

# Analysis of High Rate GPS Data from the September 12 and 13 Strong Motion Events off Sumatra

J. Genrich, J. Galetzka, O. Konca, A. Sladen, K. Sieh, and J-P. Avouac

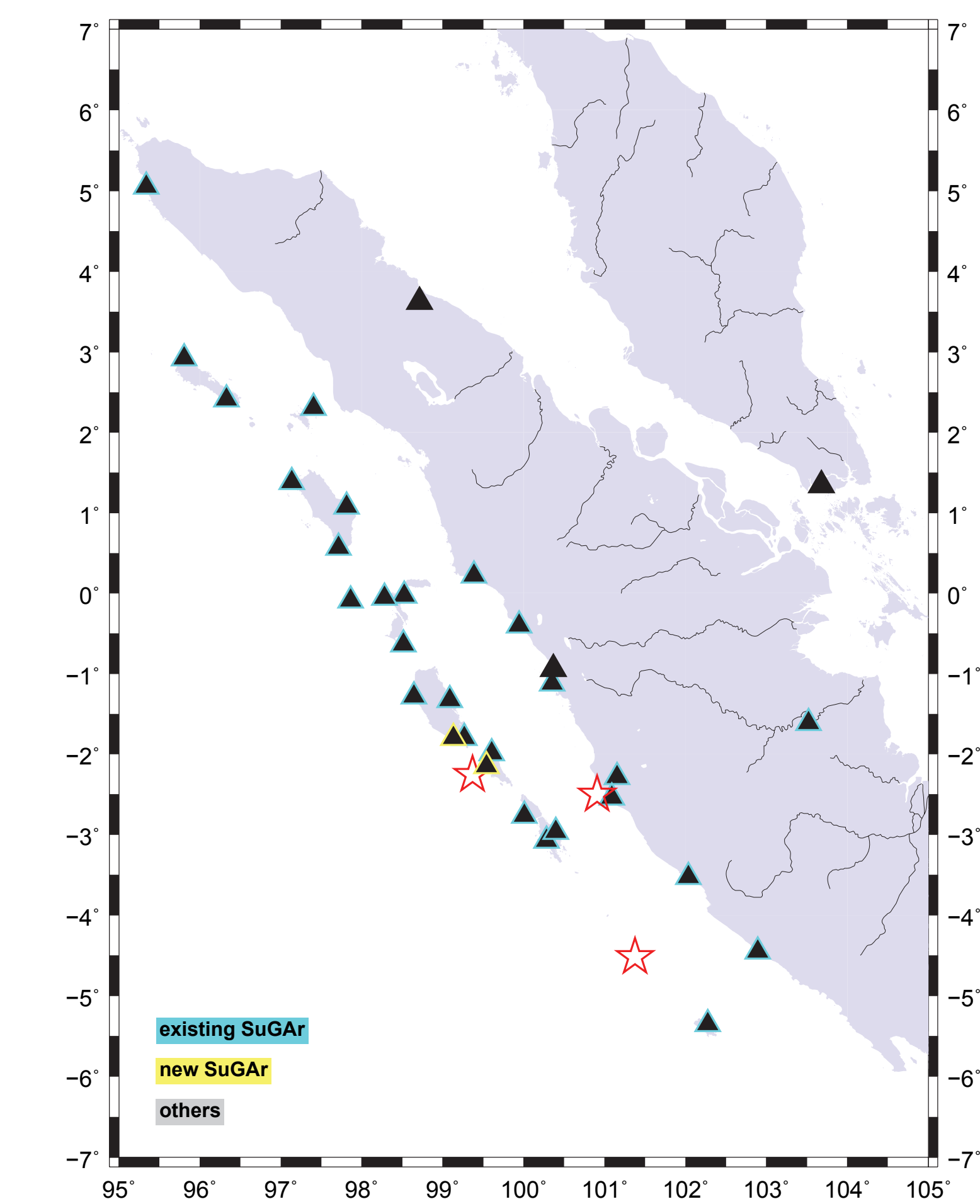


Figure 1. Map location of SuGAR stations and epicenters (USGS).

