Histogram of peaks of Dst index for from January 1999 to December 2012 according to Kyoto Dst data (black bar) and Temerin and Li (2006) model (white bar).

North-South asymmetry of the ionosphere perturbations at the degrading trend of geomagnetic activity

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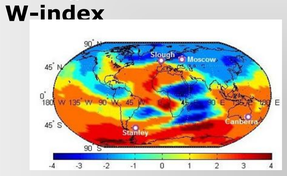
Introduction

- Total Electron Content, TEC, and the F2 layer critical frequency foF2 observed with Digisondes are transformed to the ionosphere weather W-index
- Example of global GIM-W-index map produced from global ionospheric map GIM-TEC is shown in the picture for 2000-07-15 00:00 UT



- Cumulative ionosphere indices (positive disturbance WU index, negative disturbance WL index, and their range WE index) are introduced to characterize the ionosphere quiet or disturbed state.
- Cumulative indices can be local (combined for 1h, 3h, diurnal, etc. block of time), regional or global indicator.
- The Poster presents results of local 3h WU, WL, WE indices based on foF2 critical frequency at four selected locations shown in the map (two in the North and two in the South Hemisphere)
- Long-term trends of the ionospheric cumulative indices are compared with relevant trends of solar and geomagnetic activity for more than 70 recent years.

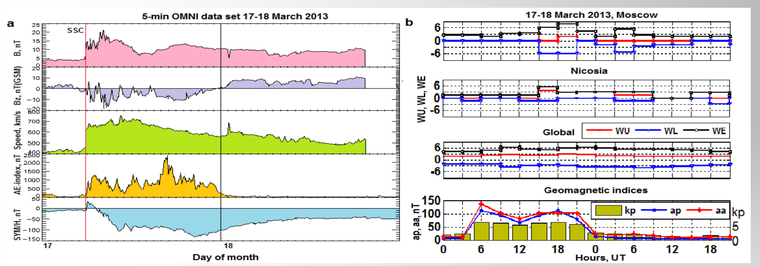


Fig. 1 Demonstration of space weather storm on 17-18 March 2013. (a)Interplanetary Magnetic Field IMF parameters B, Bz, Vsw, geomagnetic indices AE and SYM-H; (b) 3h ionospheric indices at Moscow and Nicosia and utjvfgnetic indices aa, ap and Kp.

Asymmetry of long-term trends of the ionosphere activity at degrading Kp index

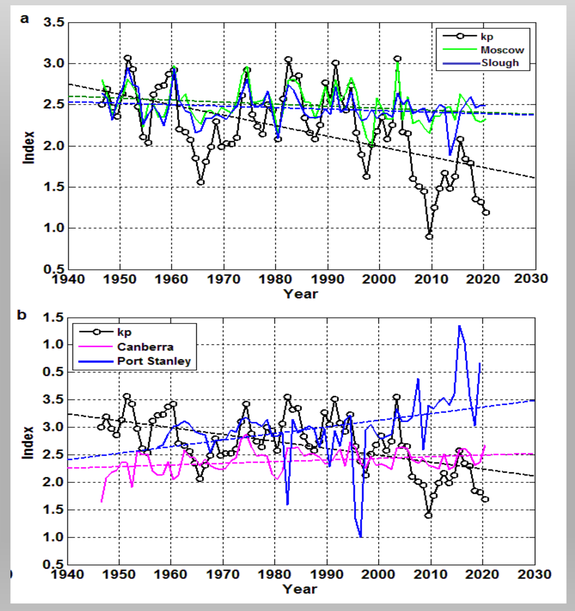


Fig. 2 Asymmetry of the monthly averaged 3h cumulative WU, WL and WE indices in the North and South Hemispheres. Decreasing trend of planetary Kp-index (black curve with cycles) in the both sub-plots. (a) Moscow (55N, 37E) and Slough-Chilton (52N, 1W), (b) Canberra (35S,149E) and Port Stanley (52S, 58W).

Trends of solar and geomagnetic activity

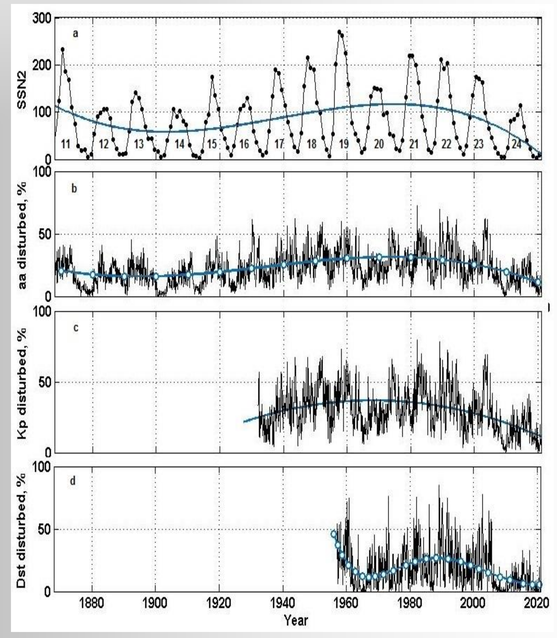


Fig. 3 Trends of solar and geomagnetic activity from 11 to 24 solar cycles: (a)Annual sunspot number SSN2; (b) disturbed aa index, aa > 28 nT; (c) disturbed Kp index, Kp > 3; (d) disturbed Dst index, Dst < -30 nT. Diminution of the solar and geomagnetic activity for 21 – 24 SCs.

Conclusion

- The analysis of the 3h indices of positive ionospheric disturbances WU, negative WL, and their range WE = WU – WL of the critical frequency foF2 at Moscow, Slough-Chilton, Canberra, and Port Stanley stations has been carried out from 1945 to 2020.
- There is an asymmetry in the trends of the ionospheric activity in the Northern and Southern hemispheres: the decline of indices in Moscow and Slough-Chilton and the growth at Canberra and Port Stanley while the solar and geomagnetic activity decrease.
- The difference in the changes of the indices of geomagfnetic and ionospheric activity suggests the independent character of those two types of geophysical fields and a presence of other sources of the ionosphere activity in addition to the sources of variability of the magnetosphere.