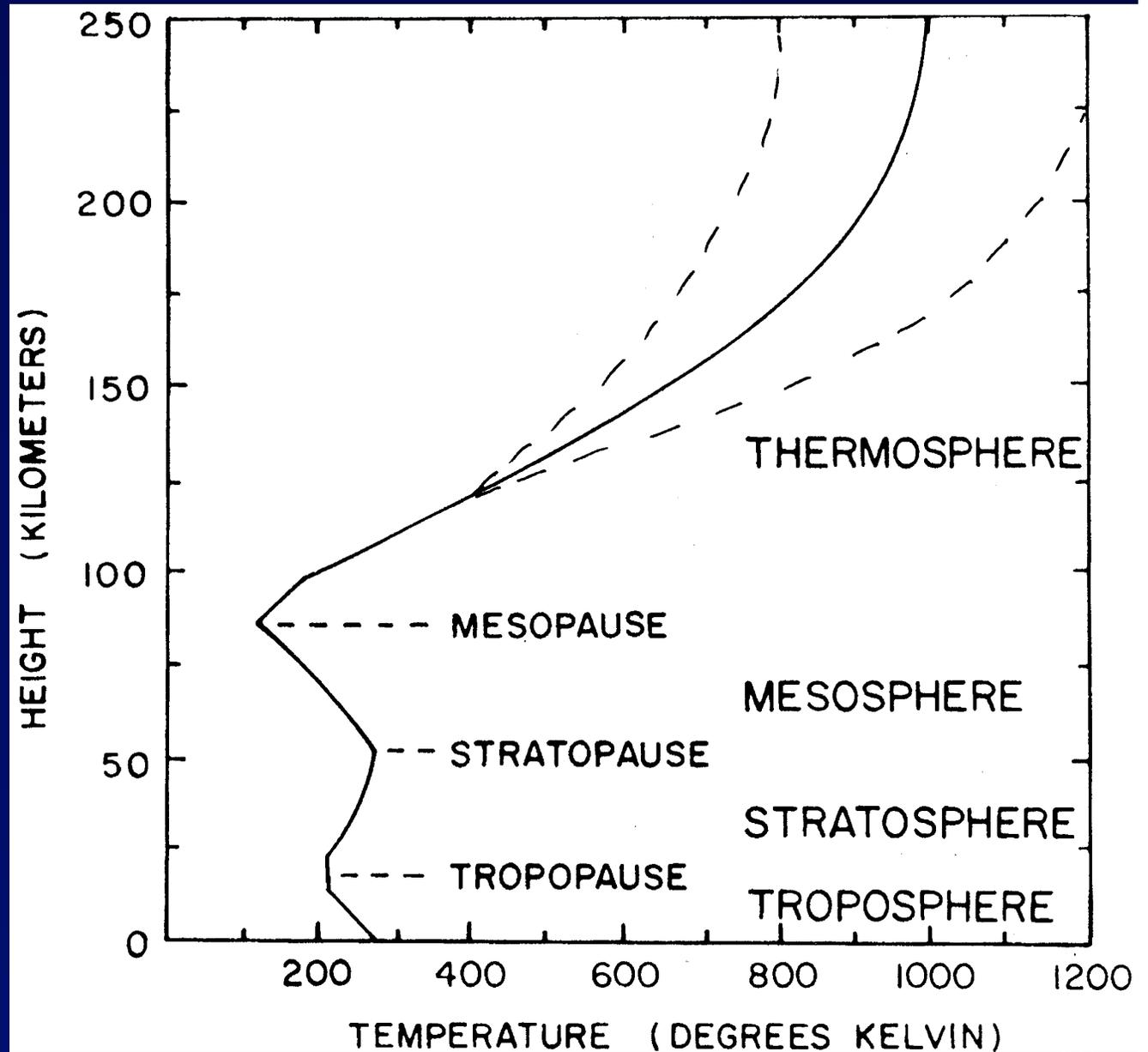
Typical Atmospheric Temperature Profile

EUV, FUV, Soft X-rays
absorption
and ionization heating

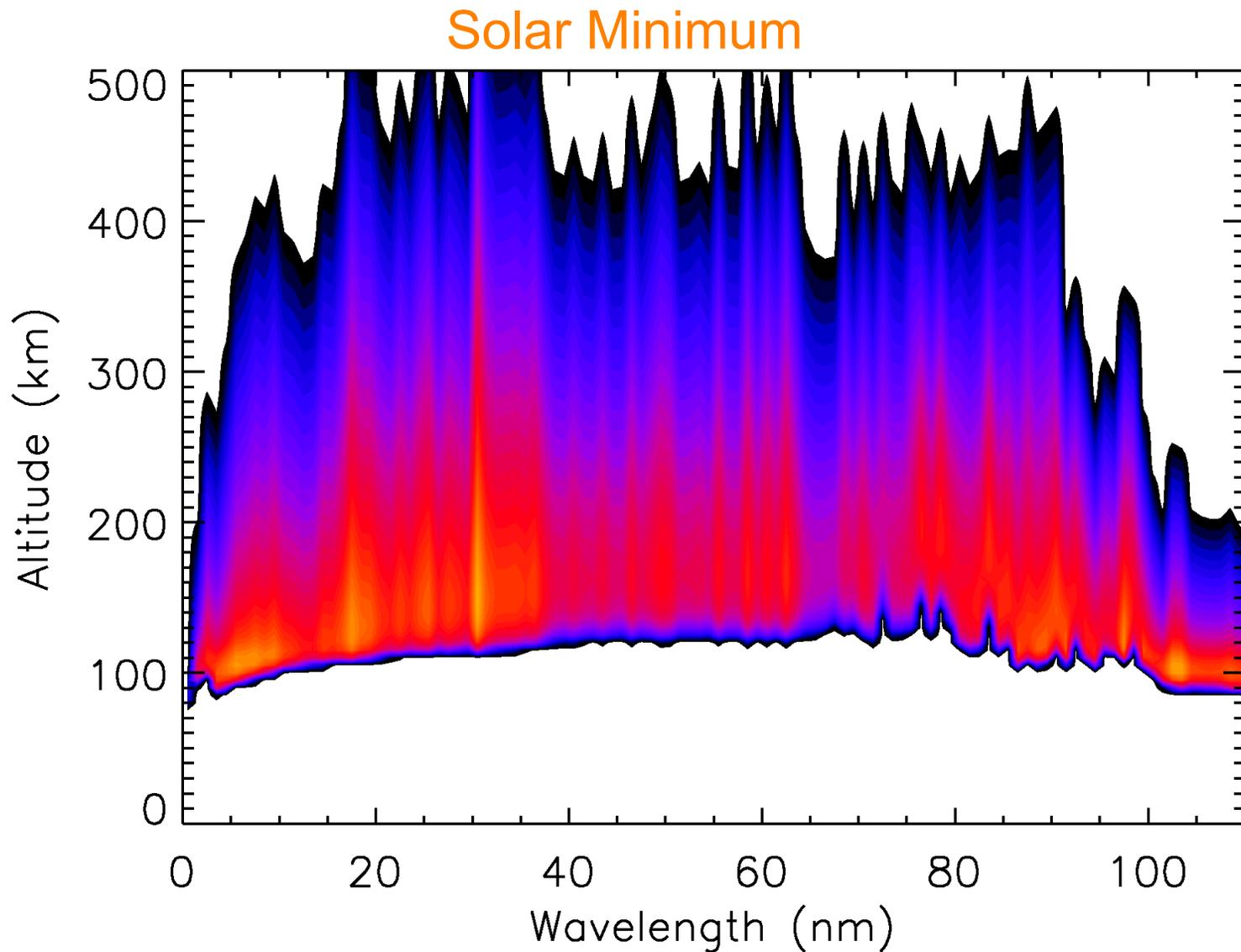
Primarily IR radiating to space