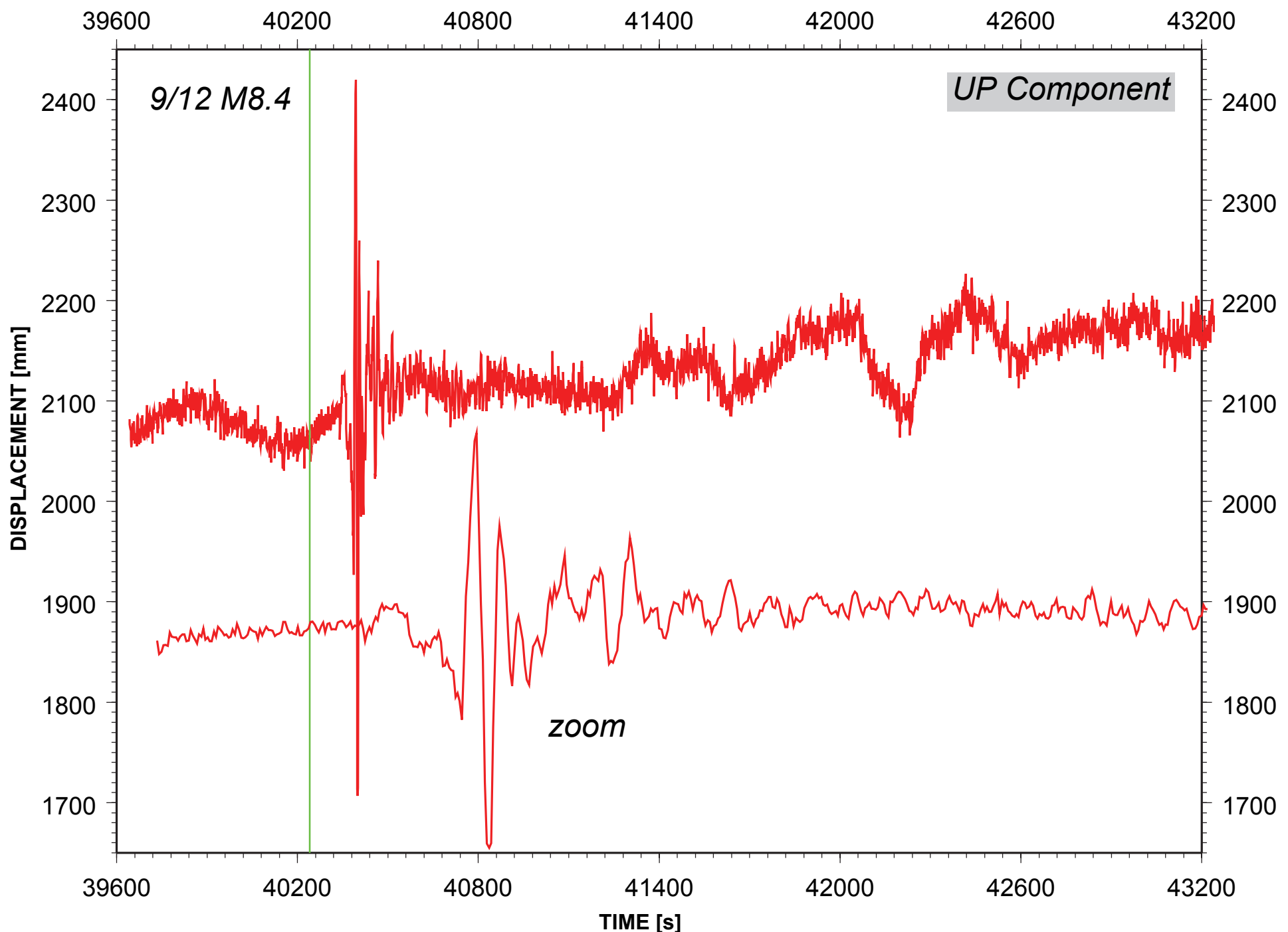
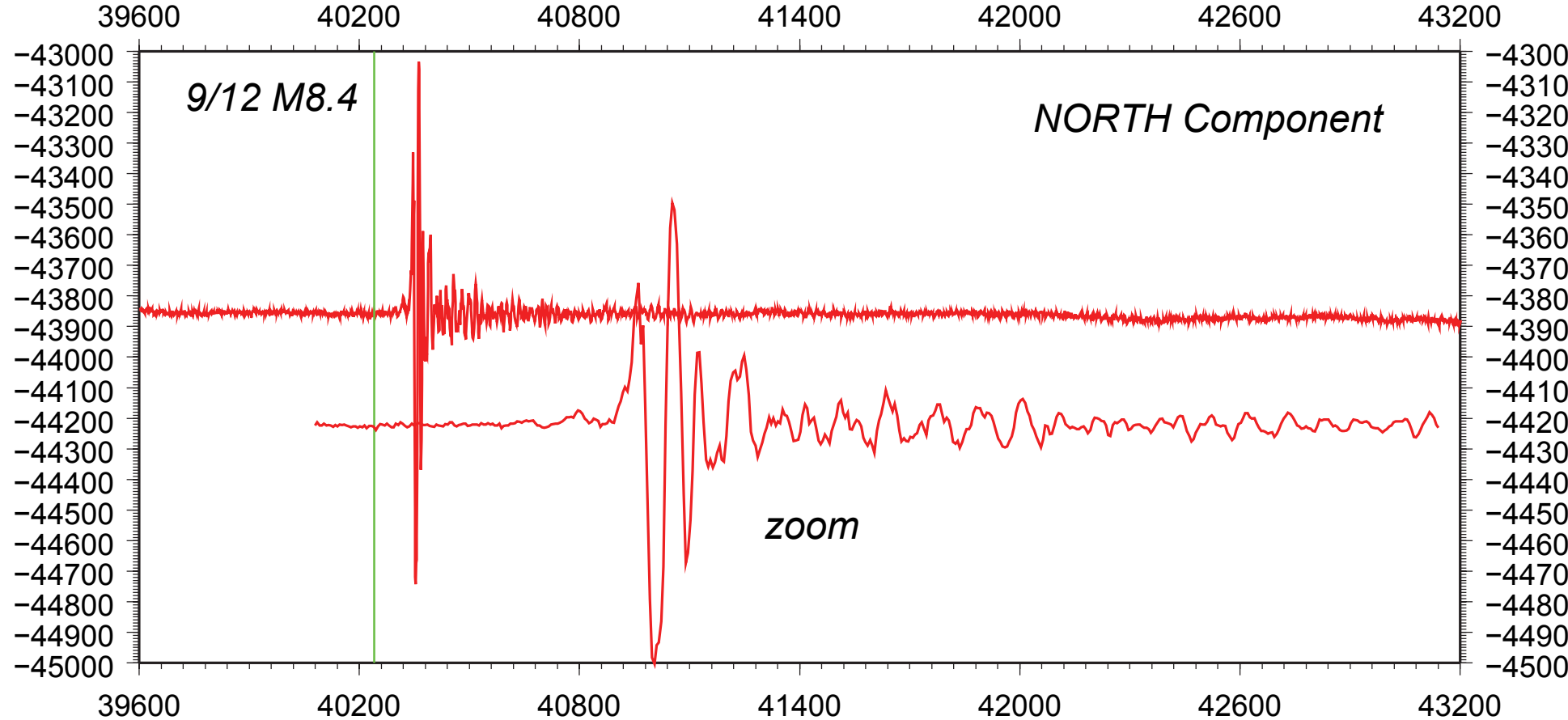
