

CORONAS-F Mission Results of the Sun and Solar-Terrestrial Relations Investigations

V.D.Kuznetsov

March 1, 2006

Vienna



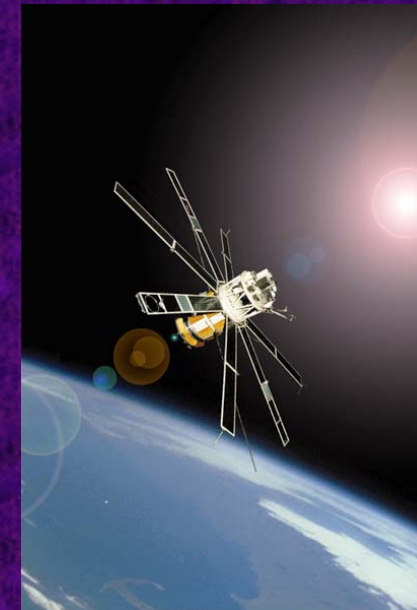
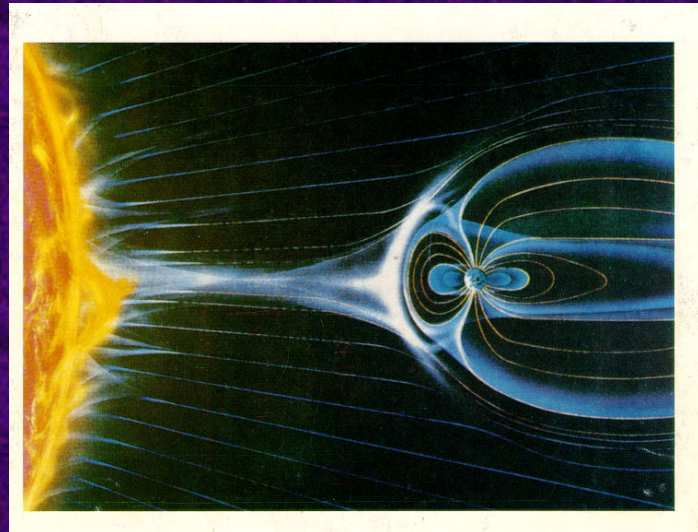
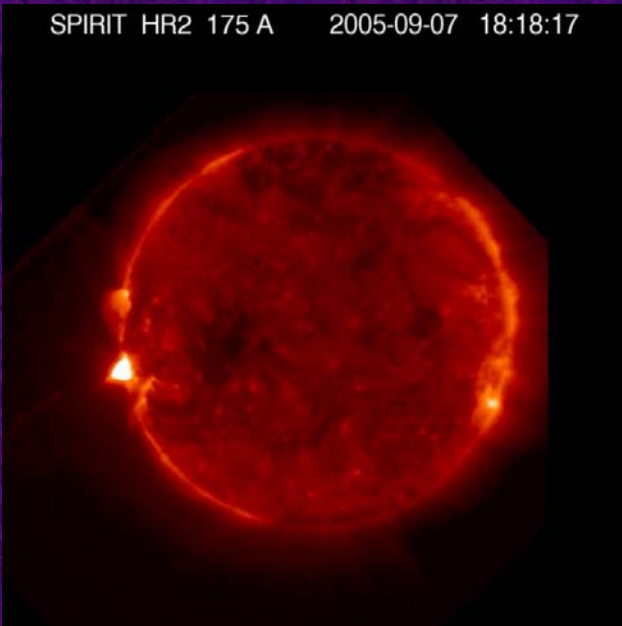
Sun



"Sun-Earth"
System

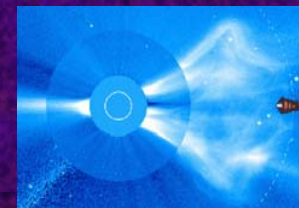
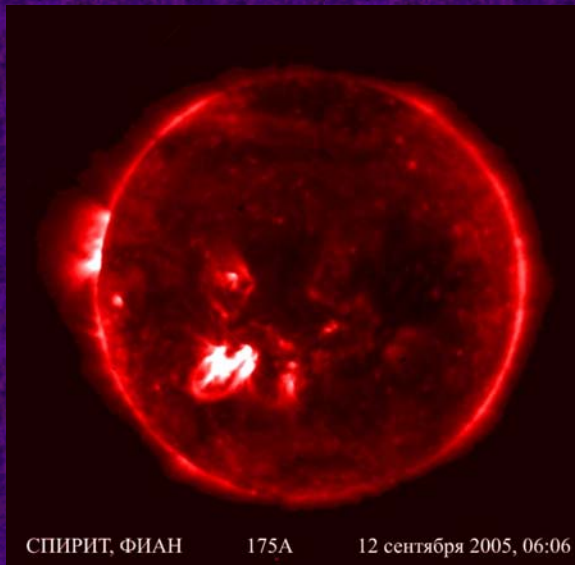
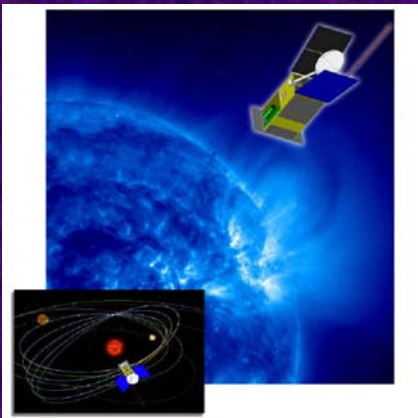
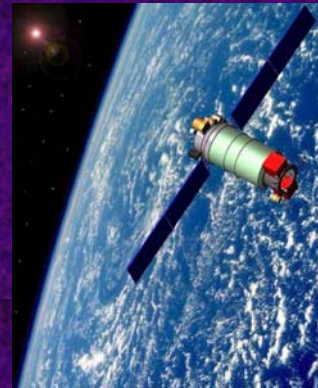
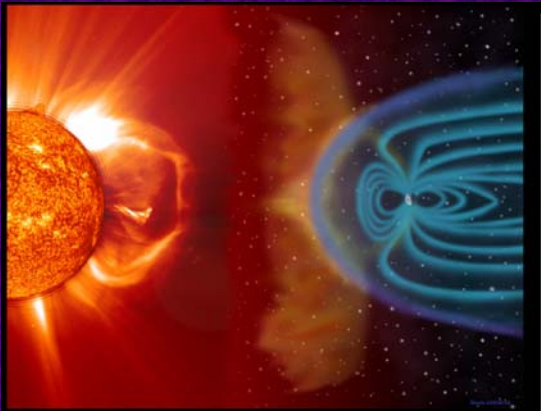
CORONAS-F
satellite

SPIRIT HR2 175 A 2005-09-07 18:18:17

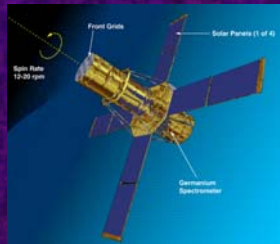
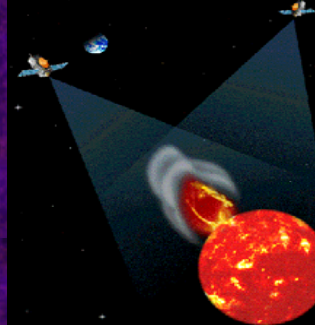


Space Research of the "Sun-Earth" System

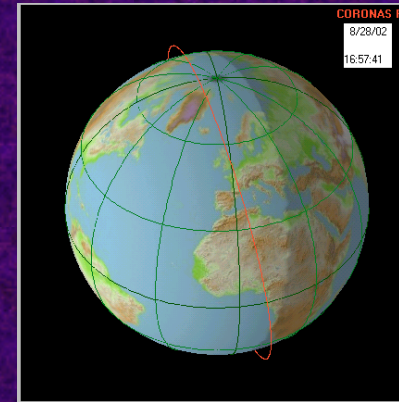
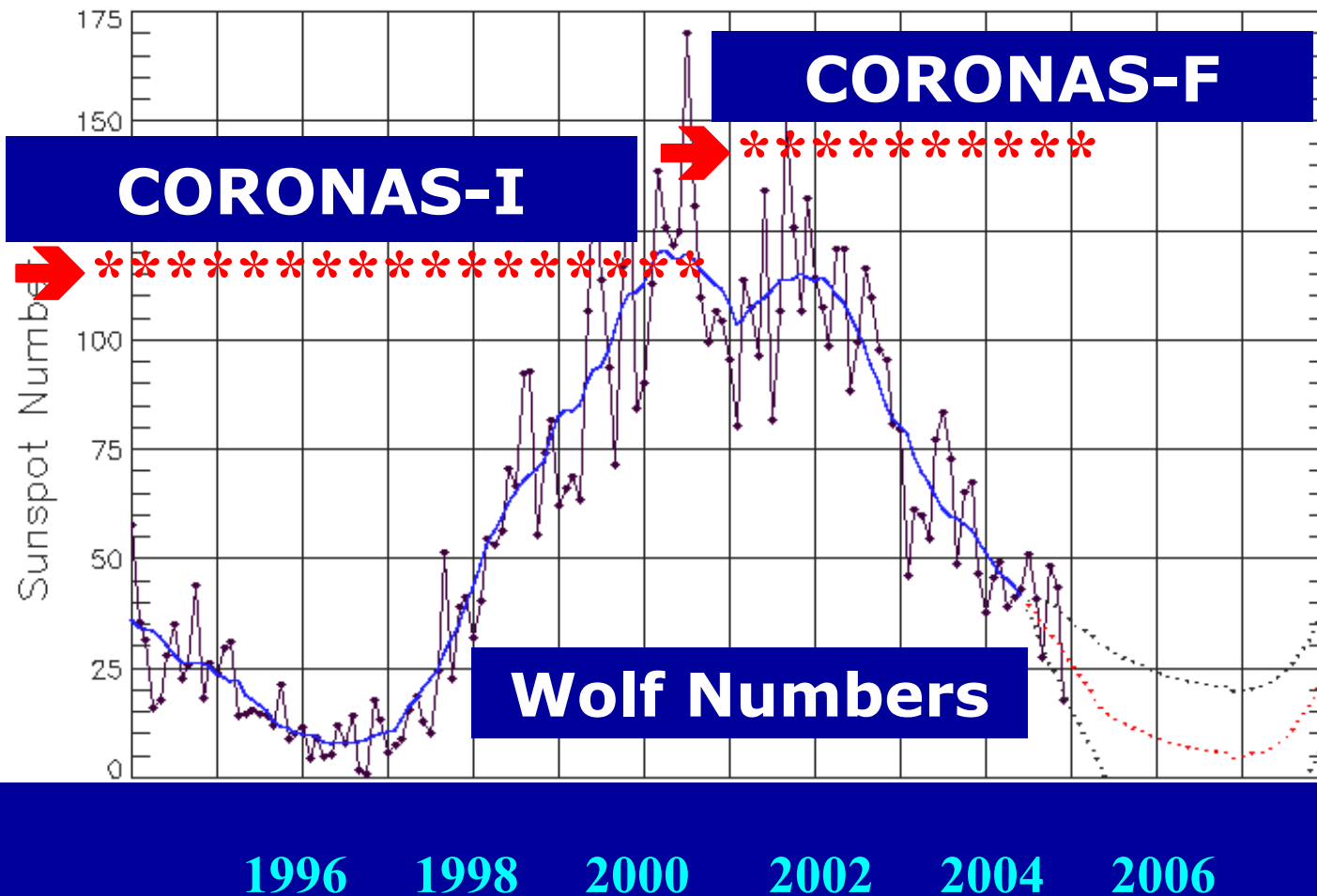
CORONAS-F