cooling,
Some FUV absorption heating

MUV Sunlight absorption by O_3
heating

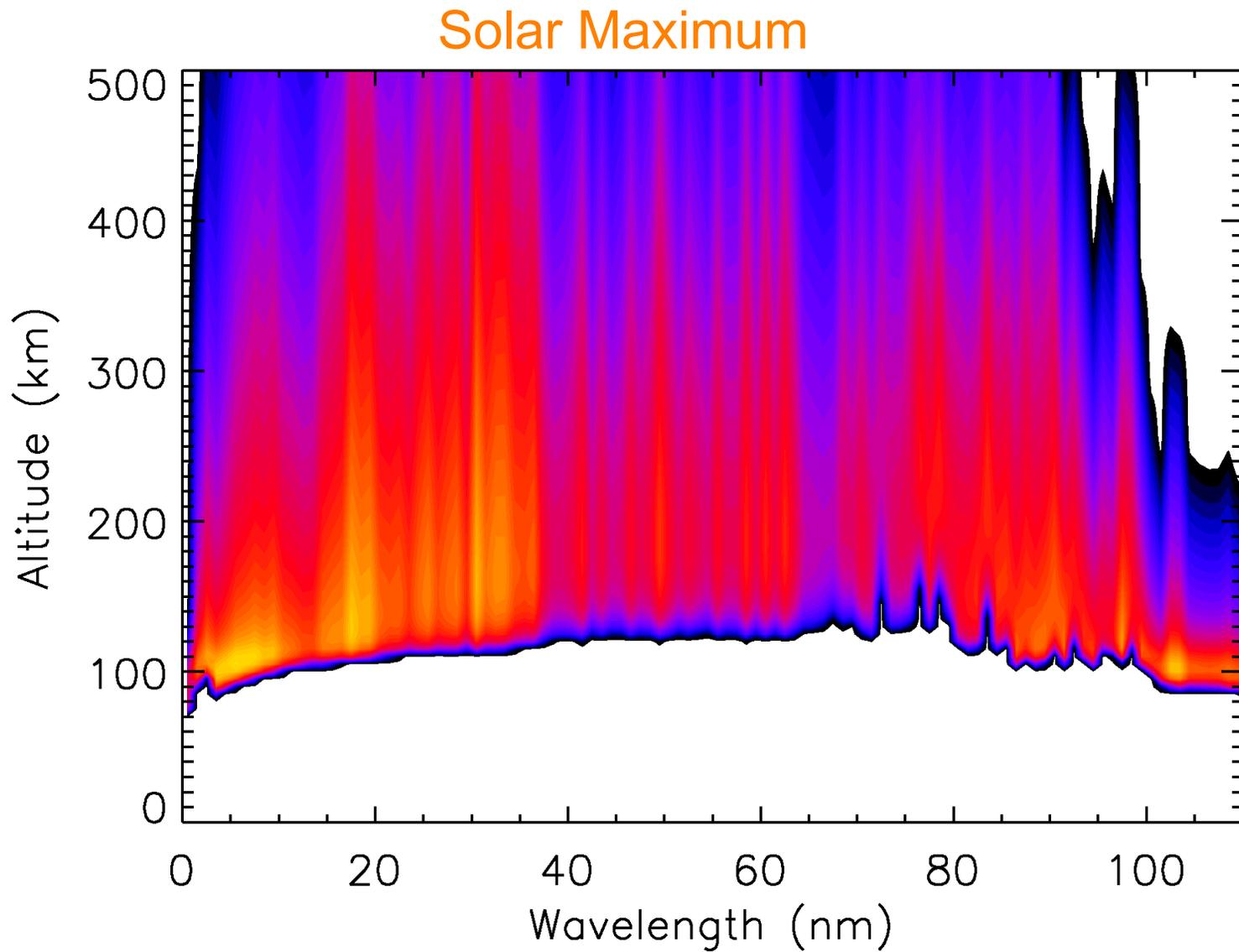
Visible, NIR, NUV absorption
of sunlight
by air and surface, surface heats
from below



