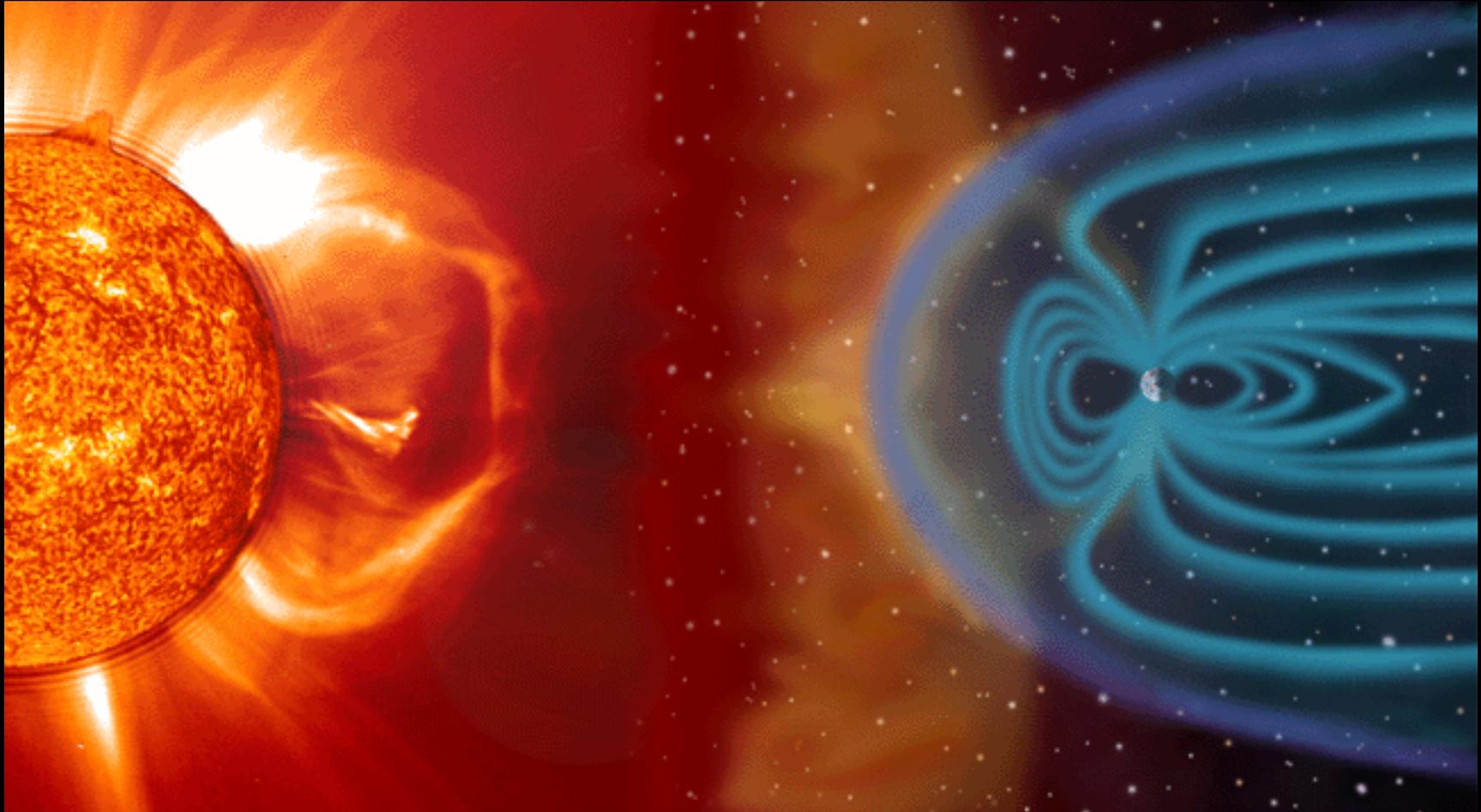


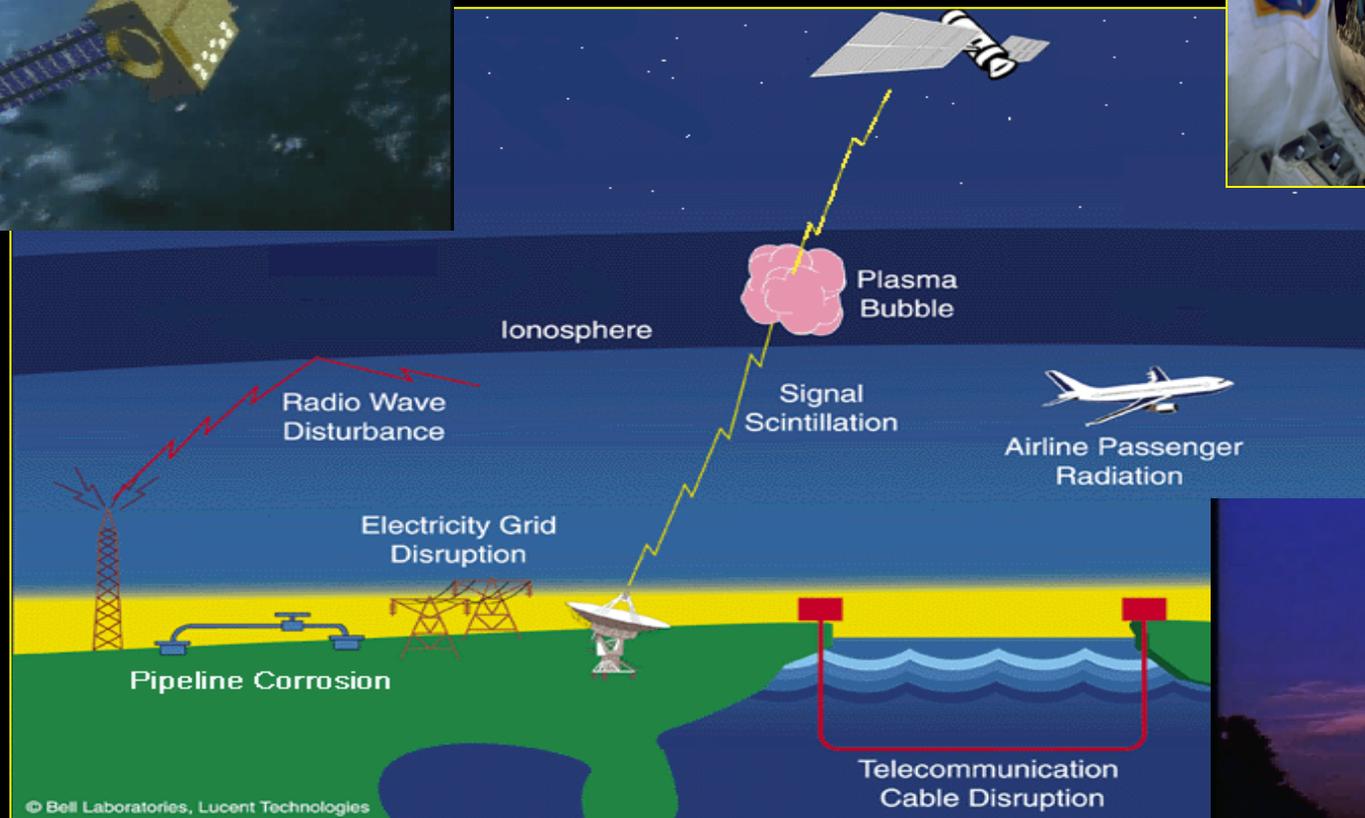
Heliophysics and Rockets

Paulett Liewer, Manager,
Astrophysics and Space Sciences Section 326



Heliophysics: Solar activity & variability and effects throughout the solar system and beyond , but especially