Solar Stereo Mission

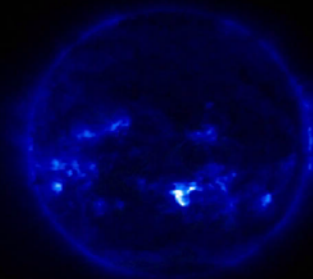


Observations of the Sun during 23th current solar cycle by CORONAS satellites

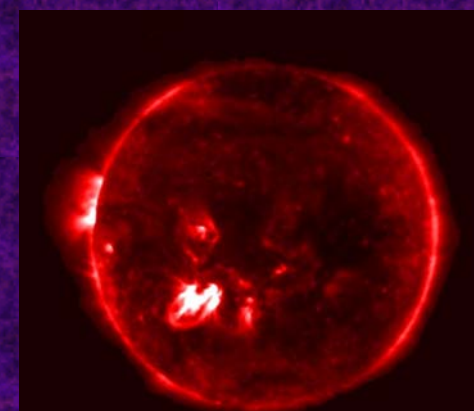


Extreme Events in "Sun-Earth" System

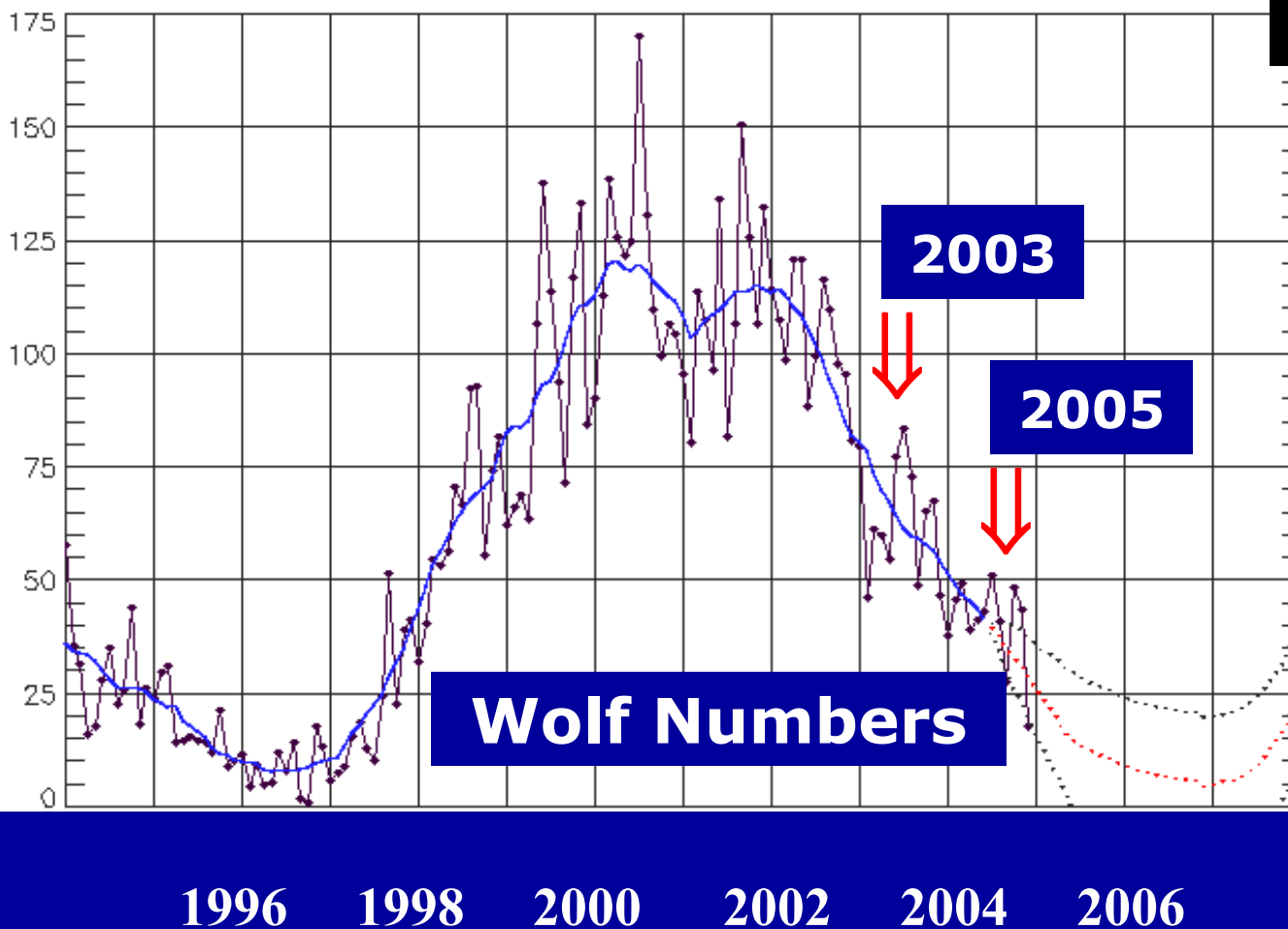
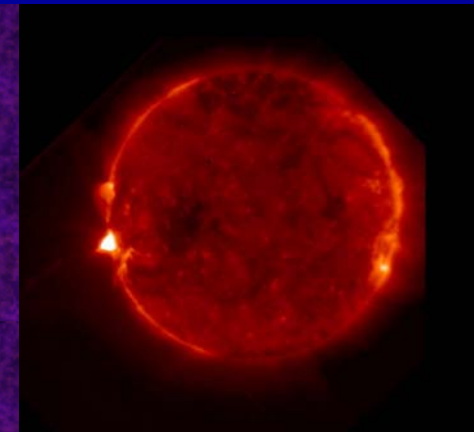
October-
November, 2003



SPIRIT: HR2 175 A

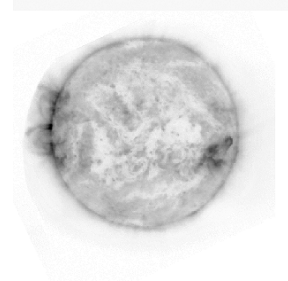
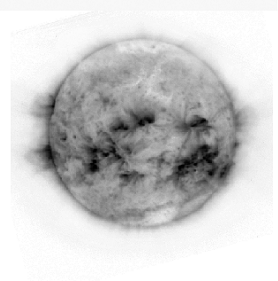


September, 2005



Extreme Solar Events

15 October-29 November 2003



2003-10-15 13:38:12



SPIRIT: HR2 175 A

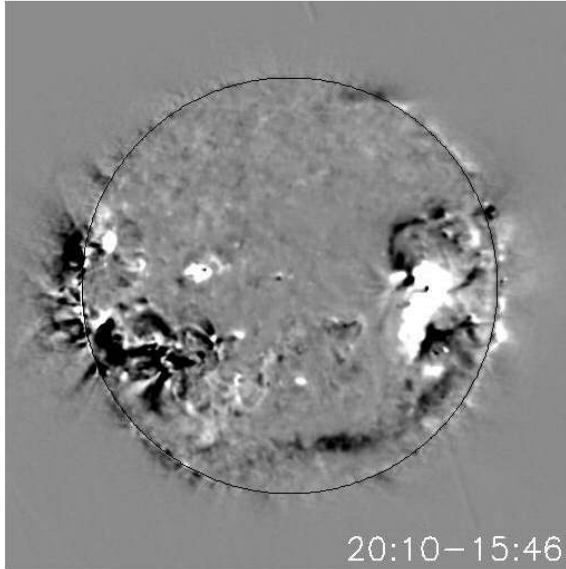


Large Solar Flares and Ejections in October 26, 2003

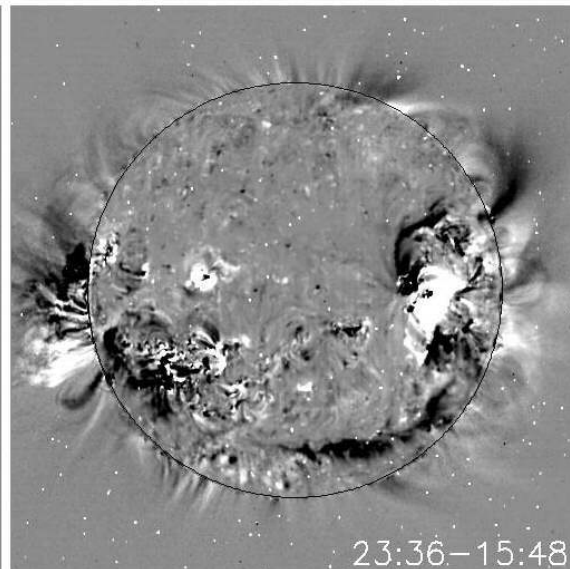
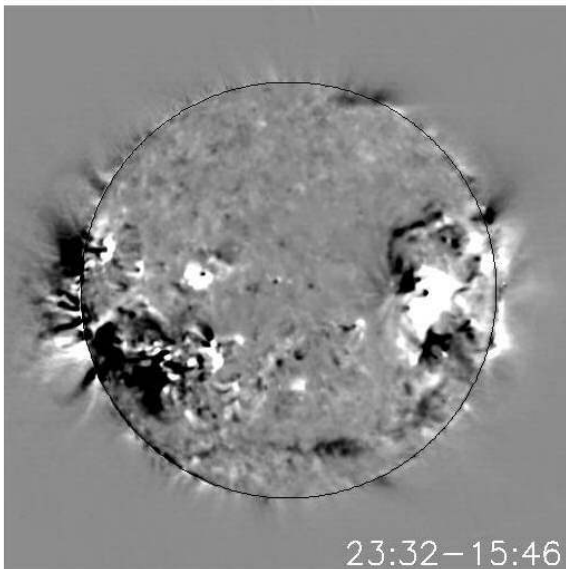
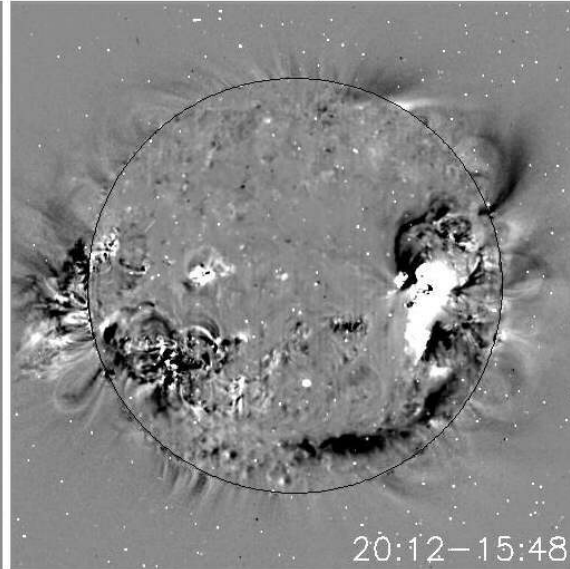
CORONAS-F and SOHO spacecrafts