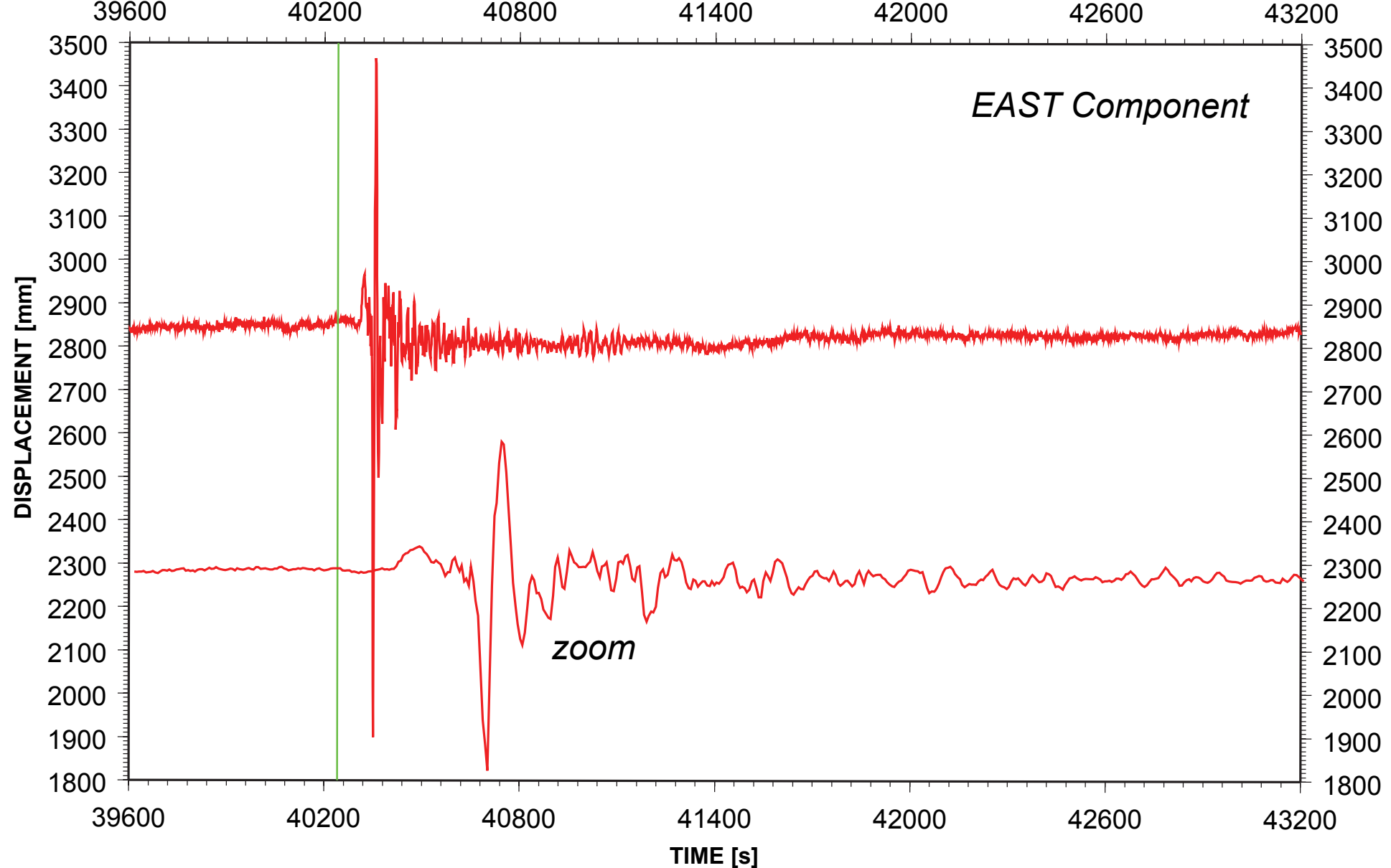


