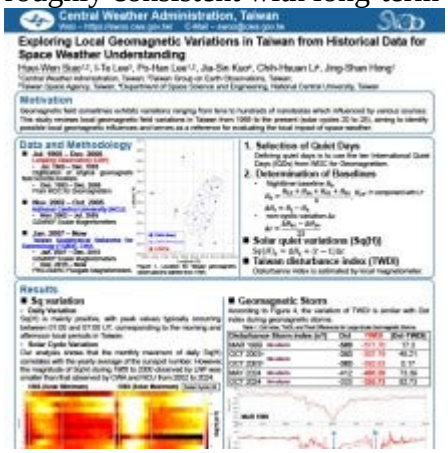
Huei-Wen
Siao
Central Weather Administration, Taiwan
I-Te Lee, Taiwan Space Agency, Taiwan
Po-Han Lee, Central Weather Administration, Taiwan
Jia-Sin Kuo, National Central University, Taiwan
Chih-Hsuan Li, National Central University, Taiwan
Jing-Shan Hong, Central Weather Administration, Taiwan
Poster
Although common geomagnetic disturbance indices, such as the Kp, Dst, and Ap indices, effectively reflect variations caused by geomagnetic storms, slight differences often exist between the measurements recorded by local magnetometers and the disturbance indices during the same period. In addition to geomagnetic storms, ground-based measurements occasionally show smooth variations of a few tens of nanoteslas (nT) that change with local time. This phenomenon is attributed to the Solar Quiet (Sq) current, an electric current flowing on the sunlit side of the ionosphere. Studies of the Sq current are crucial for advancing our understanding of ionospheric electrodynamics, as its impacts vary with latitude and time. For these reasons, evaluating the local geomagnetic effects is important.
The main aim of this study is to identify potential local geomagnetic influences from historical data. This work comprehensively reviews local geomagnetic field variations in Taiwan from 1965 to 2024. The data were collected by Lunping Observatory (25.0°N, 121.17°E) between July 1965 and December 2000, by a geomagnetic monitoring network hosted by National Central University from November 2002 to October 2005, and by Taiwan Geophysical Networks for Seismology (TGNS) starting in January 2007. These data span solar cycles 20 to 25 (1964–2025) and are capable of calculating high-temporal-resolution local geomagnetic indices that serve as a reference for evaluating future local impacts of space weather. The results show that the local geomagnetic index reflects tiny differences from the Dst index during geomagnetic storms, and the Sq current is roughly consistent with long-term solar activity variations.


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