26 October 2003

CORONAS-F/SPIRIT, 175 A



SOHO/EIT, 195 A



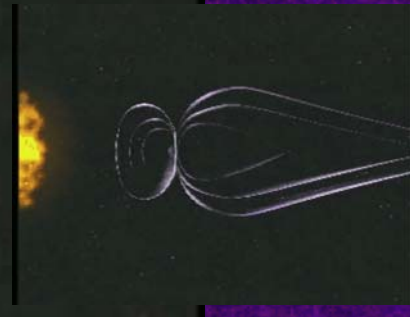
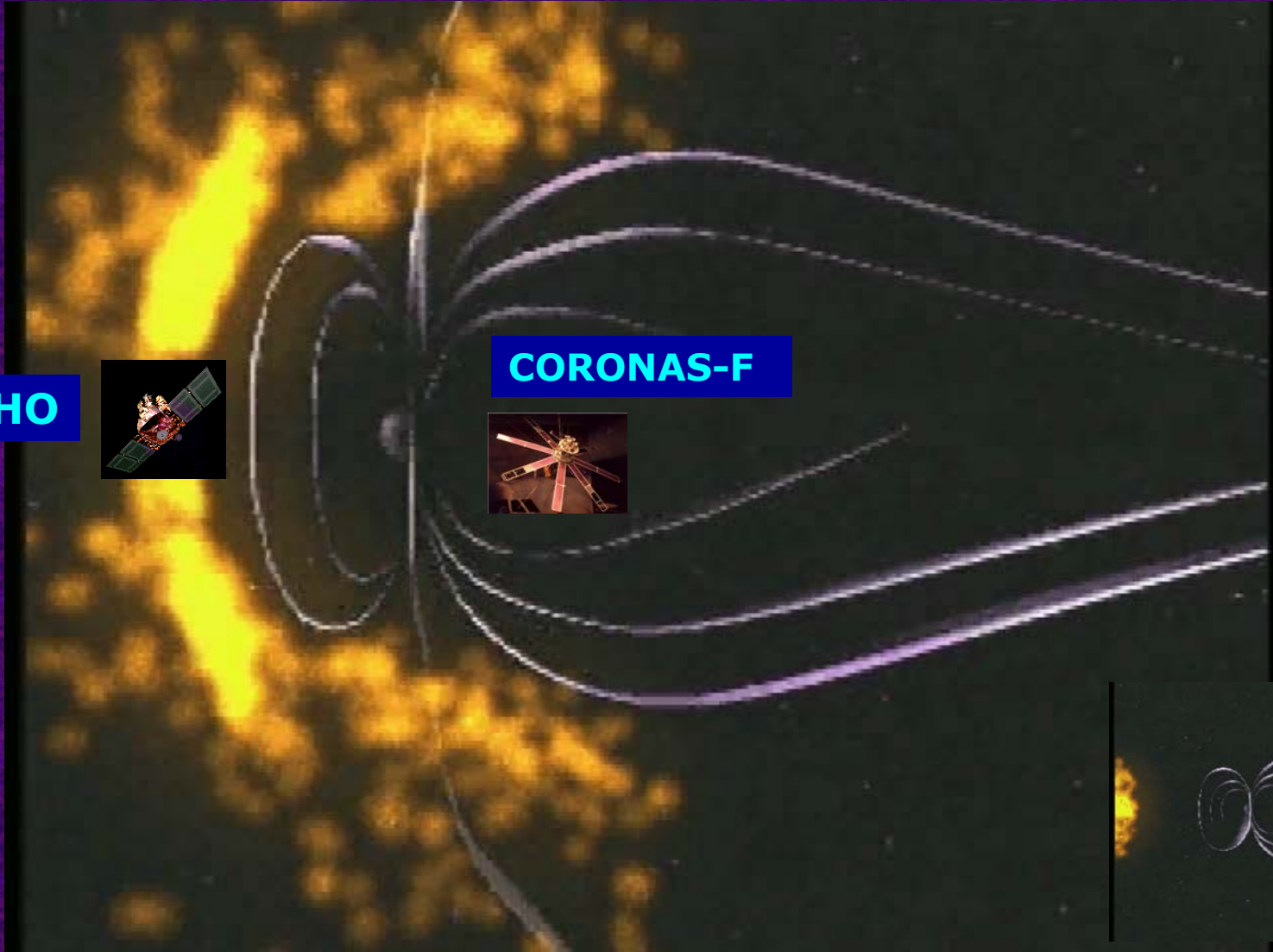
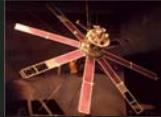
Magnetosphere of the Earth

Magnetic shield

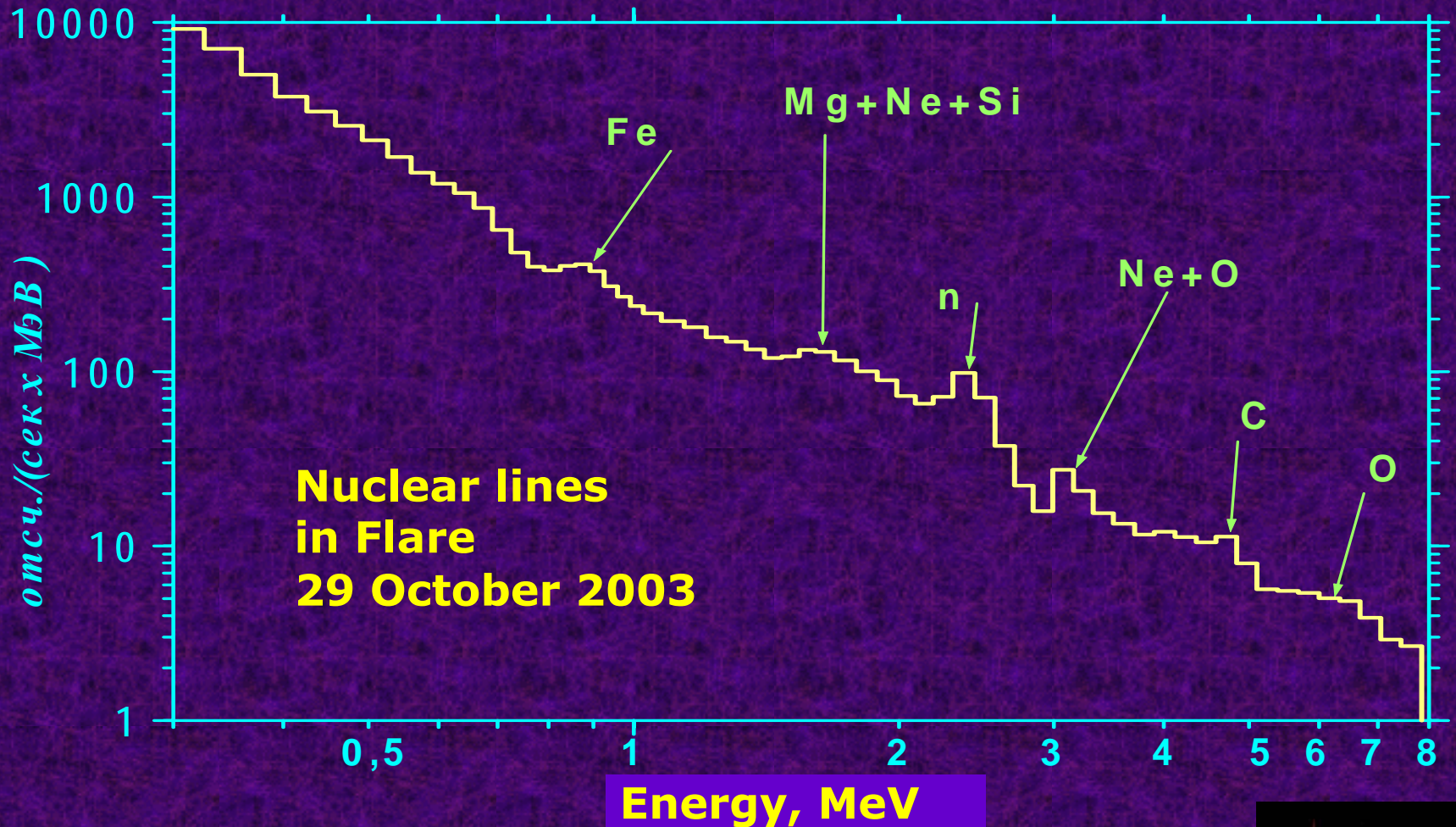
SOHO



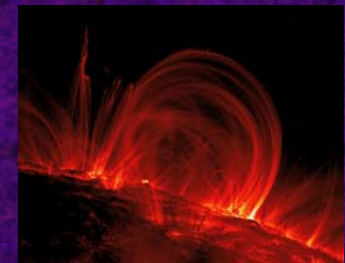
CORONAS-F



Nuclear Processes in Solar Flares



Five complexes of nuclear spectral lines:
 ^{56}Fe , $^{24}\text{Mg} + ^{20}\text{Ne} + ^{28}\text{Si}$, $^{20}\text{Ne} + ^{16}\text{O}$, ^{12}C , ^{16}O .