Figure 2. Baseline TIKU->SLBU sampled at 1s during M8.4 event. Vertical green line marks origin time.

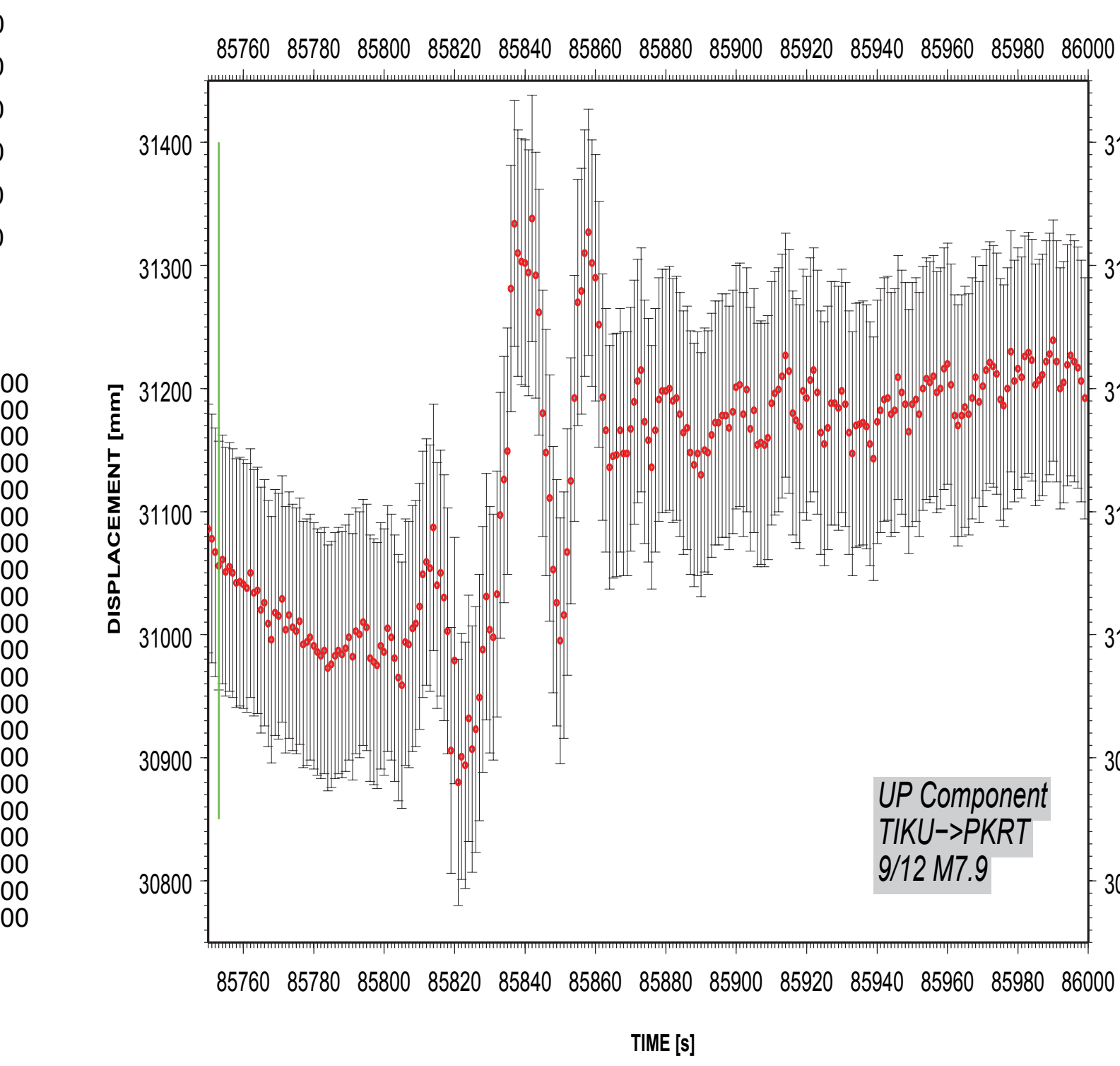
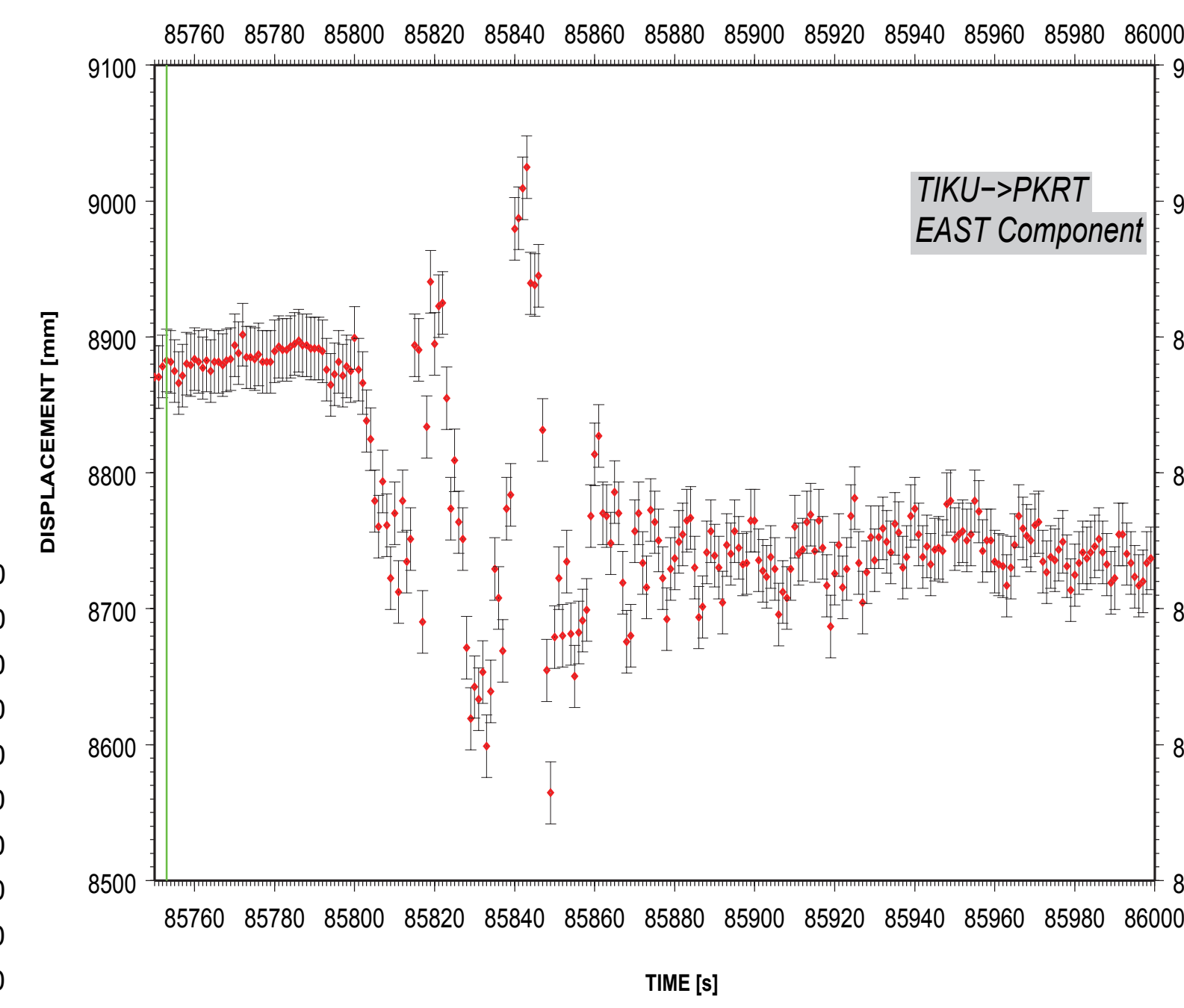
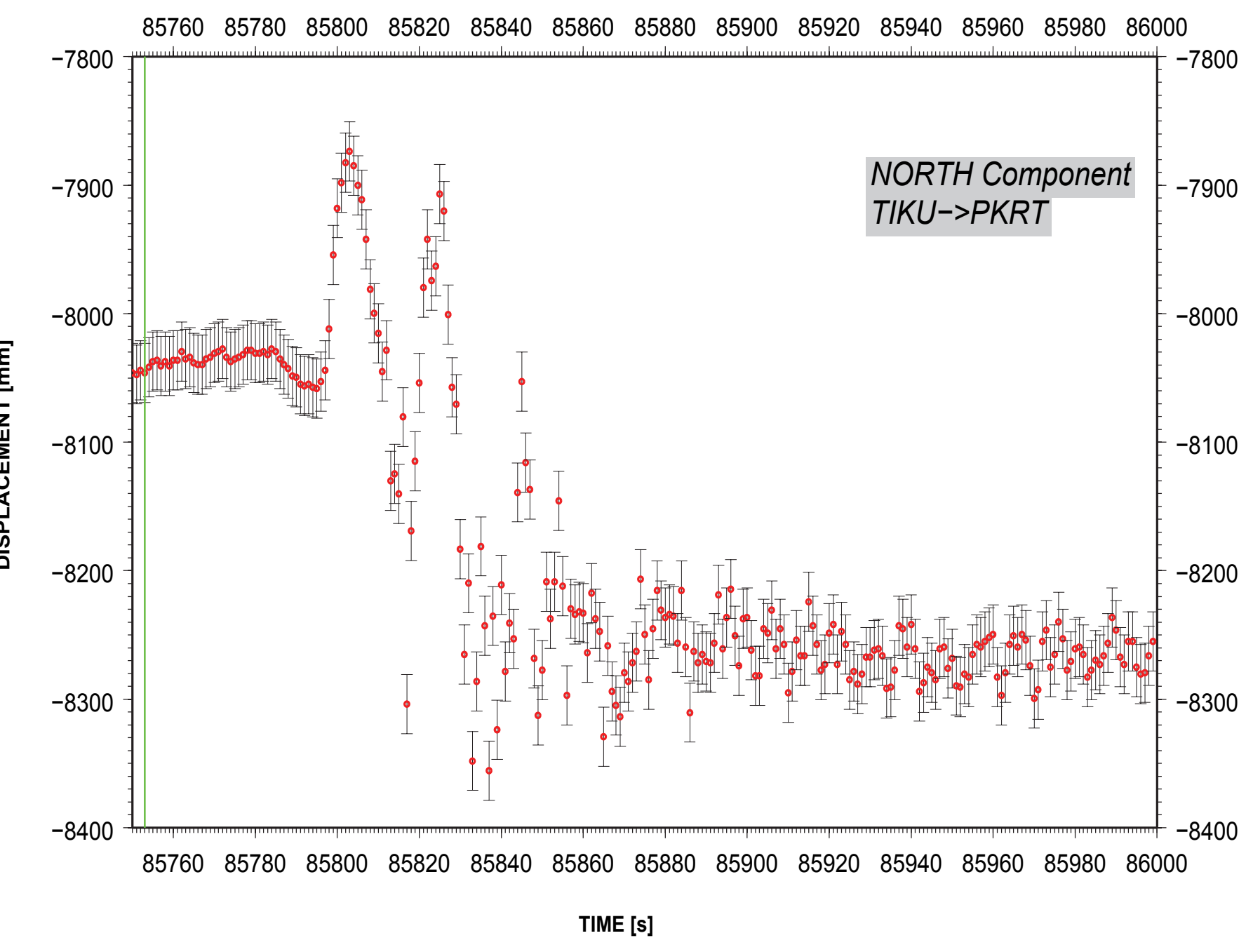