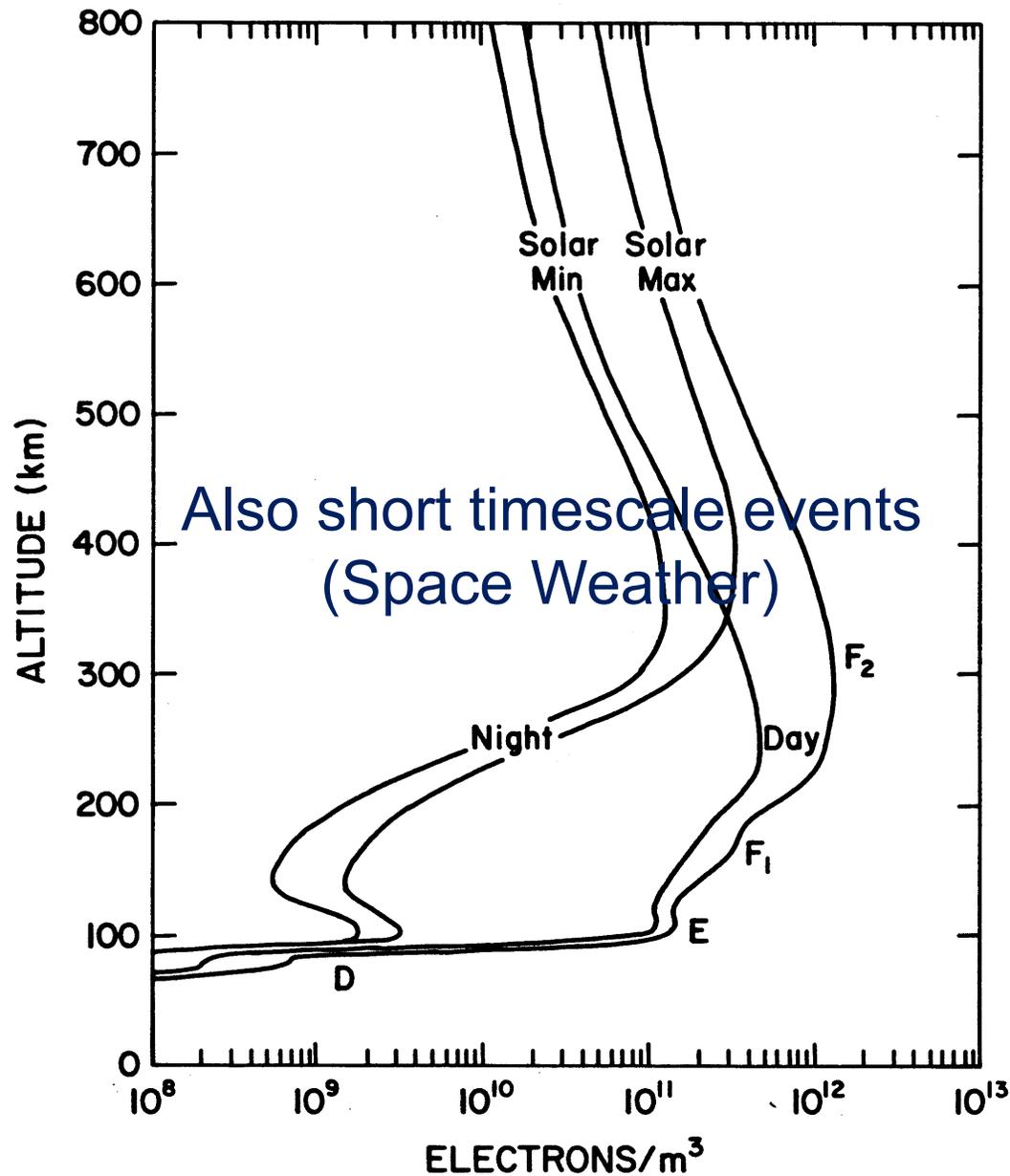
EUV Ionizes the Upper Atmosphere



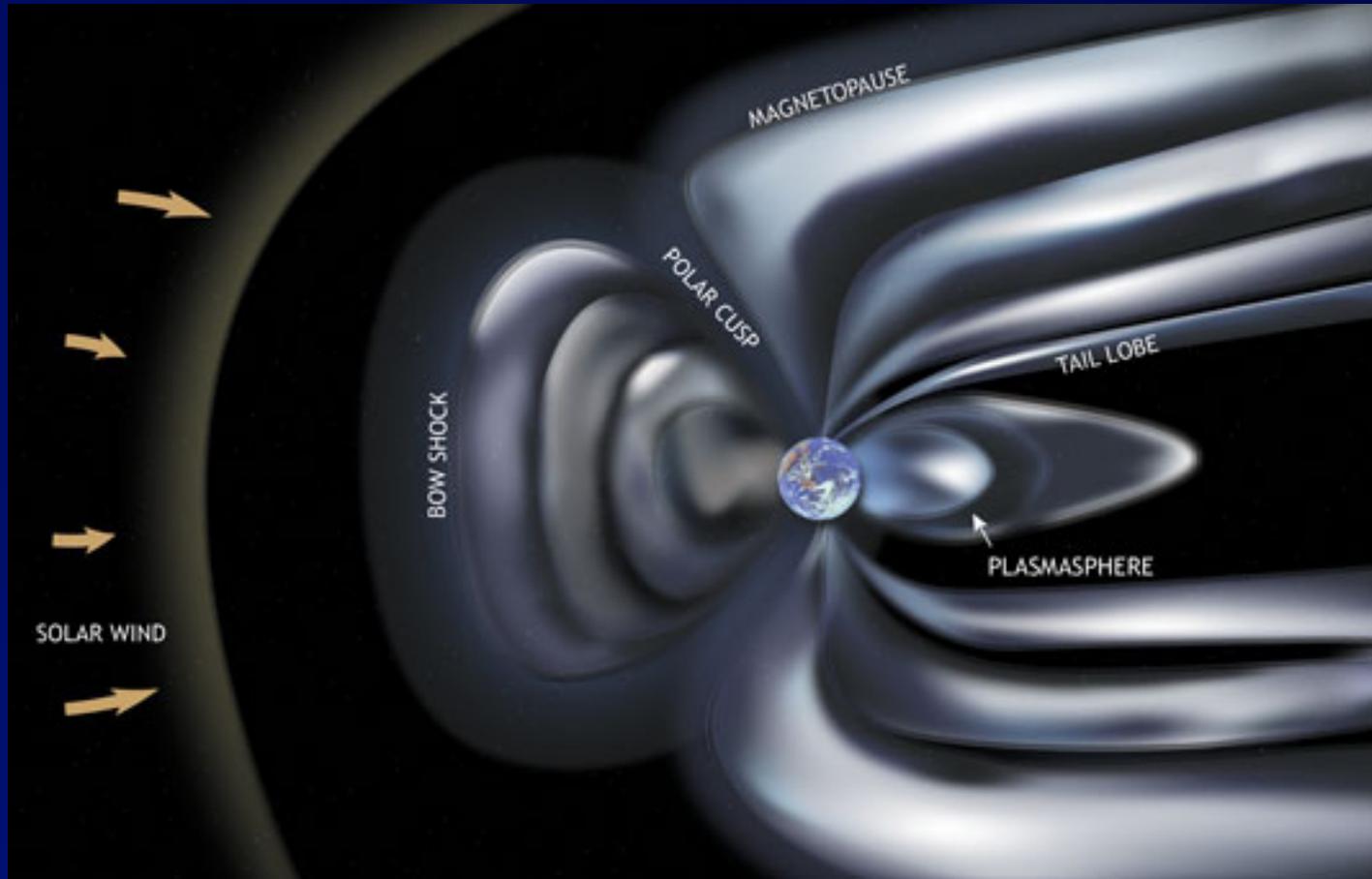
EUV Ionizes the Upper Atmosphere



Ionosphere Reaction to Solar Variability



Earth Has a Magnetic Field



Credit: Tsurutani, 2005

Space Weather?



This is Space Weather!



Quiz: What is wrong with this picture?