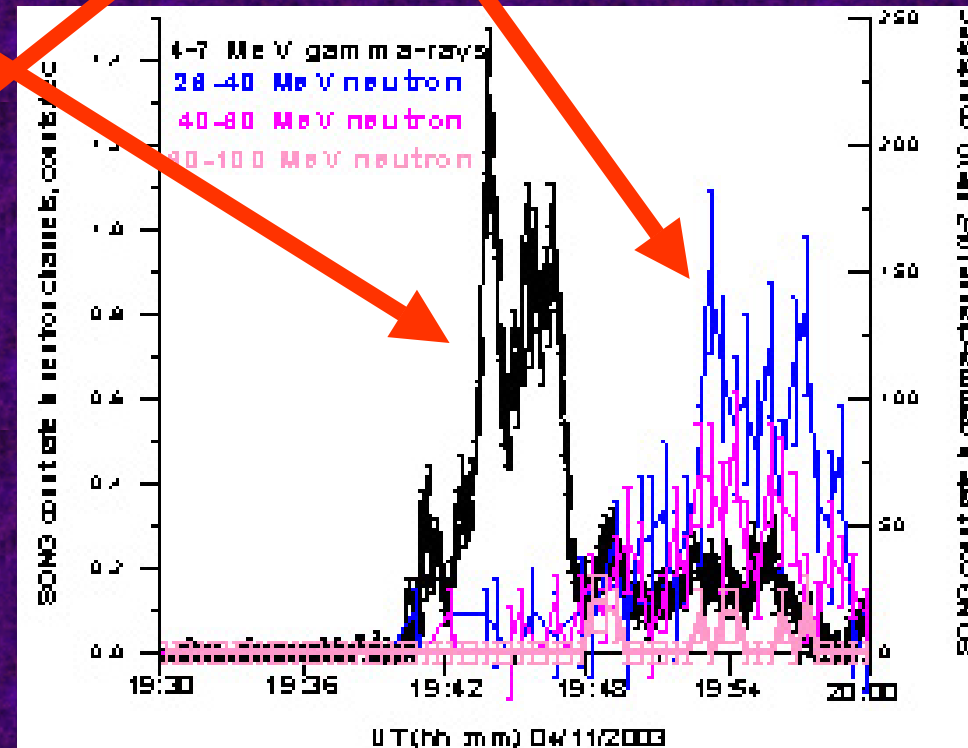
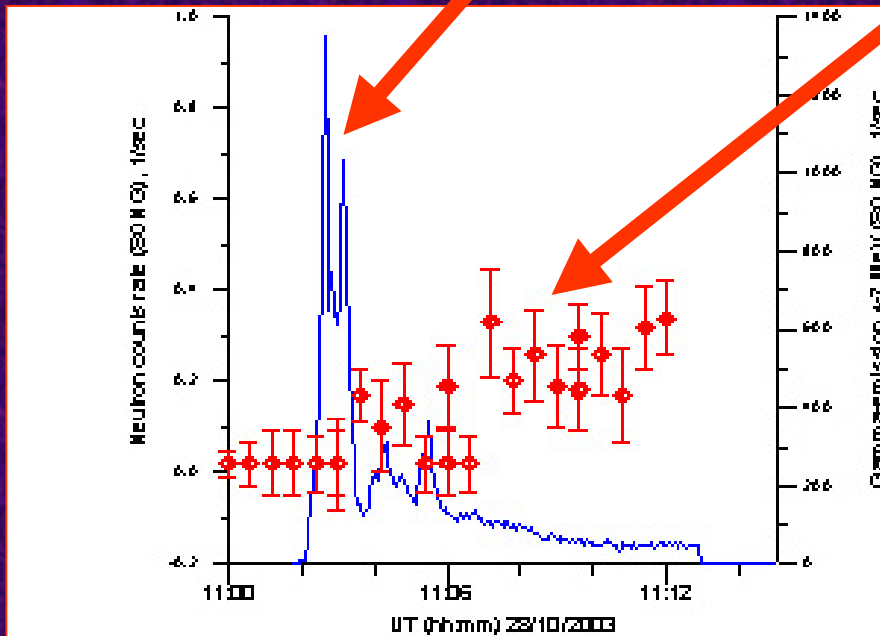


Caption neutron line in energy range 2,14-2,64 MeV.

Solar Neutrons and γ -rays

Gamma emission
E = 4-7 MeV

Neutrons
200 – 400 MeV

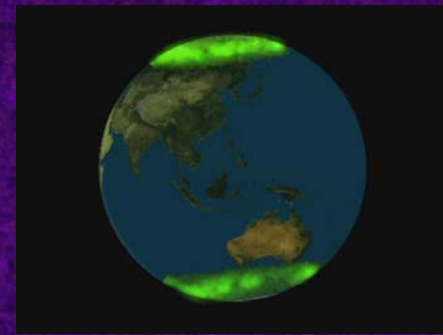


Flare on 28 October 2003

Flare on 4 November 2003

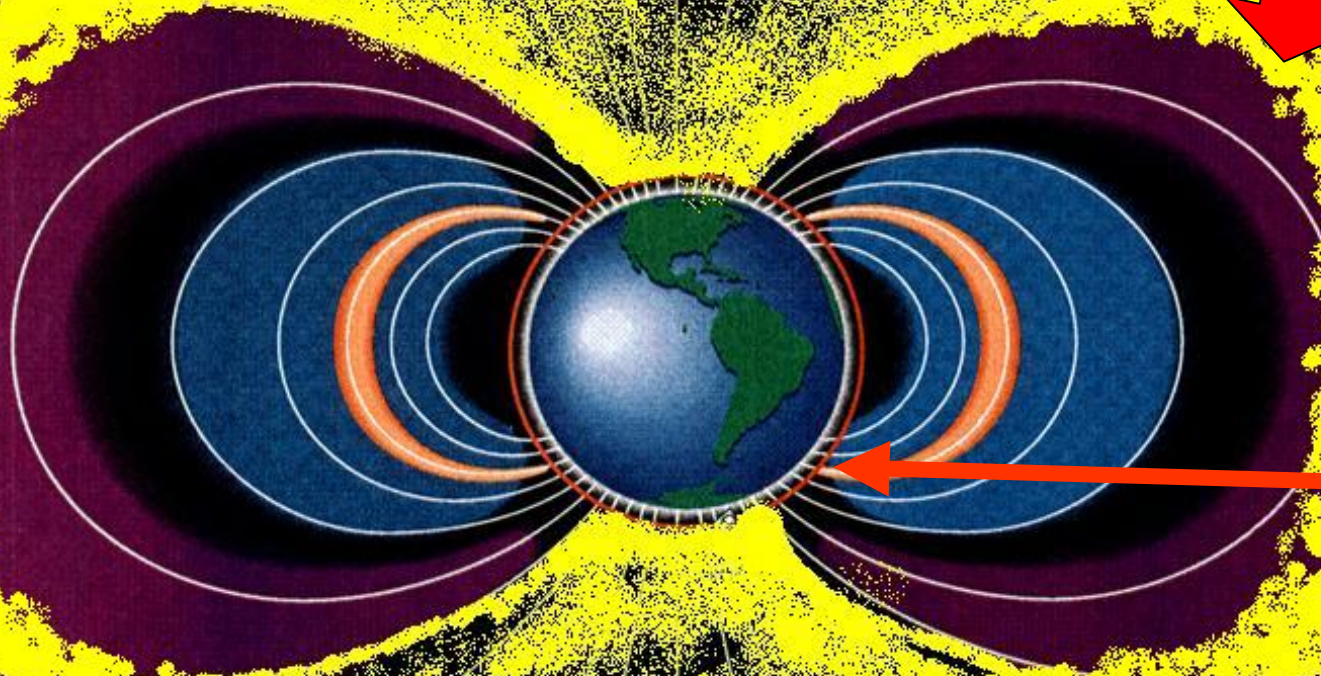
CORONAS-F

Solar Energetic Particle Penetration into Magnetosphere



Solar energetic particles

The boundary of solar energetic particle penetration into Magnetosphere



CORONAS-F Orbit

Solar energetic particles



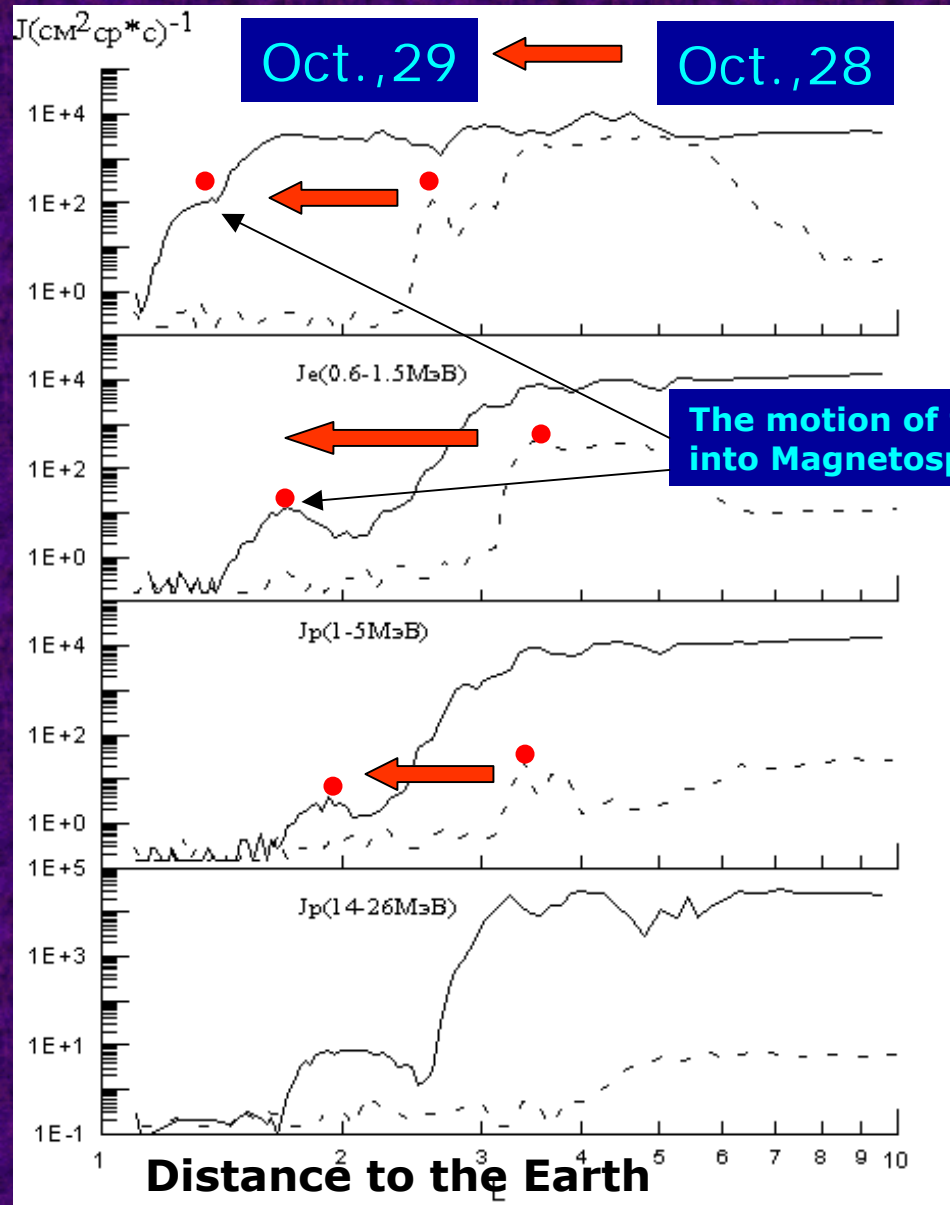
Charged Solar Wind (Electrons)

Charged Solar Wind (Protons)