effects on Earth and on our technologies (Earth & Space)

Effects of Solar Storms: Space Weather



Flares: Relativistic solar energetic particles (SEPs) rapidly reach Earth

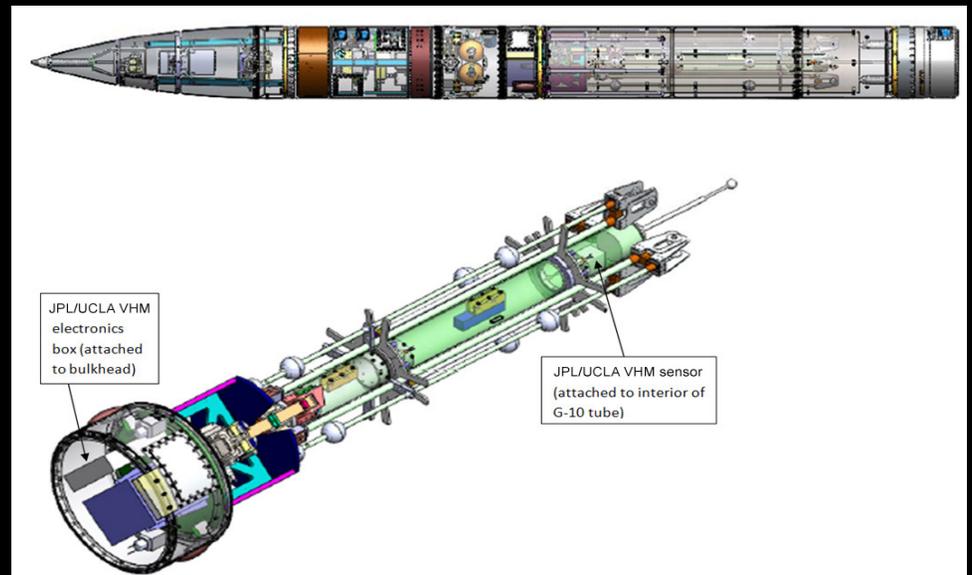
Coronal Mass Ejections: Slower ($< 2000\text{km/s}$), but more energy and SEPs