This is also Space Weather (SWx)



DiscoveryNews. ... imagines skinny dinosaurs.

EARTH | SPACE | TECH & GADGETS | ANIMALS | HISTORY | ADVENTURE | HUMAN | BRAIN GAMES

Discovery News > Space News > Zombiesat Attack! Solar Storm Fries Satellite's Brain

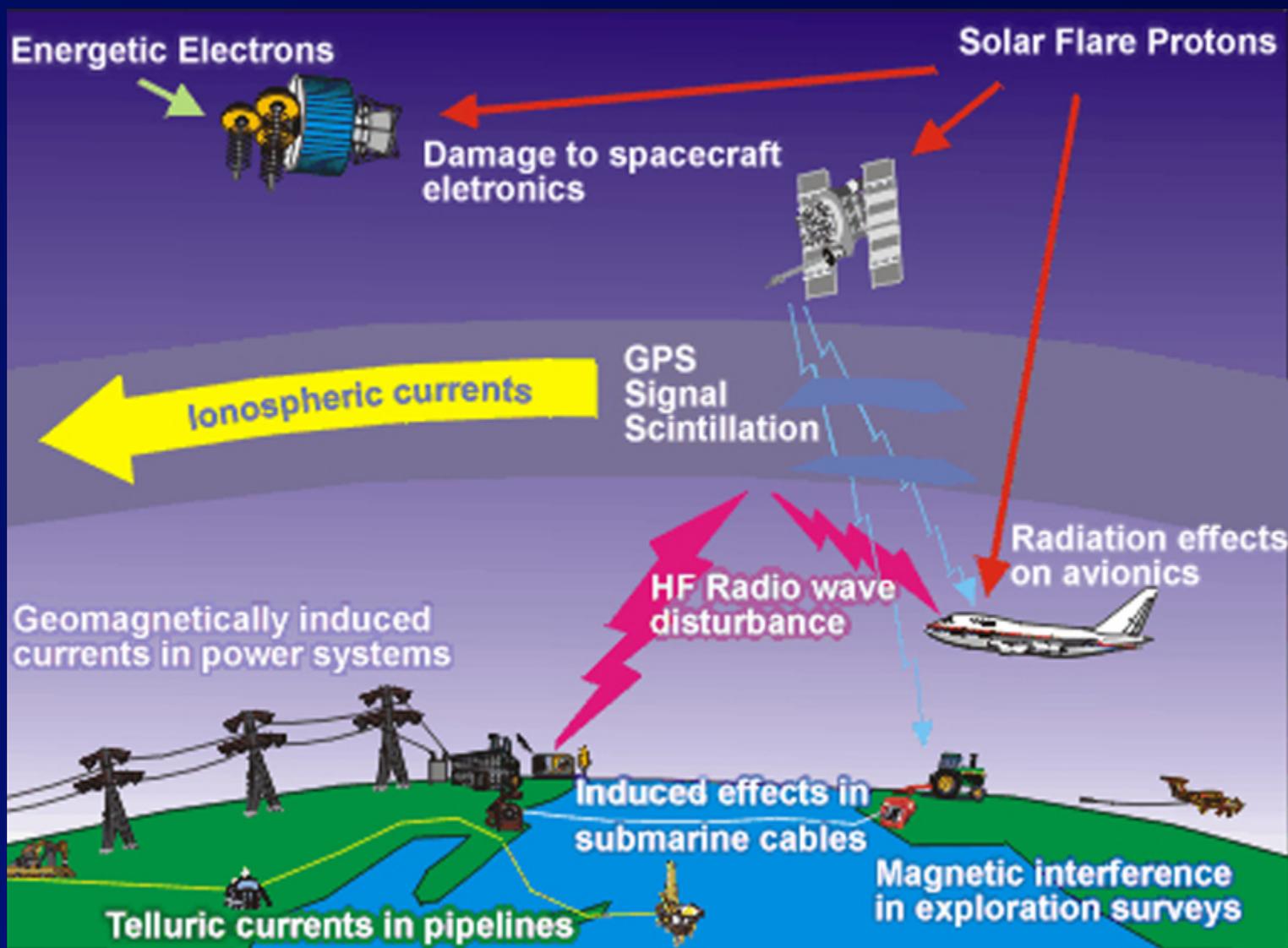
ZOMBIESAT ATTACK! SOLAR STORM FRIES SATELLITE'S BRAIN