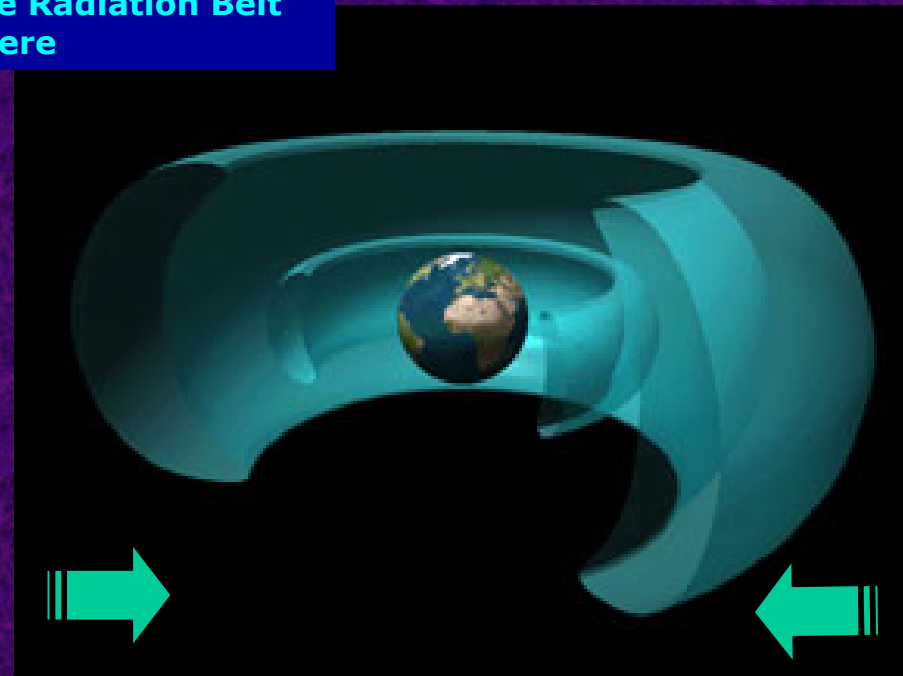
(Interstellar Matter)

CORONAS-F

Radiation environment in near Earth Space



Electron Radiation Belts

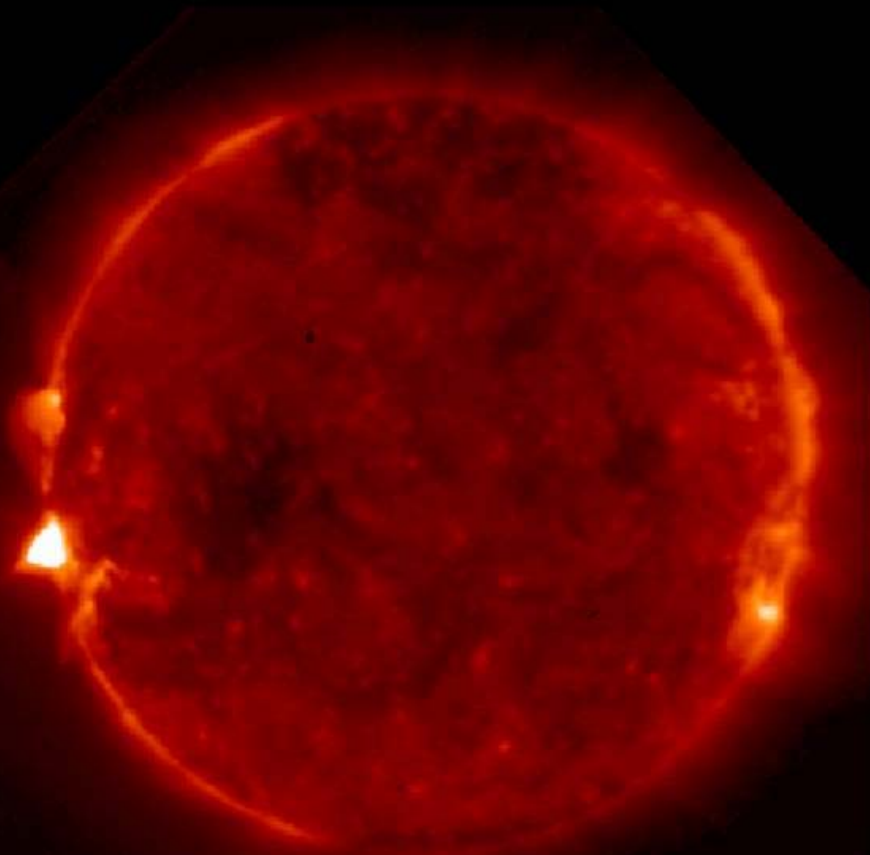


Extreme Solar Events

September 2005 (Solar Flare X17.1)

SPIRIT HR2 175 A

2005-09-07 18:18:17

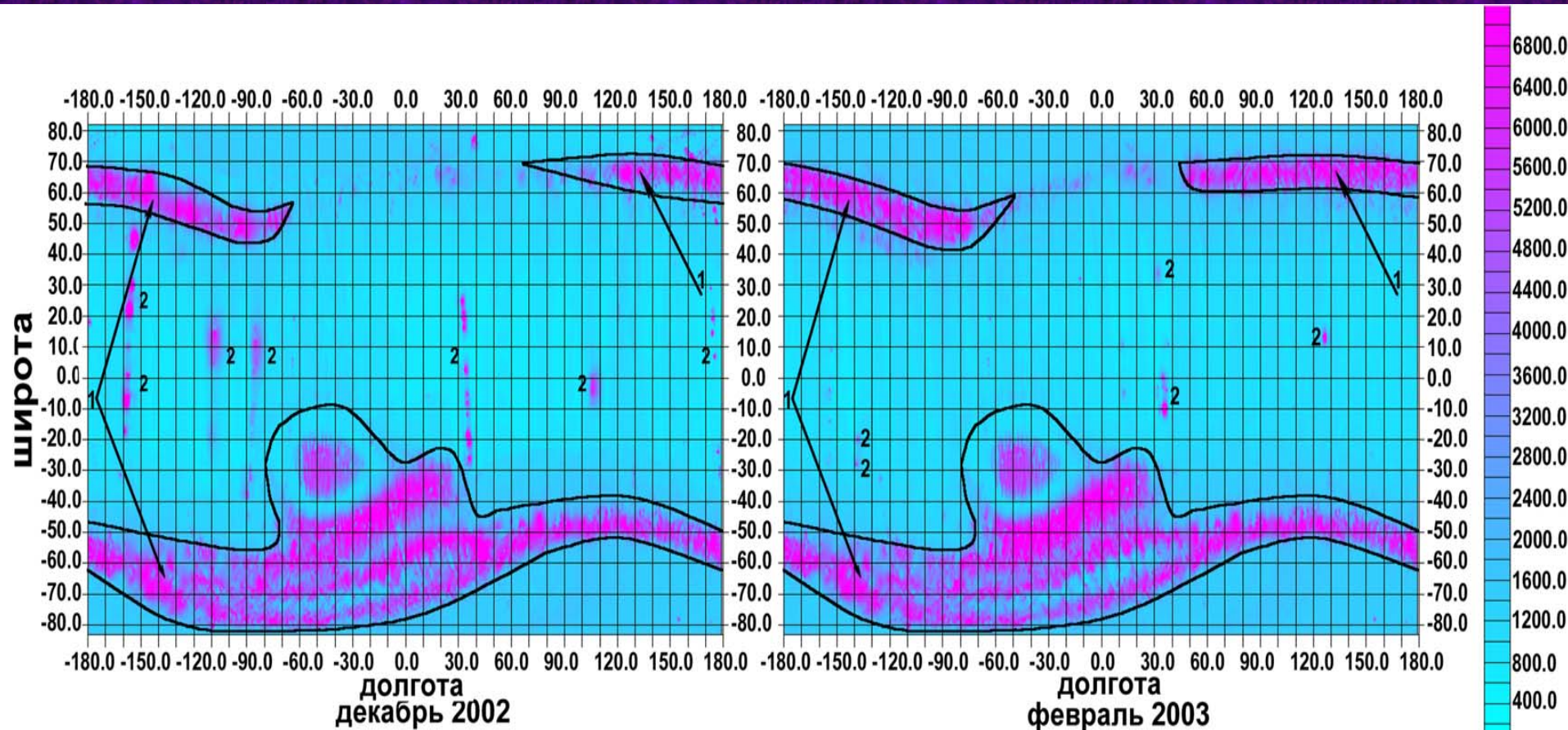
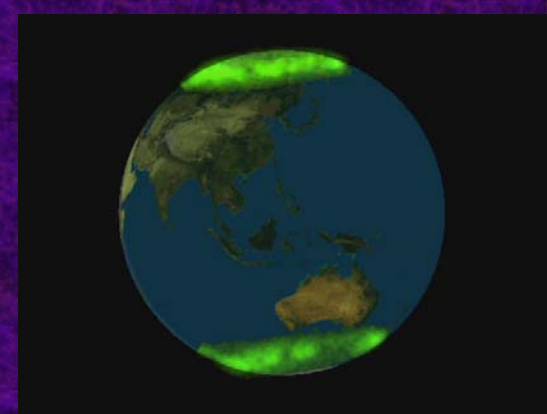


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Located precipitations of energetic particles from the magnetosphere into ionosphere

