[III-1-3] Relationship between Coronal Mass Ejections Eccentricity parameter and the strength of geomagnetic storm

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We examine the eccentricity parameter (EP) of Coronal Mass Ejections (CMEs). For this, we select 298 front-side CMEs from SOHO LASCO CMEs whose speed is larger than 1000km/s and angular width is greater than 120° during from 1997 to 2007. These are thought to be the most plausible candidate of geoeffective CMEs. We examine the relation between CMEs eccentricity parameter and the minimum value of the Dst index. We find that strong geomagnetic storms (Dst < -200nT) are well correlated with the EP from the scattered plot. We also find that CMEs have high geoeffectiveness when they occurred near the center of the solar disk with the small EP and they have the small speed with the small EP. These results indicate that the CME EP also can be an important indicator to forecast CME geoeffectiveness such as Earthward direction parameter (Moon et al. 2005, Kim et al. 2008).

[III-1-4] Correlation Analysis between Global Warming Index and Its Two Main Causes (space weather and green house effects) from 1868 to 2005

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We have examined the relative contributions of representative space weather proxies (geomagnetic aa index) to global warming (Global temperature anomaly) and compared them with that of green house effect characterized CO2 content from 1868 to 2005. For this we used Hadcrut3 temperature anomaly (Ta) data, aa index taken at two anti-podal subauroral stations (Canberra Australia and hartland England), and the CO2 data come from historical ice core records. From the comparison between Ta and aa index, we found several interesting results: (1) the linear correlation coefficient between two parameters increases until 1990 and then decreases rapidly, and (2) the scattered plots between two parameters shows different patterns before and after 1990. A partial correlation of Ta and two quantities (aa, CO2) also shows that the geomagnetic effect (aa index) is dominant until about 1990 and the CO2 effect becomes much more important after then. These results imply that the green house effect become very important since at least 1990. For a further analysis, we simply assume that Ta (total) = Ta (aa) + Ta (CO2) and made a linear regression between Ta and aa index from 1868 to 1990. A linear model is then made from the linear regression between energy consumption (a proxy of CO2 effect) and Ta (total) - Ta (aa) since 1990. This linear model makes it possible to predict the temperature anomaly in 2030, about 1 degree higher than the present temperature, which is much larger than in the previous century.

■ Session IV-1 : Upper Atmosphere
Wednesday, 22 October [17:40-18:40]

[IV-1-1] The height variation of F2 peak density using Anyang Ionosonde measurements for GNSS ionospheric model

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The signals transmitted from satellites of Global Navigation Satellite System (GNSS) interact with the plasma of the ionosphere. To study the impact of the ionospheric plasma on GNSS applications a comprehensive knowledge of the ionosphere is required. Especially the correct measurement of the ionosphere such as the peak height of the F2 layer peak electron density (hmF2) is important for the GNSS ionospheric model. Anyang ionosonde station (37.39°N, 126.95°E) has been operating from October 2000 and the accumulated data for 8 years may allow us to obtain climatological characteristics of middle latitude ionospheric F region for GNSS application. We analyzed the variations of the hmF2 and NmF2 over Anyang station for different conditions of solar activity, geomagnetic activity, season, and local time, and we compared our results with the IRI model.

[IV-1-2] Vertical emission rate variations of the O2 (0-0) Atmospheric band from TIMED Doppler Interferometer (TIDI)

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Limb scanning measurements of the O2 (0-0) Atmospheric band emission by the TIDI instrument aboard the TIMED