

Development of an Empirical Model for Estimating the Quiet Day Curve (QDC) over the Brazilian Sector

S. S. Chen¹, C. M. Denardini¹, L. C. A. Resende^{1,2}, R. A. J. Chagas¹, J. Moro^{2,3}, and G. A. S. Picanço¹

¹ National Institute for Space Research (INPE), São José dos Campos-SP, Brazil.

² State Key Laboratory of Space Weather – NSSC/CAS, Beijing, China.

³ Southern Space Coordination – COESU/INPE - MCTI, Santa Maria-RS, Brazil.

Abstract: The Embrace Magnetometer Network (Embrace MagNet) uses a series of magnetometers over South America to monitor the Earth's space environment and to study space weather. One of the common techniques used to study the effects of the magnetic disturbances in the globe is through the quiet day curve (QDC) of the geomagnetic field components. These types of QDC are calculated based on geomagnetic field data collected by magnetometers in the five quietest days for each month at each station. Thus, we developed and implemented an empirical model based on the QDC H component obtained by the Embrace MagNet. This model ought to be used as a prediction device when data are not available. The proposed algorithm is a function of the solar activity, the day of the year, and the universal time, which was adjusted based on 12 stations across to the South America sector between 2010 and 2018. Our results show that the values computed by this model are in good agreement with the observational data for the QDC. Finally, it is essential to mention that the QDC model presented in this study is the only available predicting tool of the Embrace MagNet stations to date, providing data with a high confidence level in the Brazilian sector.

Acknowledgment: S. S. Chen is grateful to CNPq/MCTIC (grant 134151/2017-8) and CAPES/MEC (grant 88887.362982/2019-00). C. M. Denardini thanks CNPq/MCTIC (grant 303643/2017-0). L. C. A. Resende is grateful to China-Brazil Joint Laboratory for Space Weather (CBJLSW), National Space Science Center (NSSC), Chinese Academy of Sciences (CAS), for supporting her postdoctoral fellowship. J. Moro is grateful to China-Brazil Joint Laboratory for Space Weather (CBJLSW), National Space Science Center (NSSC), Chinese Academy of Sciences (CAS), for supporting his postdoctoral fellowship and to CNPq/ MCTIC (grant 429517/2018-01). G. A. S. Picanço thanks CAPES/MEC (grant 88887.467444/2019-00). The authors acknowledge Embrace/INPE for providing the magnetic data (<http://www.inpe.br/spaceweather/>), GFZ Potsdam for the classification of International Q-Days (<ftp://ftp.gfz-potsdam.de/pub/home/obs/kp-ap/quietdst/>), and Natural Resources Canada (NRC) for providing the solar radio flux data (<https://www.space-weather.gc.ca/solarflux/sx-en.php>).

Reference: Chen, S. S., Denardini, C. M., Resende, L. C. A., Chagas, R. A. J., Moro, J., & Picanço, G. A. S. (2020). Development of an Empirical Model for Estimating the Quiet Day Curve (QDC) Over the Brazilian Sector. *Radio Science*, 55(12), e2020RS007105. <https://doi.org/10.1029/2020RS007105>

Session: 4. The interaction of the sun with the planets, and space weather

Oral or Poster: Oral