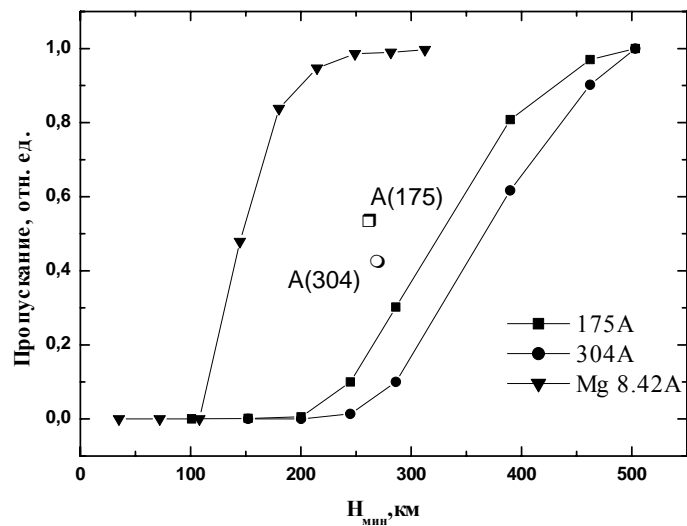
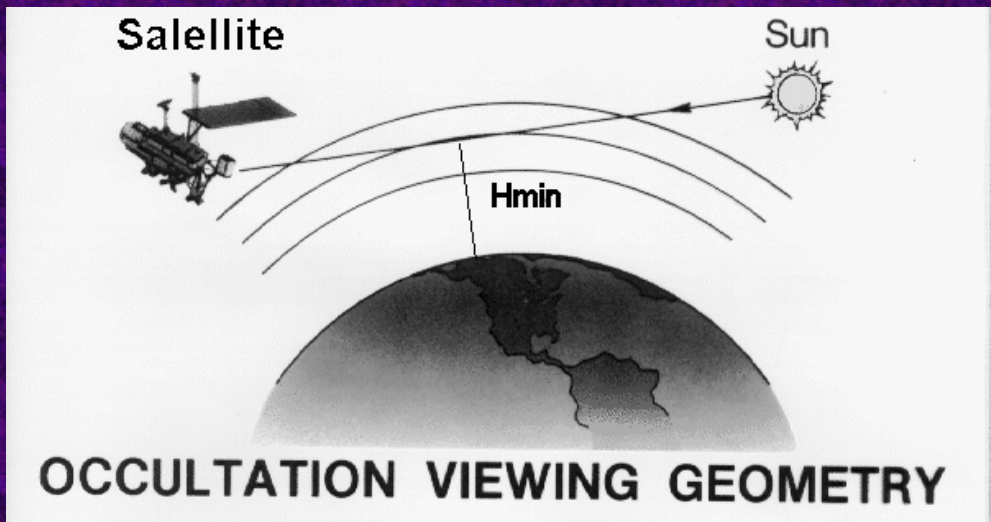
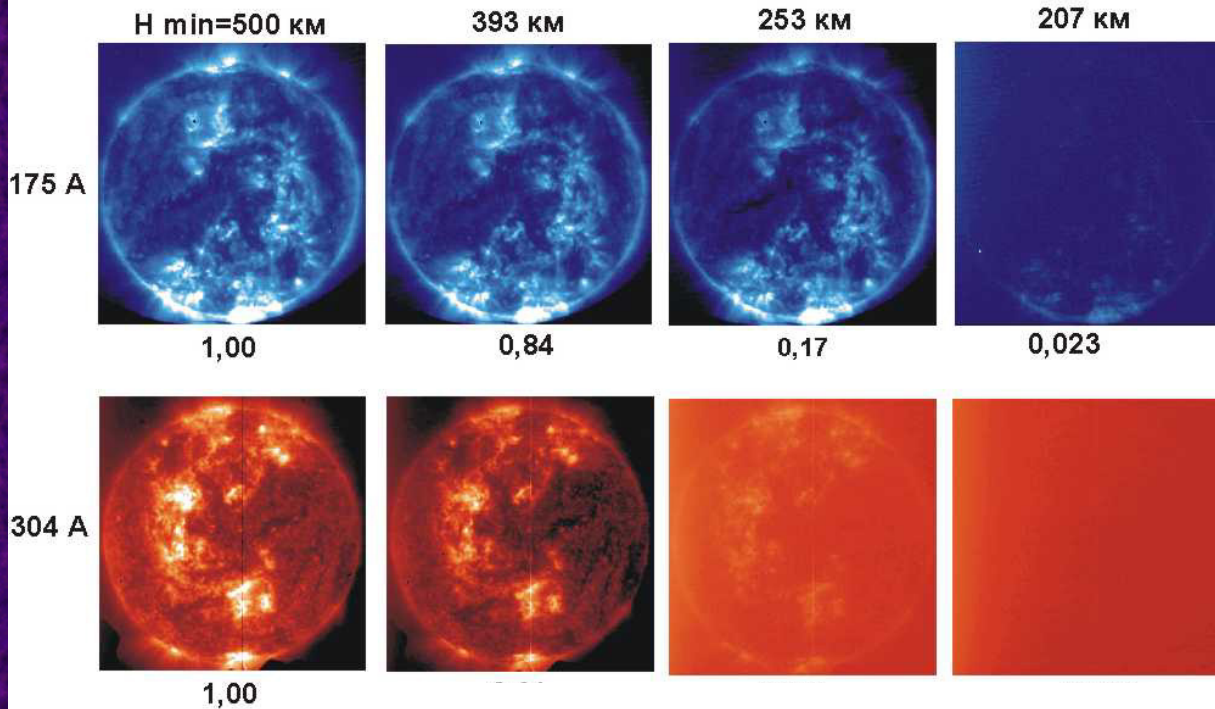


1- Radiation Belts

2- Quasi-stationary Precipitations

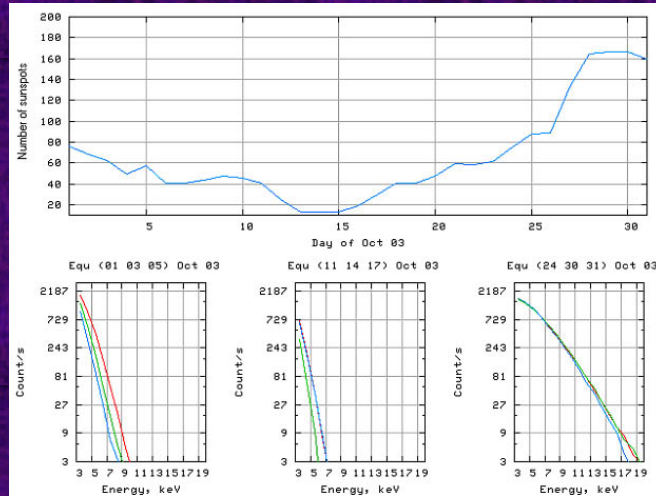
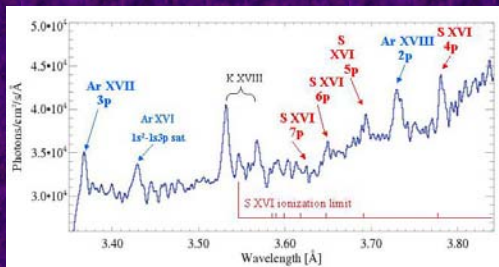
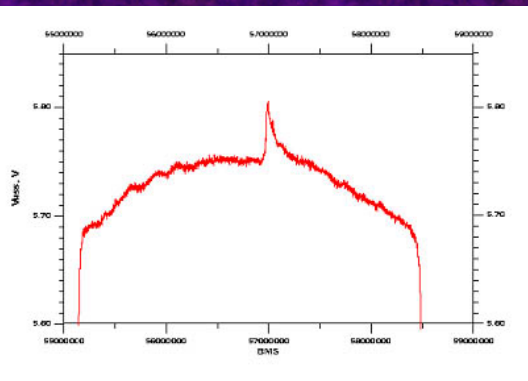
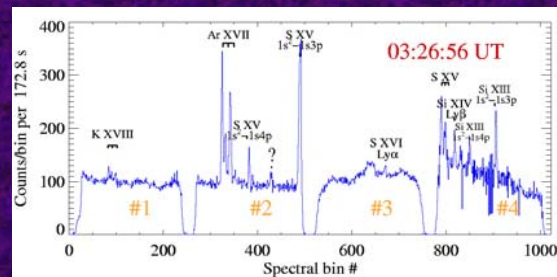
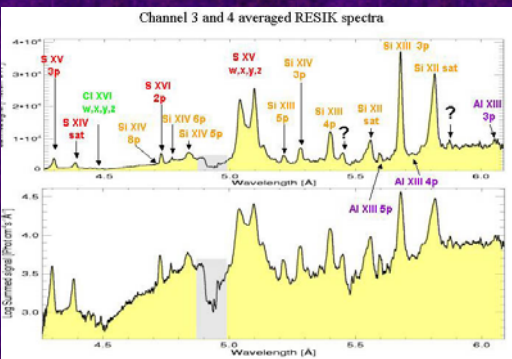
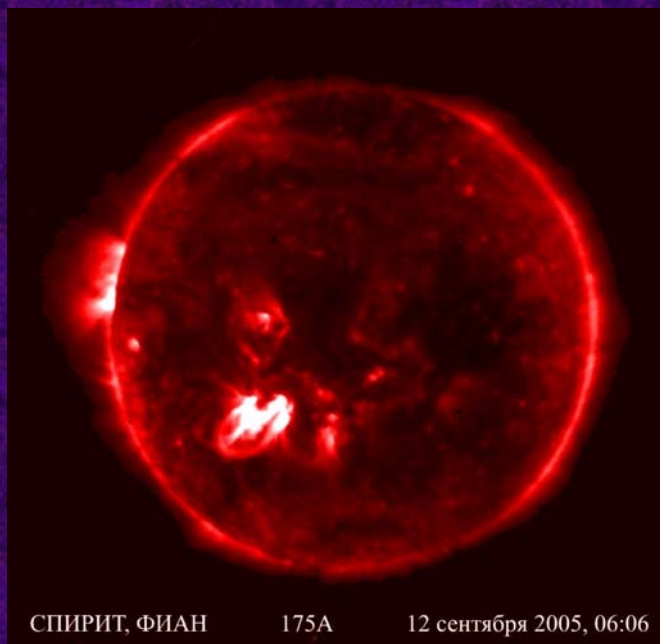
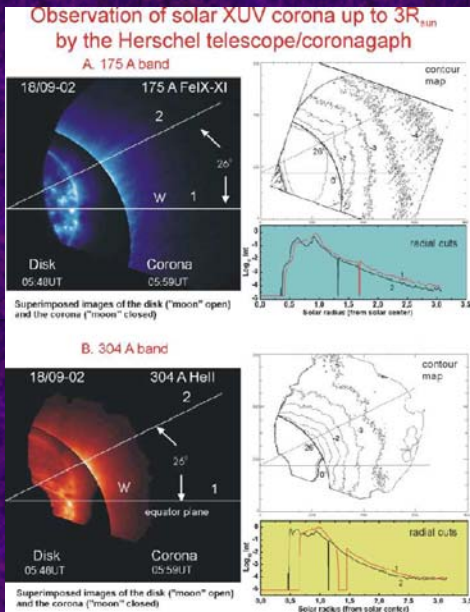
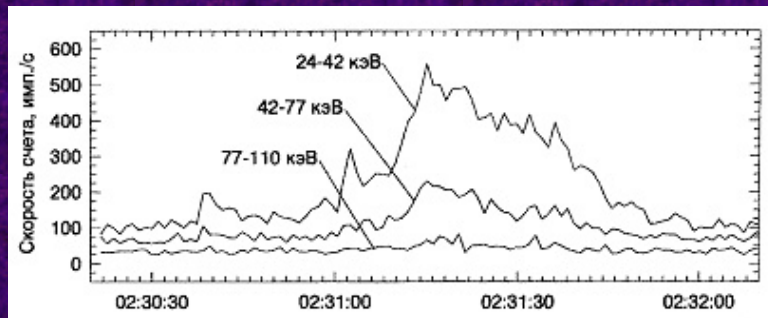
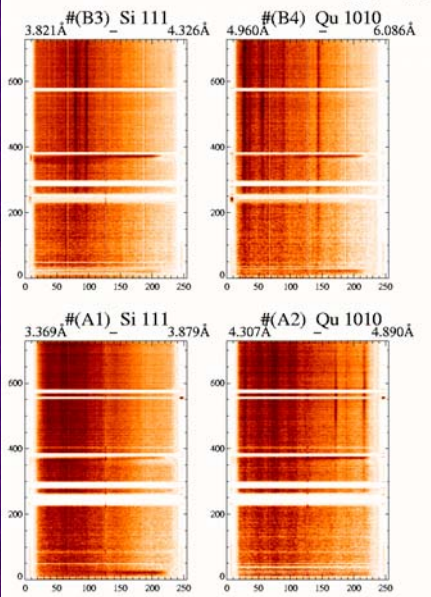
Upper atmosphere of the Earth

