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Analyzing the geomagnetic diurnal variation field for days away from quiet time using observatory station measurements, the CM4 model and RC index.

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In this work, we analyzed the geomagnetic diurnal variation field for days away from quiet time using the comprehensive model (CM4) and the RC index as tools. The external field descriptions included in the CM4 model – the Dst and F10.7 – have been shown to be unable to explain sufficiently the rapid variations observed in geomagnetic diurnal variation measurements for days away from quiet time. Using measurements from 120 world-wide geomagnetic observatory stations, the CM4 and RC index, we analyzed the field for days away from quiet time and show that the RC index is a better tool for describing the external field variations (instead of Dst). Our results show that the X component of the field contain a strong component in rapid variations related to large scale external field variations possibly arising from magnetospheric ring current. This is seen from the very good coherence and agreement between the residuals of the X component of our geomagnetic observatory measurements and that of the RC index. This is confirmed by the good cross-correlation coefficients between our X component and the RC index which ranges from 0.50 to 0.85 seen in different geographical regions of the Earth. The results seen in this study leads us to characterize the RC index as a good representation of the geomagnetic observatory station measurements for rapid variation globally.