



Correlation between Space and Atmospheric March 2012 Extreme Events

Georgios C. Anagnostopoulos

Space Science Lab., Dept. of Electrical & Computer Engineering, Xanthi, Greece (ganagno@ee.duth.gr)

Previous studies have provided statistical evidence of a solar cycle correlation between space weather and meteorological phenomena. In this study we present a case study, the March 2012 events, with a strong evidence of such a correlation between space and atmospheric extreme events. March 2012 phenomena, beside a great CME (March 7) and a following superstorm, has been most known in the scientific community as well as in the public from the historic heat wave in USA. This event was not anticipated by solely atmospheric models (called a “black swan event”:<http://www.esrl.noaa.gov/psd/csi/events/2012/marchheatwave/anticipation.html>). Furthermore, various extreme phenomena as high temperatures, intense rainfalls and ice extent at middle and high latitudes followed the March 7, 2012 CME all over the globe (USA, Europe, Australia, Antarctic), while unusual measurements of various atmospheric and ionospheric quantities were observed by a series of satellites (TIMED, MODIS, NOAA etc.) In this study we concentrate to (a) the unusual high maximum of temperature in north-east USA (highest values since 1910) and (b) intense winds, rainfalls and fluctuating (>1500 V/m) geoelectric fields in South East Europe (Greece). These events were observed almost simultaneously with geomagnetic storms and unusual radiation belt electron precipitation (RBEP) events on days 6-9, 10-12 and 26-28.3.2012 (two CMEs and one CIR). The most striking result is the time coincidence of variations of several space and meteorological measurements, which, for instance, most probably suggests a direct influence of the RBEP on the intense rainfalls observed in Greece. It is also possible that the RBEP at polar latitudes was responsible for the positive North Atlantic Oscillation effect evaluated at those times, which contributed to the global middle and high latitude weather variations. Our study provides an example of possible space weather utility to the atmospheric models, and, therefore, to the everyday life worldwide.