X-Ray transparency of the Earth atmosphere

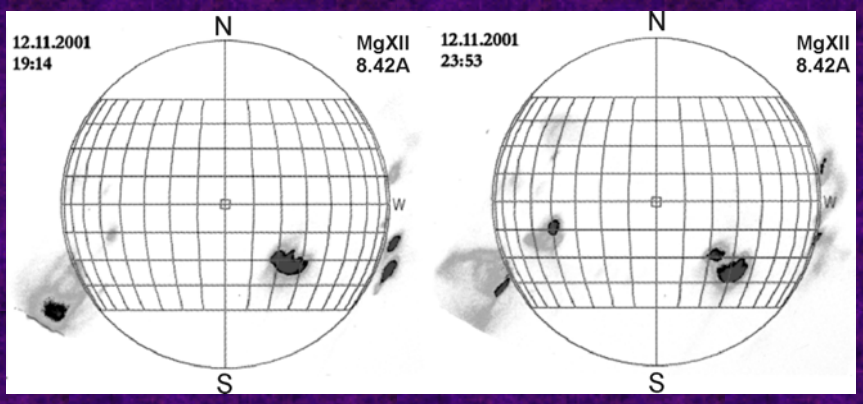
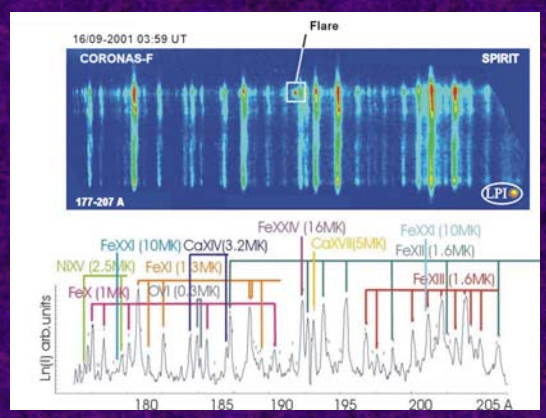
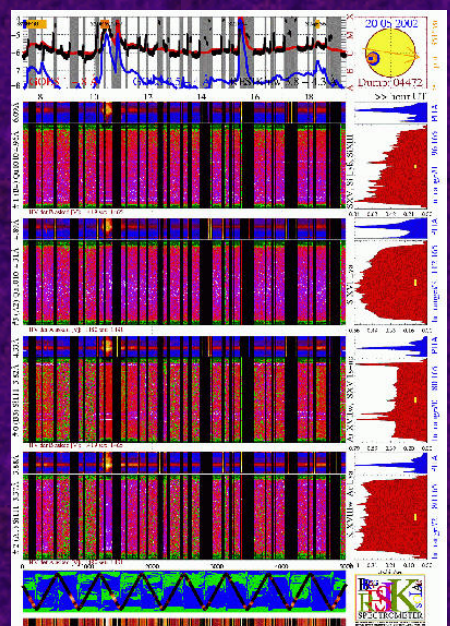
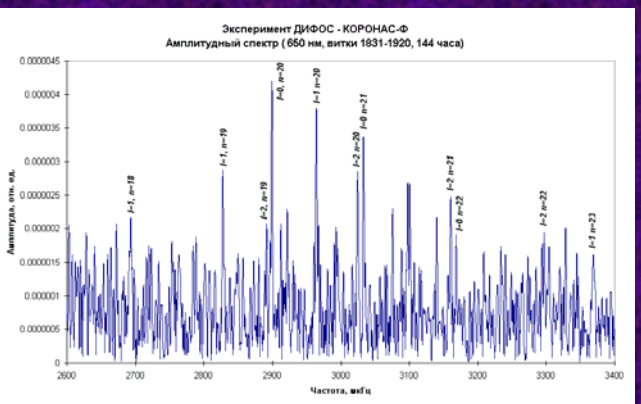
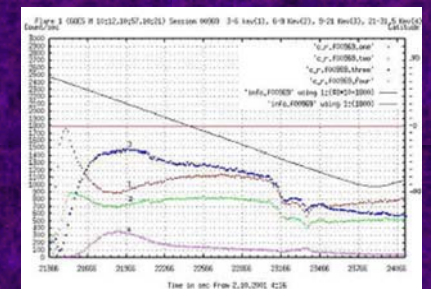
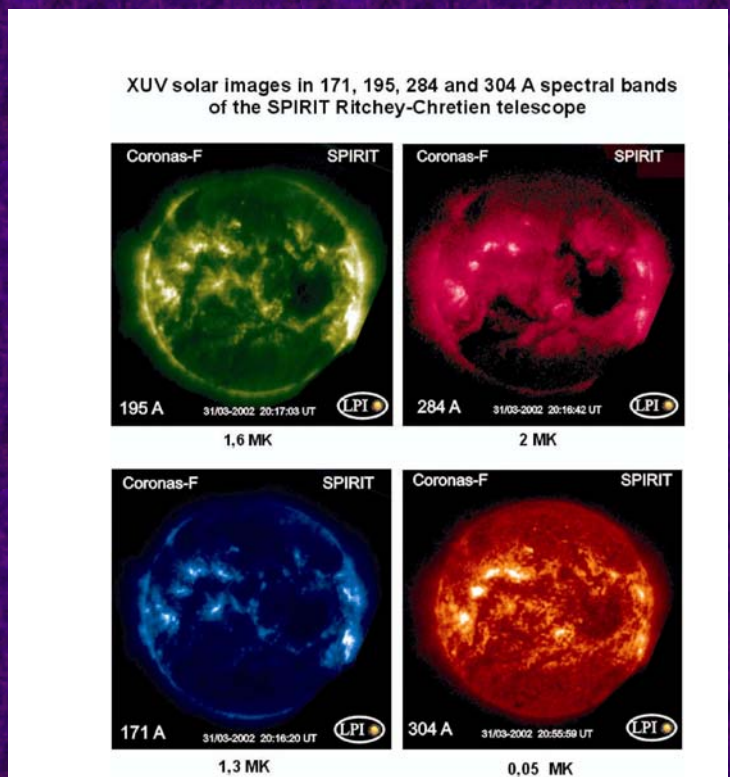
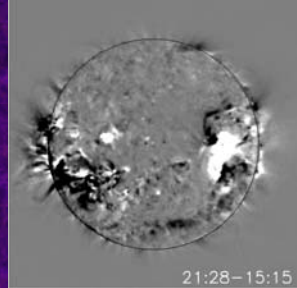
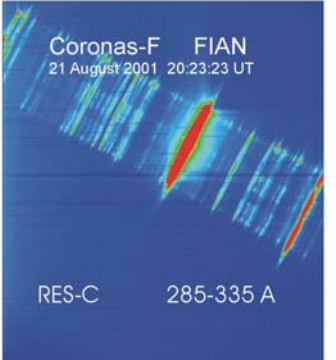
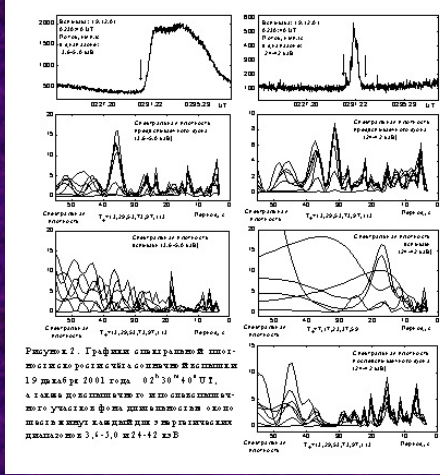


