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Influence of Space Weather on El-Niño Southern Oscillation (ENSO)

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Atmospheric perturbations in the Southern winter polar region are well related to fluctuations in the interplanetary magnetic and electric fields: the large increases of the geo-effective dawn-dusk component of the interplanetary electric field give rise to warming on the ground level in the Central Antarctica. The warming in the central Antarctica would crucially disturb the wind regime at the whole of Antarctica. The severe deviations of atmospheric winds from the regular pattern (i.e. anomalous winds) have been examined in relation to strong disturbances in the interplanetary magnetic field (IMF). The statistically significant relationships between anomalous winds at the Antarctic coast stations and the southward IMF have been found. The Southern Oscillation Index (SOI) has been used to characterize the phase and intensity of the ENSO activity. Taking into account that the negative SOI values tend to appear and develop strictly during March-August period, the winds in the winter Antarctica were only analyzed. The anomalous winds at three stations turned out to be observed 1-2 months ahead of the El-Niño event. To check a possible link between El-Niño and Space Weather the behavior of SOI for 1987-2001 has been compared with variation of the AE index, because the monthly IMF data are very incomplete for years preceding 1998. It is shown, that in case of El-Niño, the mean magnetic activity starts to increase 2-3 months before the El-Niño beginning, and continue to be high during the next some months. On the contrary, in cases of short-term positive or negative deviations of SOI, the magnetic activity does not show the noticeable changes before and after the SOI impulses. These results make it possible to conclude, that negative or positive SOI oscillations may occur irrespective of Space Weather, however development of the veritable El-Niño events is likely influenced by the intense and lasting IMF disturbances, which are accompanied by the high magnetic activity.