

# Correlation of GNSS-Derived Tropospheric Parameters with Local Weather Events in Mzuzu, Malawi

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Accurate and timely prediction of extreme weather events remains a significant challenge, particularly in regions with limited meteorological infrastructure. Although Global Navigation Satellite System (GNSS)-derived tropospheric parameters have shown potential for atmospheric monitoring, their correlation with local weather events, including storms, is not well understood. This gap limits the effectiveness of early warning systems that rely on atmospheric data for disaster preparedness and risk reduction. This study investigated the correlation between GNSS-derived tropospheric parameters and storms in Mzuzu City. By using observations from a single GNSS station processed with GPS and GLONASS constellations, statistical analysis was applied to examine how fluctuations in tropospheric parameters correlate with changes in weather conditions. The findings revealed significant relationships between specific tropospheric parameters and weather events in the same location, highlighting the potential for GNSS-derived data to serve as an early indicator of extreme weather. These results provide valuable insights for strengthening early warning systems and enhancing disaster preparedness in regions that rely on GNSS for atmospheric monitoring.

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