Analysis by Ian O'Neill
Tue May 4, 2010 04:59 PM ET
(3) Comments | Leave a Comment

Like 325 people like this. Be the first of your friends. Tweet

What was Nicole saying? Something about the reasons why we should "care about the sun"? Right on cue, my Discovery News colleague has been proven right; it appears that a communications satellite has been hit by a solar storm, killing its ability to talk with Earth. It's now drifting past other geostationary satellites, at an altitude of 36,000 kilometers (22,400 miles), risking interruption of their services.

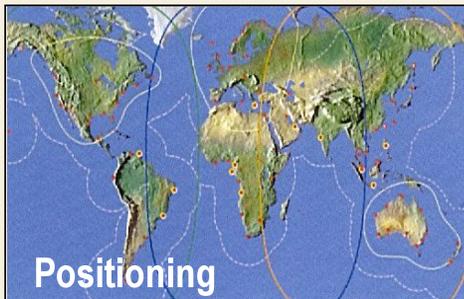
SWx and Technology



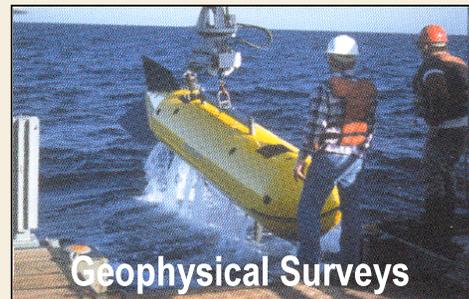
GPS Use Pervades Modern Society



Business Lines



Positioning



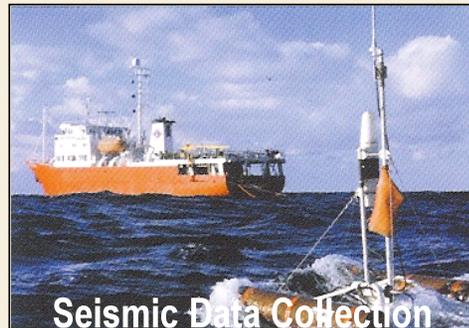
Geophysical Surveys



Marine Construction Support



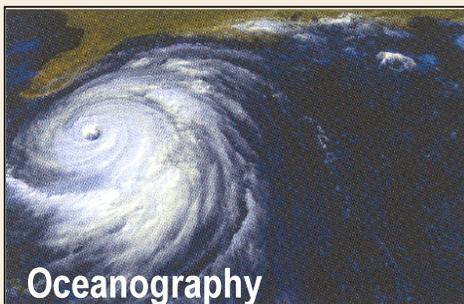
