

CGMS-XXIX USA-WP-06
Prepared by USA
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Discussed in Plenary

STATUS OF THE CURRENT SOLAR CYCLE AND REPORTED ANOMALIES

A discussion of the status and schedule of the current solar cycle as well as reported and expected satellite anomalies

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1 INTRODUCTION

NOAA's Space Environment Center (SEC) has announced that it is most probable that the maximum of Solar Cycle 23 has occurred, in April 2000. The smoothed sunspot number recorded for April 2000 was 120.8. Should this value stand - exceeding 120.8 is highly unlikely - it would mean cycle 23 was an average solar cycle. Satellite operators should be aware that the maximum of the geomagnetic storm season is still ahead, it lags Solar Maximum by approximately two years.

2 DISCUSSION

Radiation storms - Although Cycle 23 has had a relatively moderate sunspot count, satellite operators should be aware that activity has occurred that has posed problems for spacecraft. The events of July 10-19, 2000 (which include the Bastille Day Storm) produced highest ever observed values for some solar phenomena and caused widespread effects on satellites. Interestingly, the most widespread and troublesome effect observed was the degradation of data quality below useful levels for the duration of the storms in the very instruments SEC uses to monitor space weather. A more comprehensive discussion of these anomalies is contained in WP4 from the GCMS meeting of 2000. More recently, the radiation storm of August 16-18, 2001, caused star tracker anomalies on at least three widely-spaced satellites. We remind readers that although the frequency of occurrence of radiation storms is highly correlated with the years surrounding solar maximum, a very severe radiation storm may occur even close to solar minimum.

Geomagnetic storms - As noted above, we are additionally still in a period when major geomagnetic storms may be expected. These pose different threats to satellites including magnetopause boundary crossings and problems with magnetic torquing at geosynchronous altitude, increased satellite drag at lower altitudes, and surface and deep dielectric charging.