And cause of major geomagnetic storms



JPL Advanced Helium Magnetometer First Flight

- **Dynamo Mission:** characterize winds and currents in the daytime lower ionosphere (90-120 km) – R. Pfaff, GSFC, P-I
- JPL/UCLA Compact Helium magnetometer (Murphy/Angelopoulis) is one of several instruments
- Science measurements plus first flight for this advanced magnetometer
- Other JPL instruments (e.g., Lyman α magneto-optic filter, particle detectors) could use rocket flight for testing



Solar Physics and Rockets

Rockets extremely important to solar physics – historically and currently

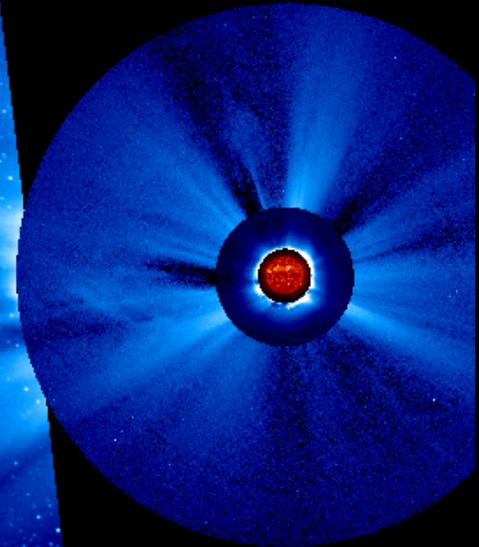
- First observation of the changing solar corona from a rocket – borne coronagraph (Naval Research Laboratory)
- First view of the X-ray Sun from rocket-borne X-ray telescope
- Now, NRL, MSFC flying very large, massive instruments with much higher spatial resolution than current space-based telescopes to look for fine structure of coronal loops
 - Analysis of current observations suggests the loops we see are made up of many unresolved strands



Solar Storms & Coronal Mass Ejections



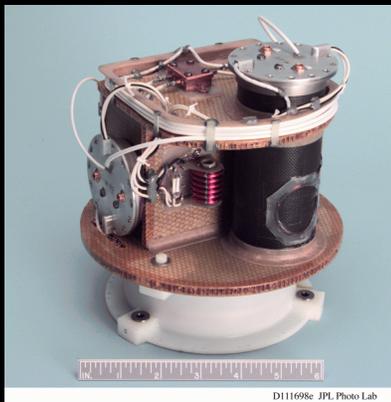
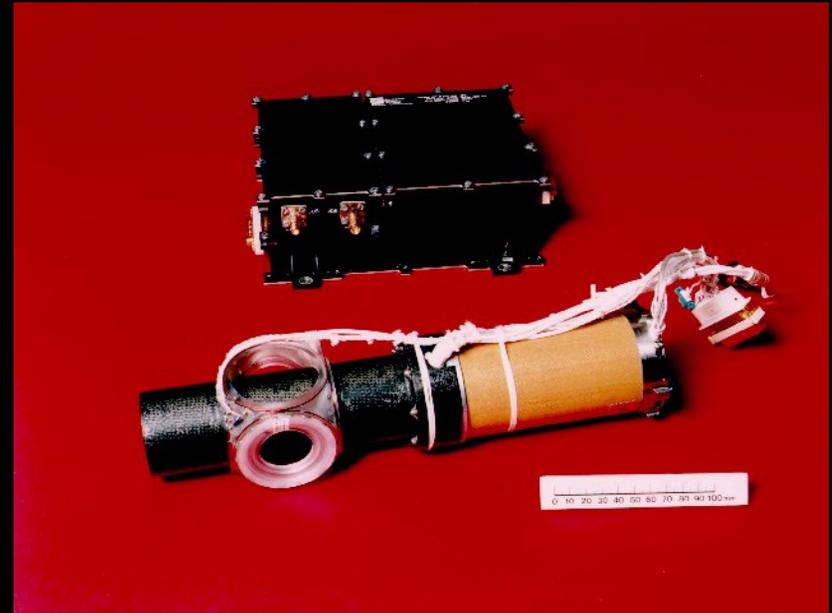
STEREO-Ahead
04 Oct 2011
06:50 UT



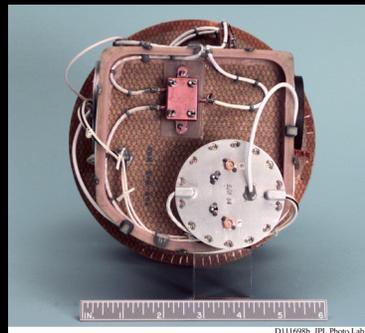
CMEs Imaged by SECCHI Telescopes on NASA STEREO

Helium Magnetometer Heritage

- o Vector Helium Magnetometer
 - Mariner 4 (1964)
 - Mariner 5 (1965)
 - Pioneer 10, 11 (1972, 1973)
 - ISEE-3 / ICE (1978)
 - Ulysses (1990)
- o Vector/Scalar Helium Magnetometer
 - CASSINI (1997)
- o Scalar Helium Magnetometer
 - SAC-C (2000)



D111698c JPL Photo Lab



D111698b JPL Photo Lab