LIDAR Surveys



Seismic Data Collection



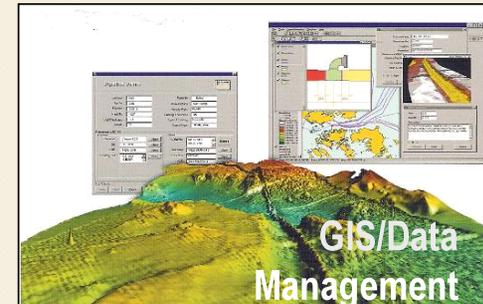
Submarine Cable Surveys



Oceanography



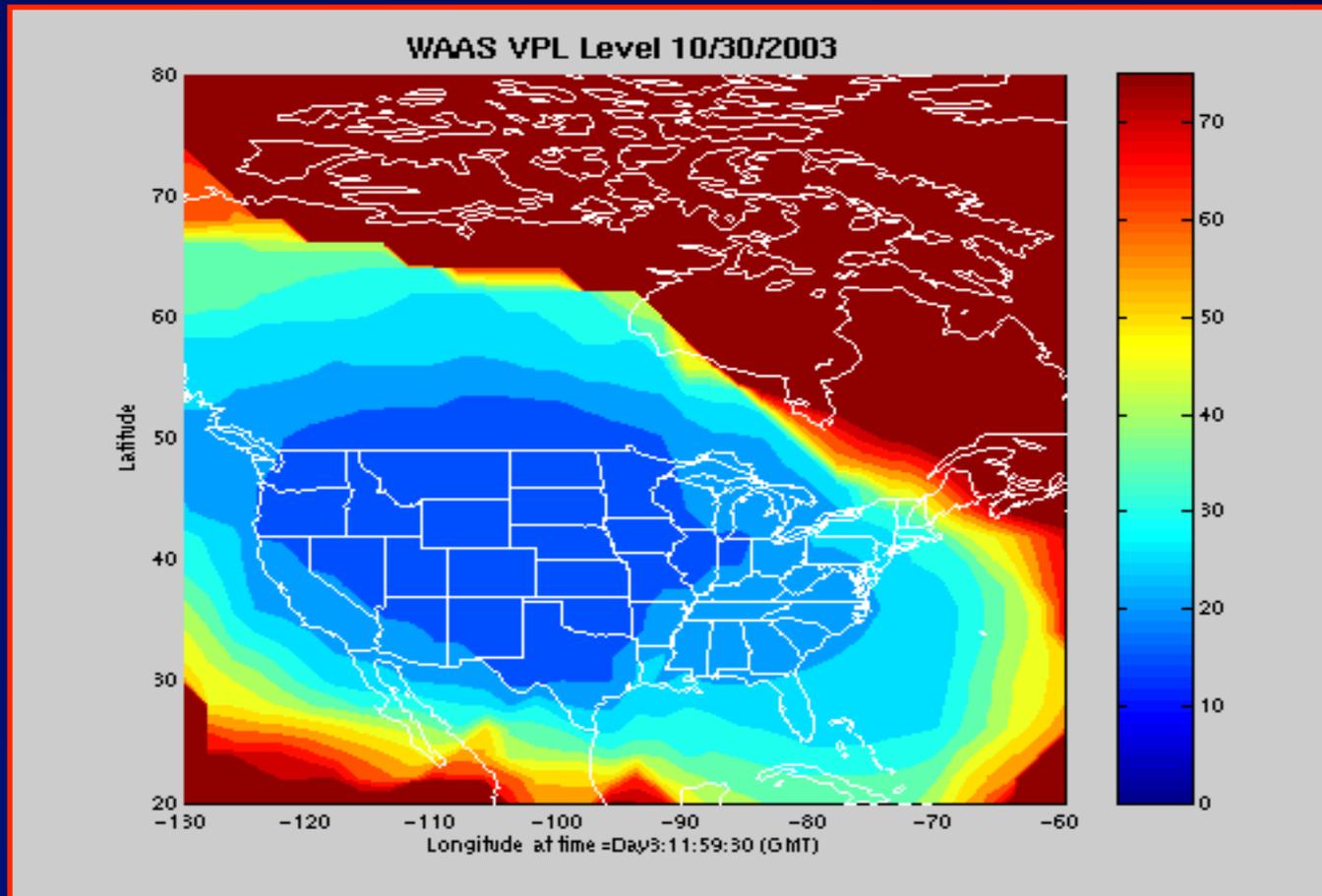
ROV / Diving



GIS/Data Management

WAAS Disruption (October 2003)

Ionosphere disturbances impact vertical error limits (< 50 m), defined by the FAA's Lateral Navigation/Vertical Navigation (LNAV/VNAV) specification: **WAAS not usable for 30 hours**



Early Detections of Solar Flares

Routine scientific observations of the Sun began soon after the discovery of the telescope in the early 1600s

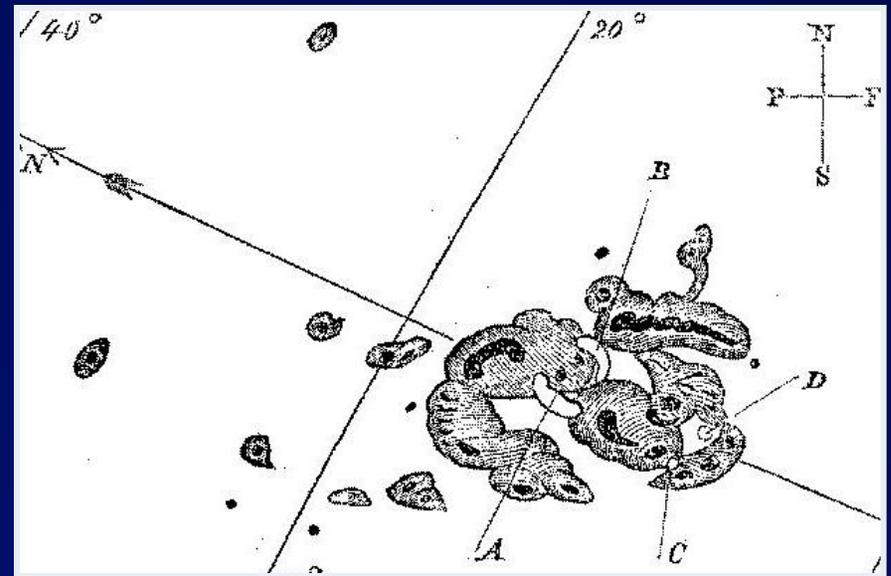
Stephen Gary observed flash in sunspot on Dec. 27, 1705

Richard C. Carrington noted visible light flare on Sept. 1, 1859 while making routine sunspot observation

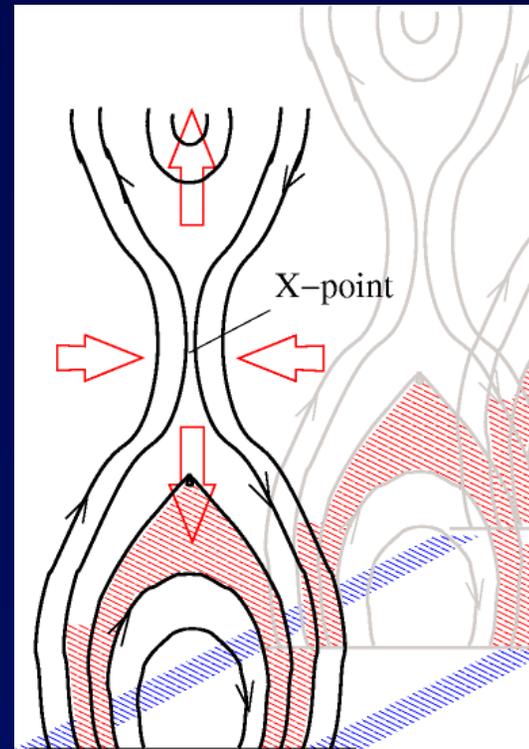
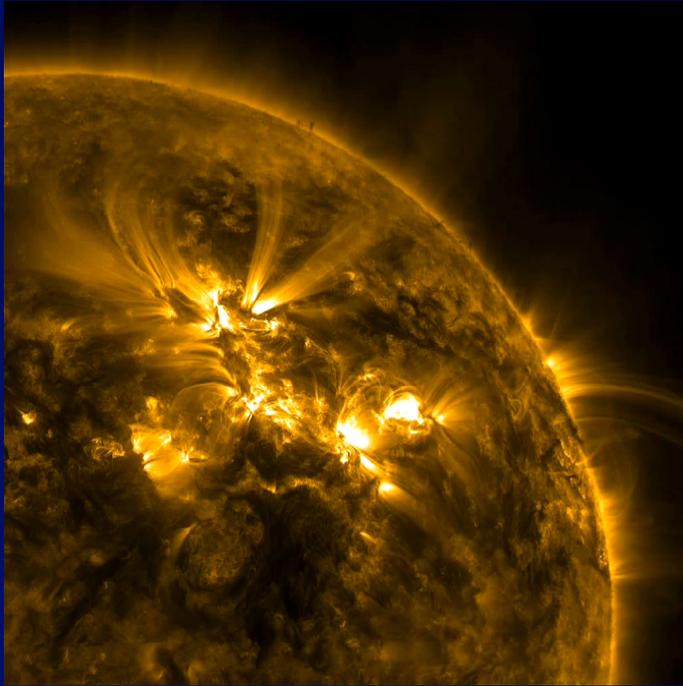
Drawing from Carrington