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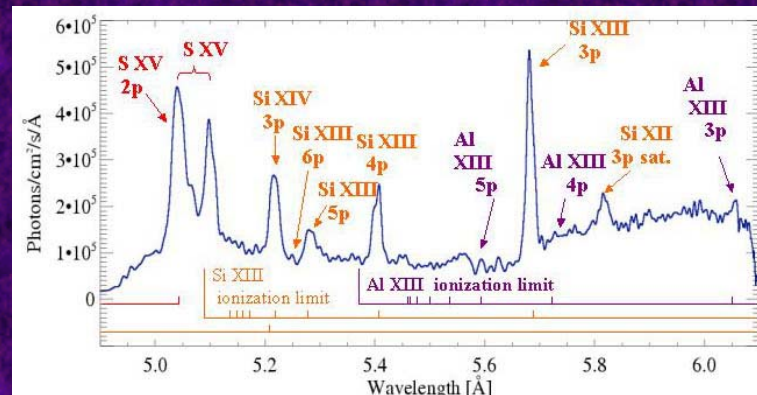
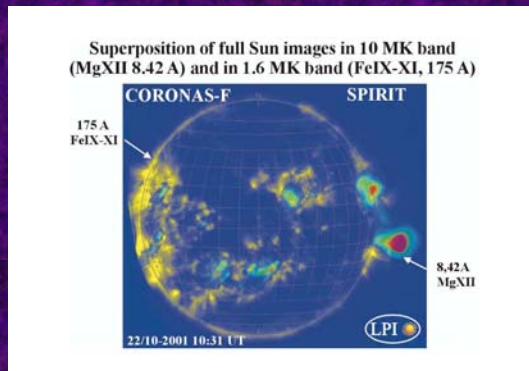
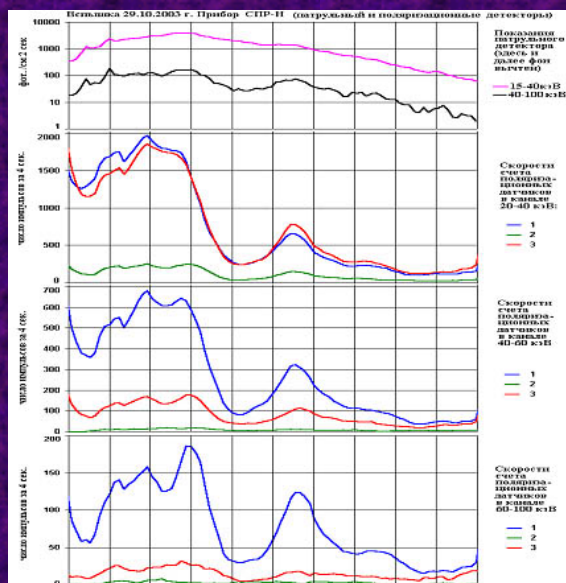
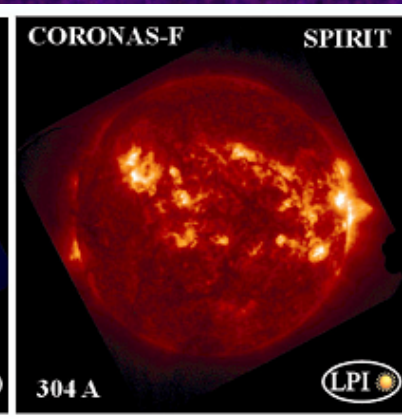
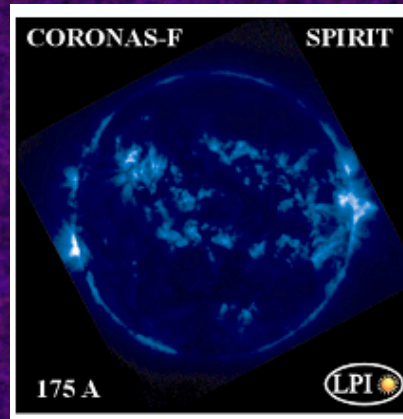
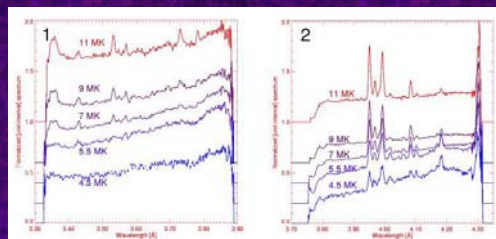
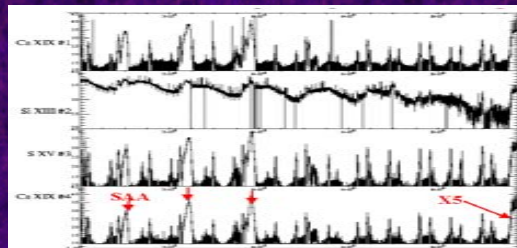
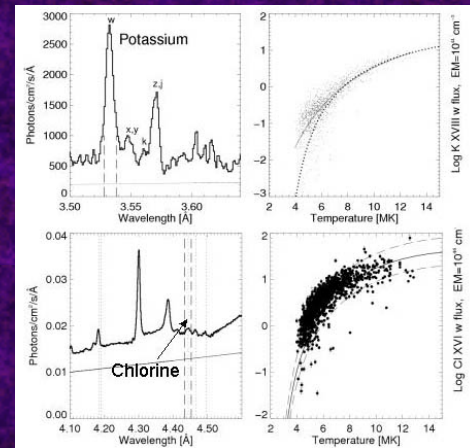
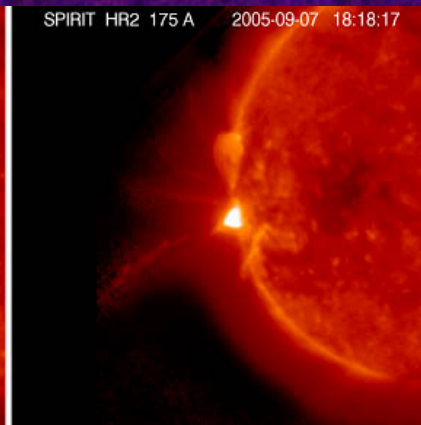
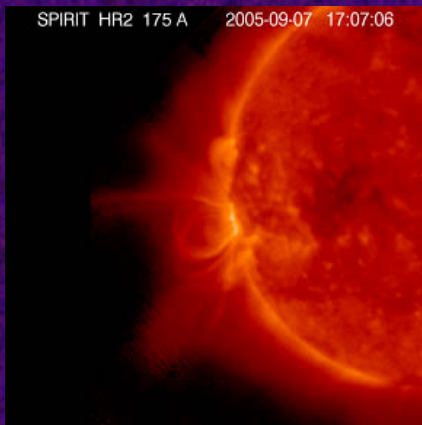
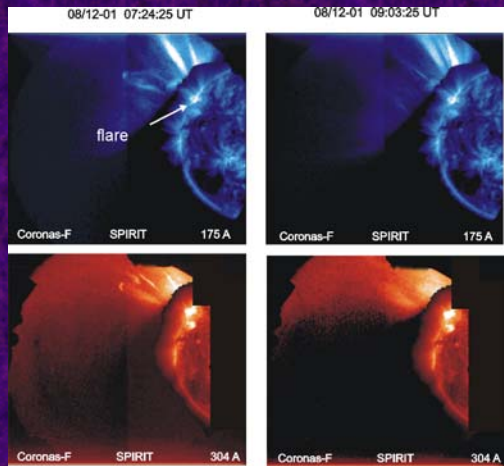
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CORONAS-F



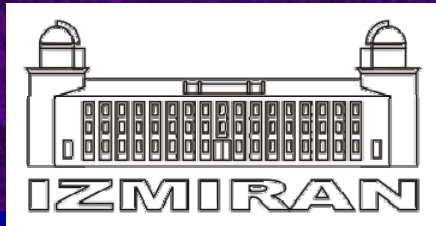
CORONAS-F





RUSSIAN ACADEMY OF SCIENCES


CORONAS-F Cooperation




coronas.izmiran.ru



LPI


Научно-Исследовательский Институт Ядерной Физики имени Д.В. Скобелыцина
 Московский Государственный Университет им. М.В. Ломоносова

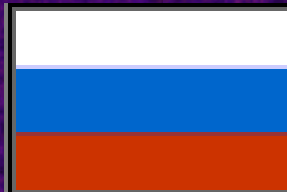



МОСКОВСКИЙ ИНЖЕНЕРНО-ФИЗИЧЕСКИЙ ИНСТИТУТ
 (ГОСУДАРСТВЕННЫЙ УНИВЕРСИТЕТ)

RESIK
 X-ray spectra
 SRC
 NRL
 MSSL
 RAL
 ИЗМИРАН




loffe Physico-Technical Institute



POLISH ACADEMY OF SCIENCES
SPACE RESEARCH CENTRE

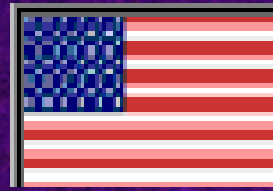
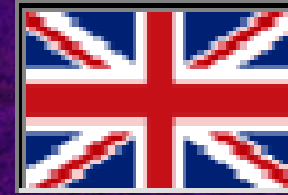
RESIK SOLAR SPECTROMETER
SYLWESTER CULHANE DOSZEK PHILLIPS ORAEVSKY KORDYLEWSKI BENILEY SHOWN WYNDHAM LONG GAICKI ROWALINSKI PRZEBSKI STEFANY AFANASY USIN SYRUCOWSKI BAKALA STANCZYK OZINSKI




CLRC

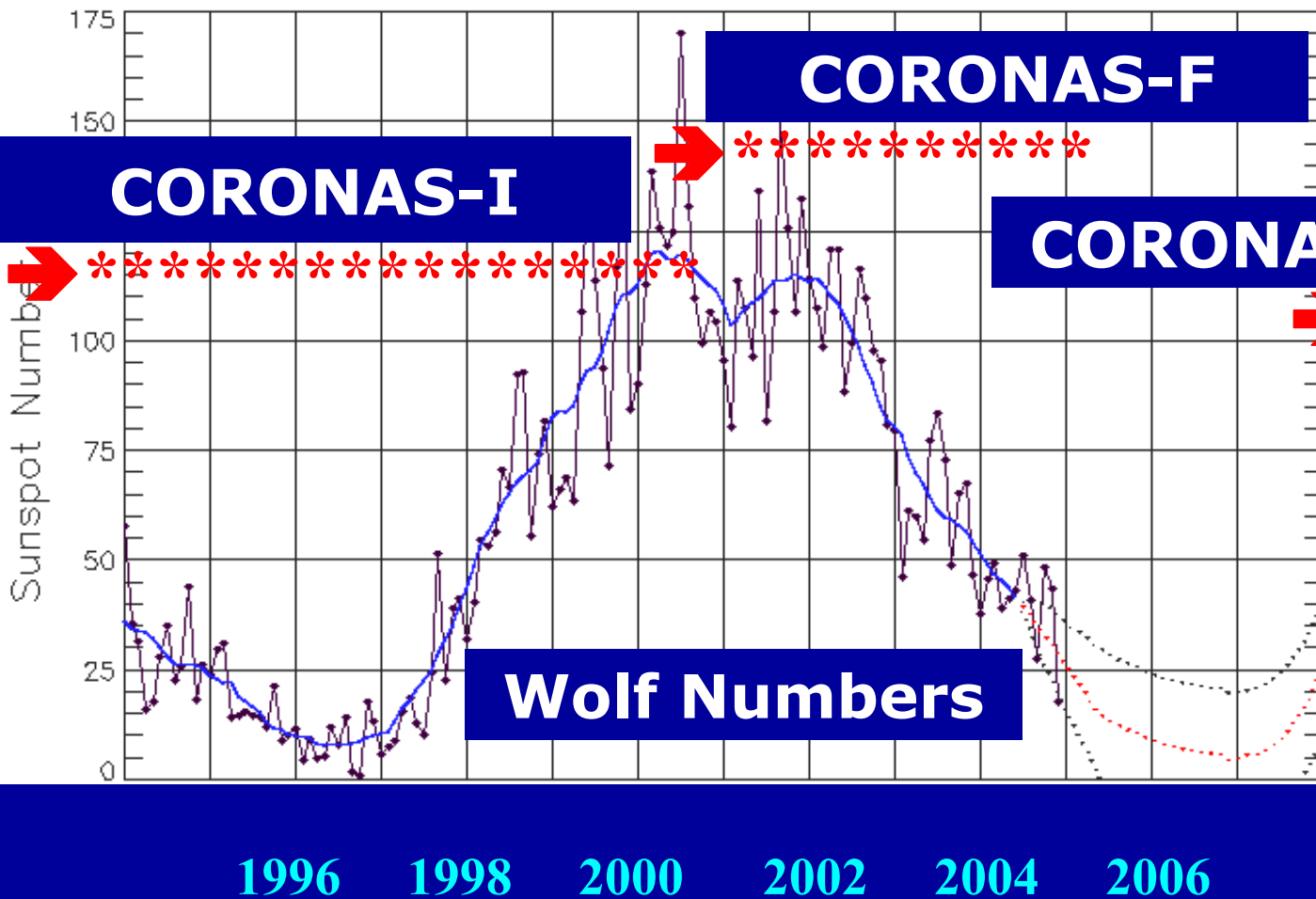
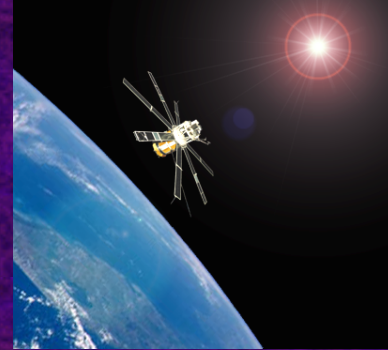




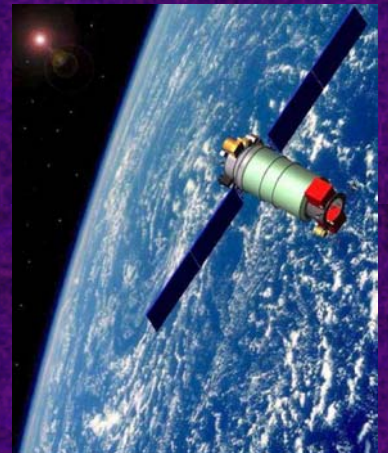


Observations of the Sun during 23th current solar cycle by CORONAS satellites

CORONAS-F



CORONAS-PHOTON



1996 1998 2000 2002 2004 2006

INTERHELIOPROBE

Lavochkin Association

FLIGHT TO A LOW - PERIHELION ORBIT

