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Geomagnetic Storm Impact on HF Communications and Radiation Exposure at Aviation Altitude

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Geomagnetic storms are one of the space weather events that have an impact on HF communications and can also contribute in enhancing the radiation exposure at aviation altitude. This paper presents the analysis of moderate geomagnetic storm activity of the period 7-9 March 2012 and 16-19 March 2015. The impact on HF propagation parameter foF2 and radiation dose rate is analysed to quantify the magnitude of the impact during these storm periods. Ionospheric foF2 data measured by ionosonde from Grahamstown station (33.3 S, 26.5 E) was used in the analysis. The monthly median of foF2 values was calculated to indicate the quiet day-to-day variation of foF2. To evaluate the level of radiation exposure over different routes the MAIRE model is used to generate the radiation dose rate data. Results show that during the storm day of 9 March 2012 a decrease in foF2 values (negative ionospheric storm) was observed, whereas during the storm day of 17 March 2015 an increase in foF2 values (positive ionospheric storm) was observed. This results show that an HF communications is expected to be disturbed by ± 2 MHz during a moderate geomagnetic storm. An enhancement in radiation dose rate was also observed as compared to the quiet days during both storm periods.

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No

Level for award (Hons, MSc, PhD, N/A)?

N/A

Would you like to submit a short paper for the Conference Proceedings (Yes / No)?

No

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