(*M.N.R.A.S.*, 20, 13, 1860).

This "Carrington Event" was the also first Space Weather event. Telegraph equipment failed, operators suffered shocks, and telegraph lines produced sparks.

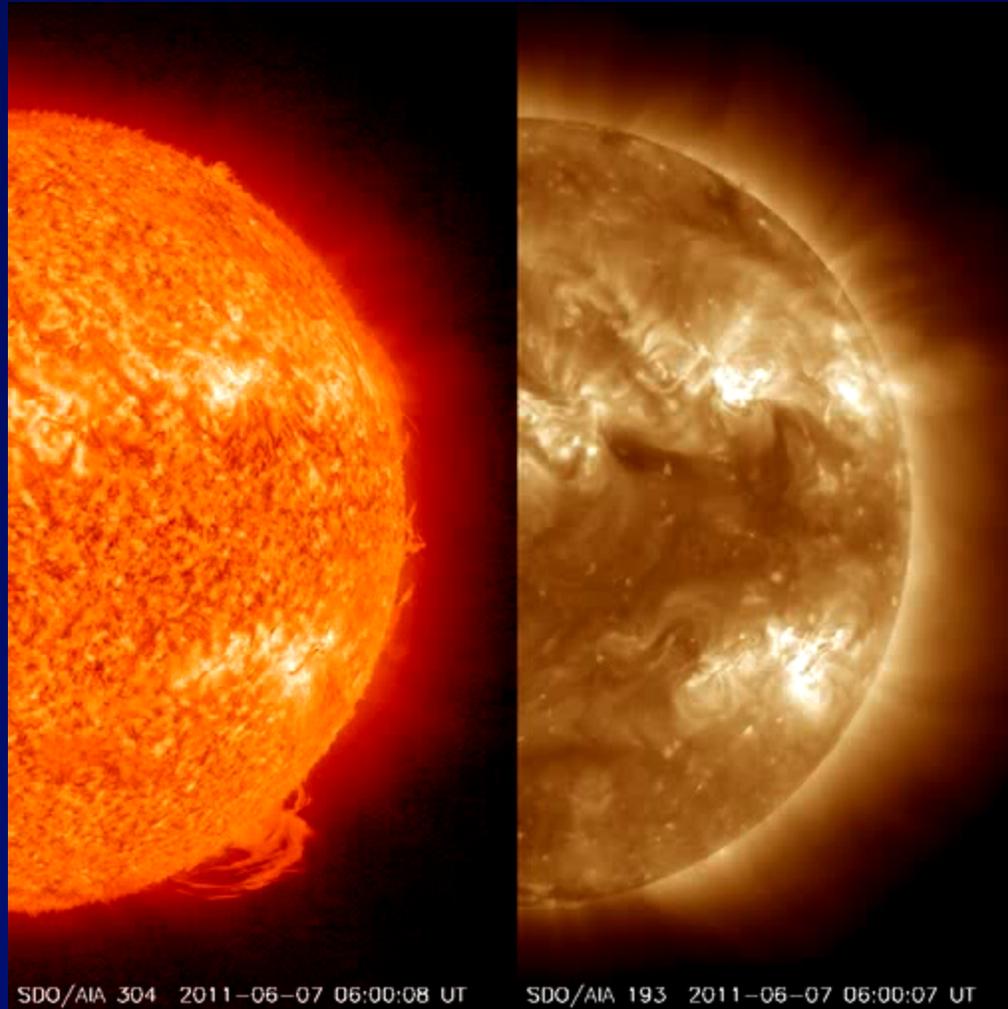


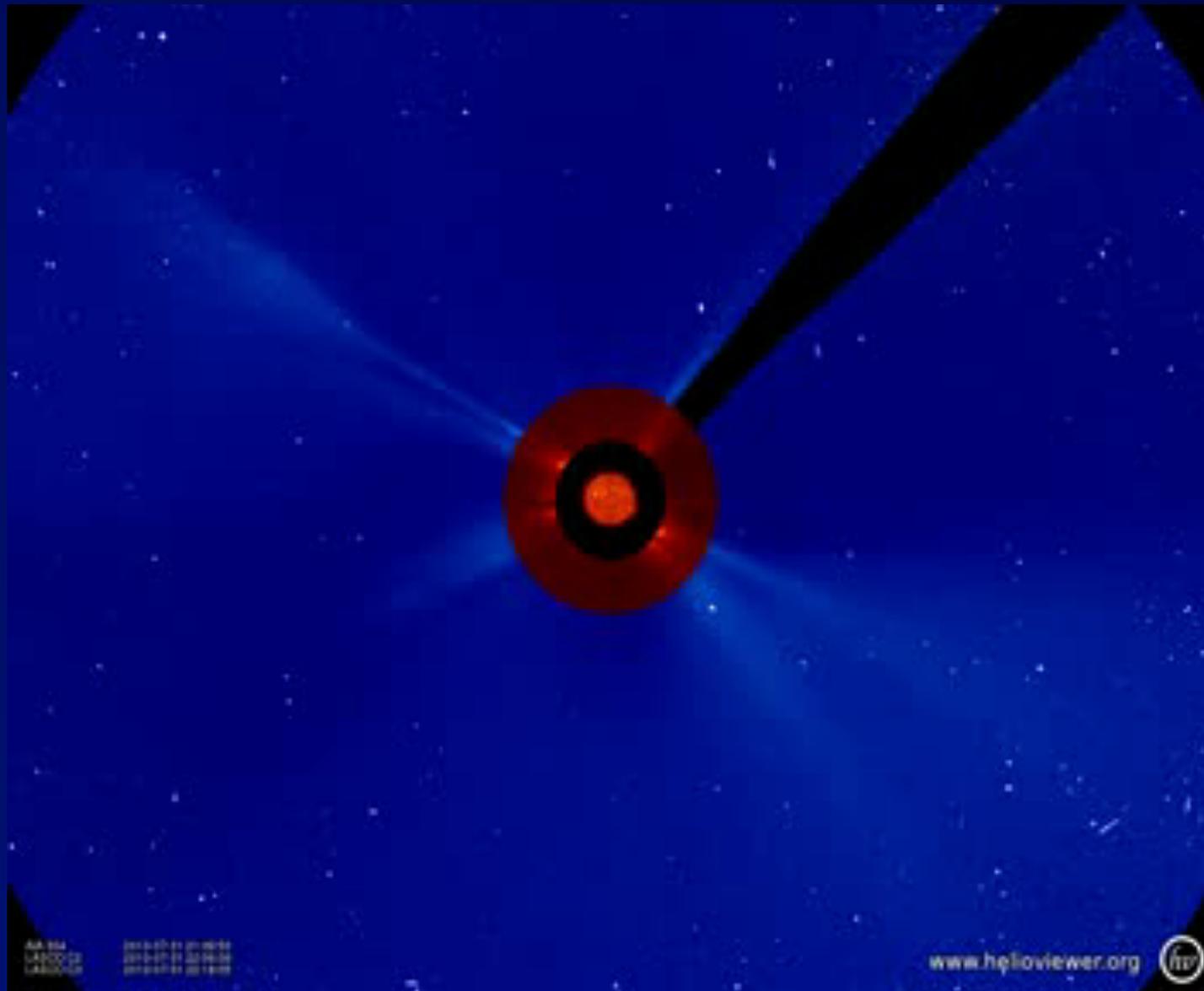
What is a Solar Flare?



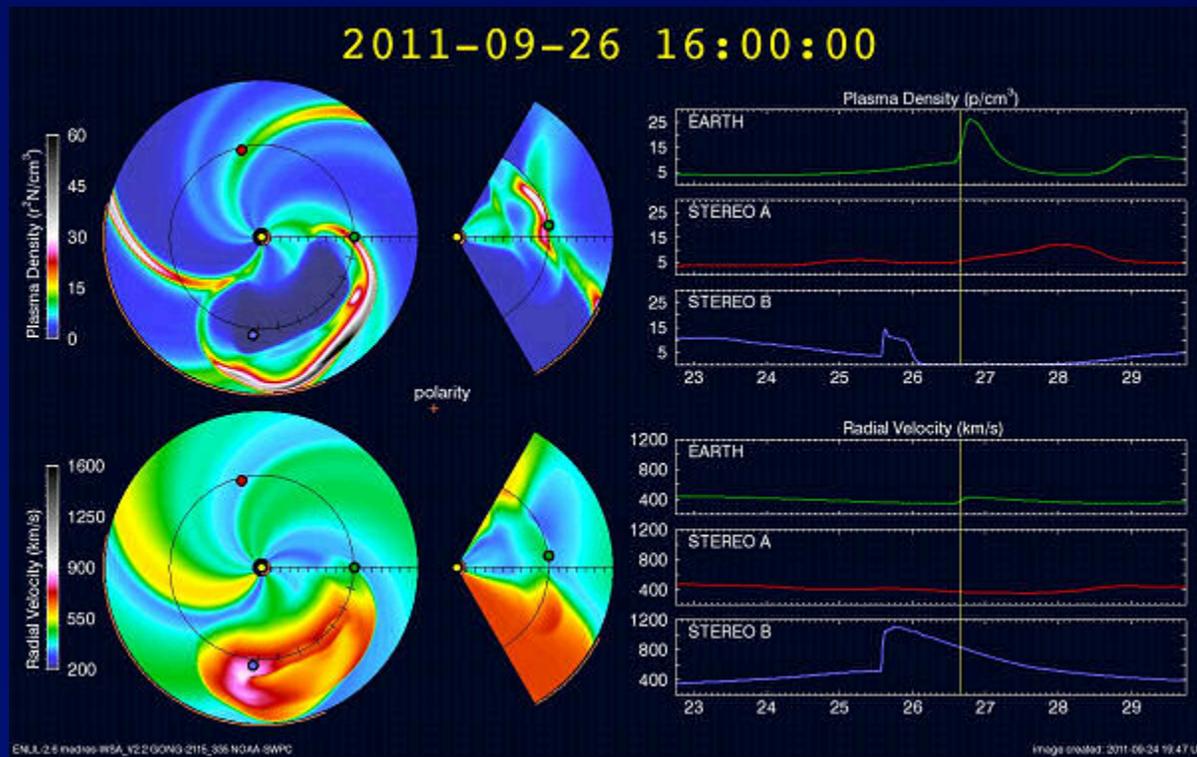
Energy stored in magnetic field is released when opposite polarities reconnect. The surrounding gas glows brightly from the high energy particles, and plasma trapped in magnetic fields be ejected.

Does the ejected material go anywhere?





Understanding and Predicting SWx



Summary

The Sun-Earth system is a complicated network of interactions.

Light from the Sun powers the climate system.

The Sun's magnetic field modifies the solar output on both long and short timescales.

The Earth's magnetic field can interact with the solar wind to produce space weather effects.