Figure 3. Baseline TIKU->PKRT sampled at 1s during M7.9 event. Vertical green line marks origin time.

The Sumatran Global Positioning System Array (SuGAR) consists of currently 29 continuous GPS stations that cover the forearc region of Sumatra. Four stations in the southern part of the array recorded high rate (1 sec. sampling rate) data during and surrounding the 3 major regional earthquakes (M8.4, M7.9, and M7.0) on September 12 and 13. Using the GAMIT/TRACK software, we compute 3-component time series of station displacements to investigate coseismic and postseismic kinematics. We present spectral characteristics of the recorded coseismic wave forms and show observed early postseismic displacement.

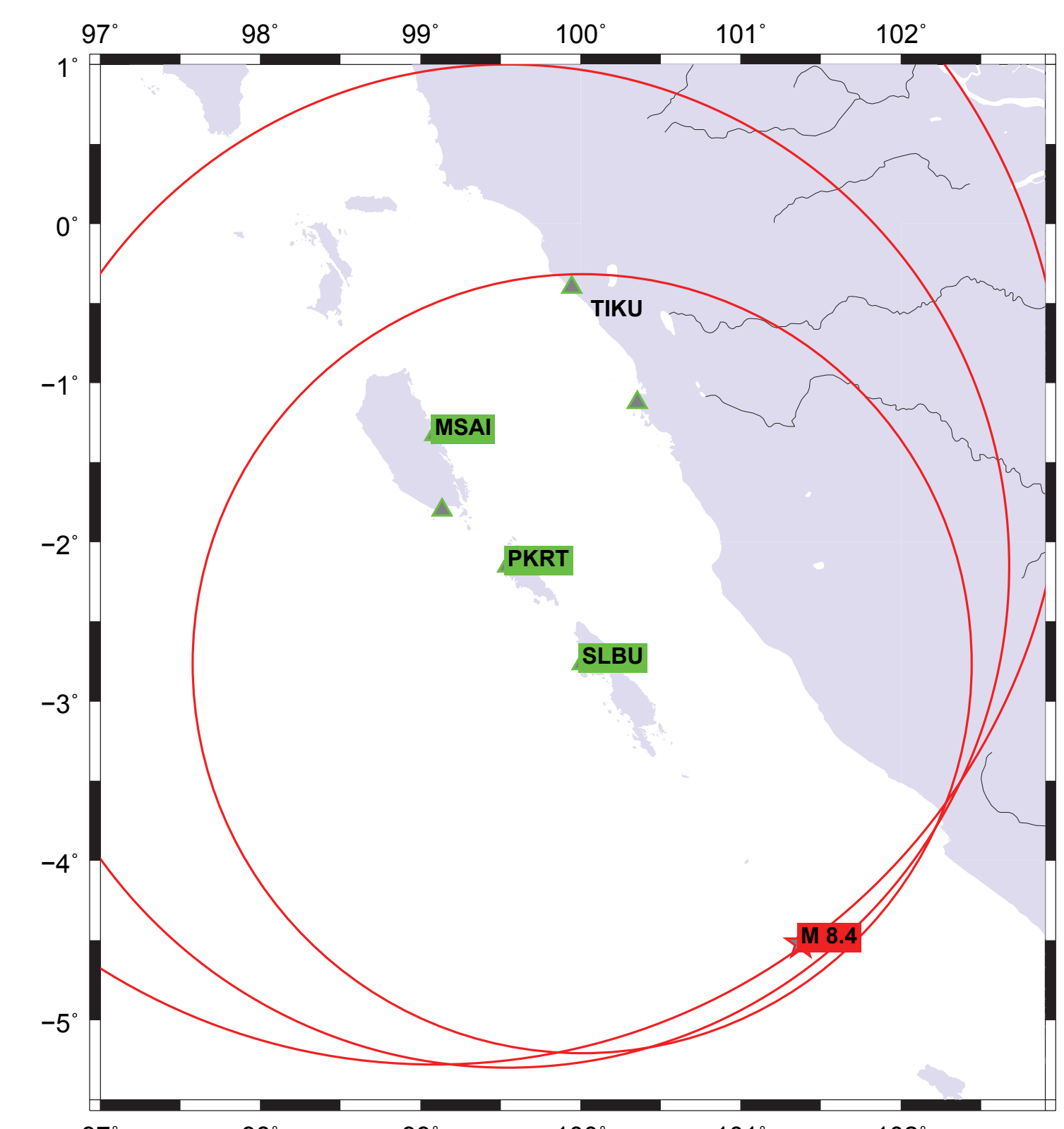


Figure 4. Attempt to determine epicenter for M8.4 event from origin time (USGS) and onset of significant displacement at 3 sites. Red asterisk marks USGS location.

