Solar X-ray spectral irradiance variability

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Variability in solar total as well as in spectral irradiance.

Total irradiance - in phase with the sunspot cycle Time scales > solar rotation

> out of phase with sunspot activity Time scales < solar rotation

As of now variability in total irradiance is explained in terms of sunspot deficit and facular excess.

Variability in x-ray irradiance is important Photoionization and dissociation of N_2 in the Earth's upper atmosphere.

X-radiation arises from the regions of the solar atmosphere with temperature > 1MK

GOES provides x-ray images in the pass band 1-8 A range.

* 1-8 A

Yohkoh provided images in the pass band 2-36.6 A during 1992-99

2-10 A
10-20 A
20-30 A

Both are exclusive of flare and CME associated emission





19 April, 2006



Yohkoh Oct 23, 1996



19 April, 2006





19 April, 2006





A





Conclusions

- X-rays in shorter wavelengths (2-20 A) are emitted from coronal regions which are magnetically linked to the photospheric sunspot and chromospheric plages.
- The emission, particularly at wavelengths < 20 A seems to appear only at times of strong field active regions present on the Sun
 - 10-20 A emission is found to be dominant (66%) emission component in the SXT wavelength band (2-30 A). 2-10 A contributes only 3%
- Emission at longer wavelengths (20-30 A) seems to arise not only from the regions of corona those are magnetically linked to the underlying photospheric active regions but also from the regions of corona above the remnants of active regions