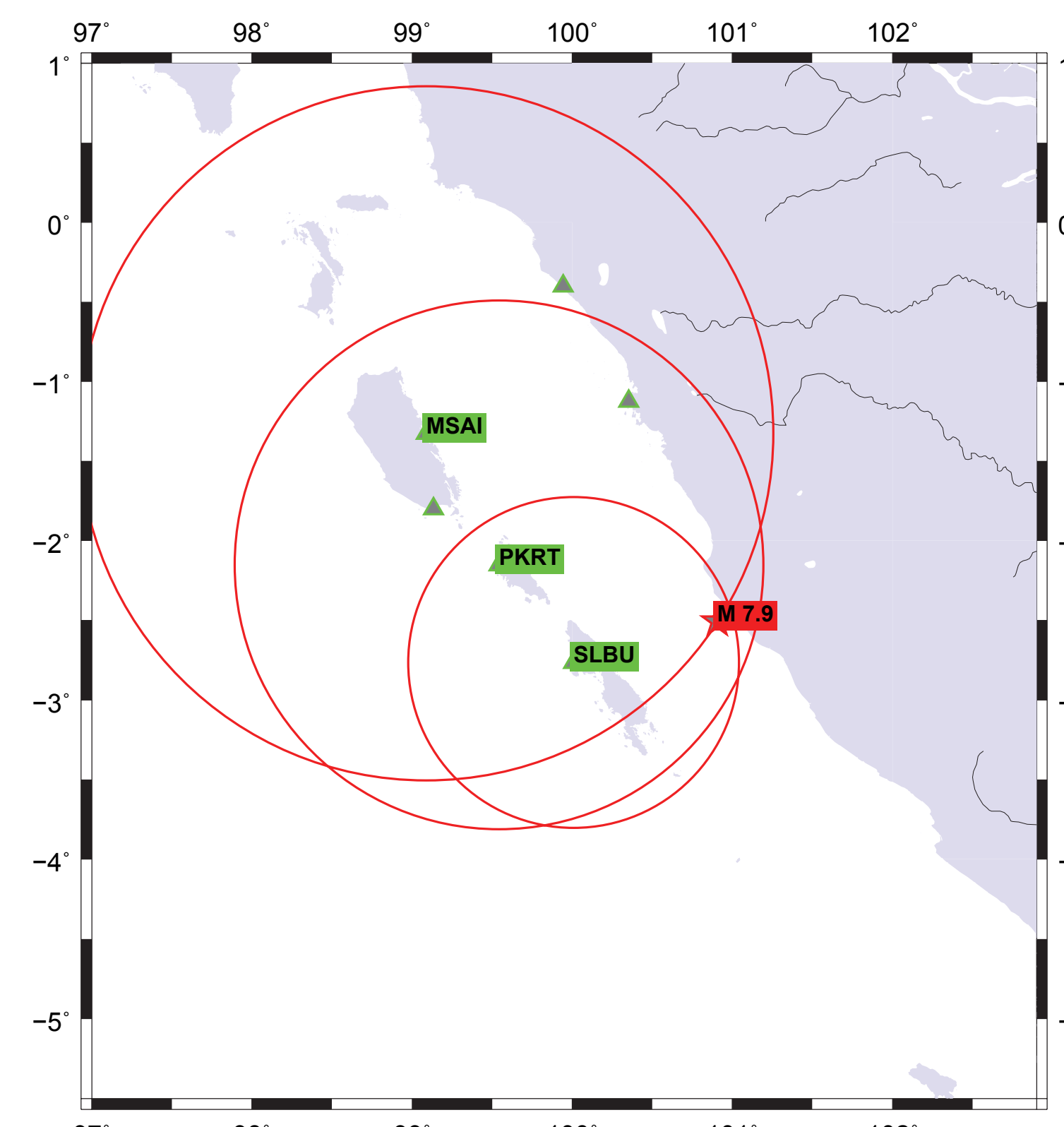


Figure 5. Attempt to determine epicenter for M7.9 event from origin time (USGS) and onset of significant displacement at 3 sites. Red asterisk marks USGS location.

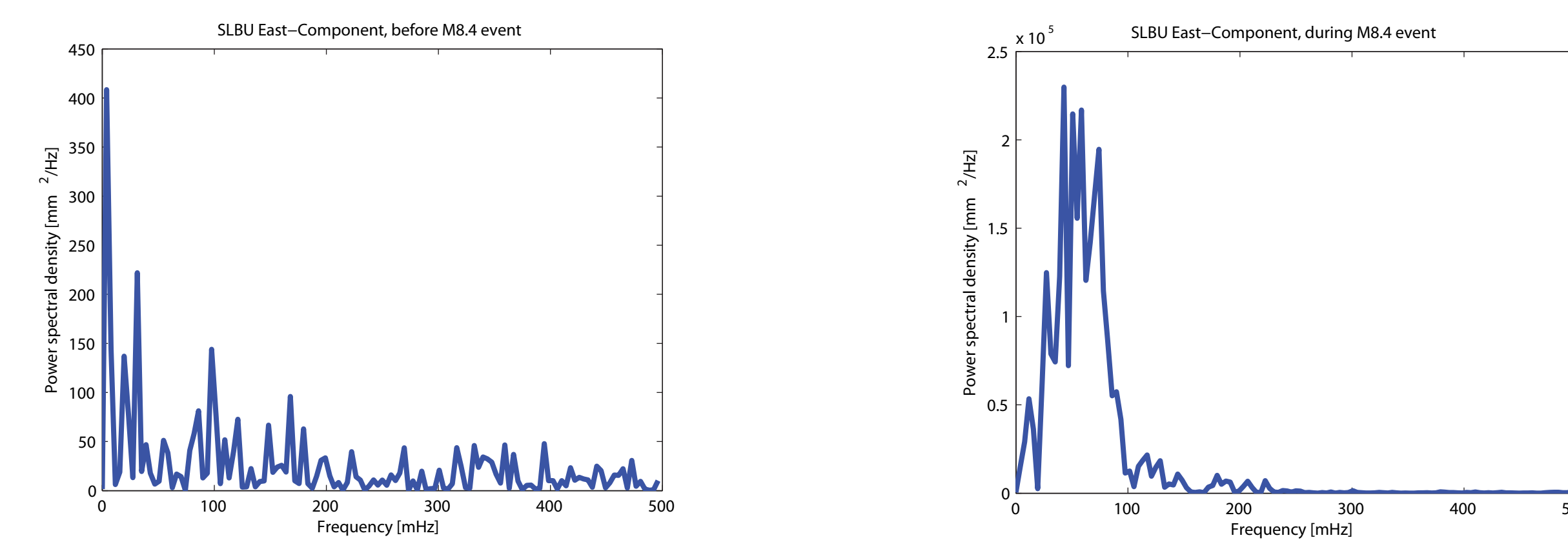


Figure 8. Power spectral densities of 500s long time series windows for TIKU->SLBU GPS baseline before, during, and after the M8.4 event. Two linear plots of raw FFT spectra are shown on the left, log-log plots of maximum likelihood (Yule-Walker) estimates on the right. Nyquist frequency is 0.5 Hz.

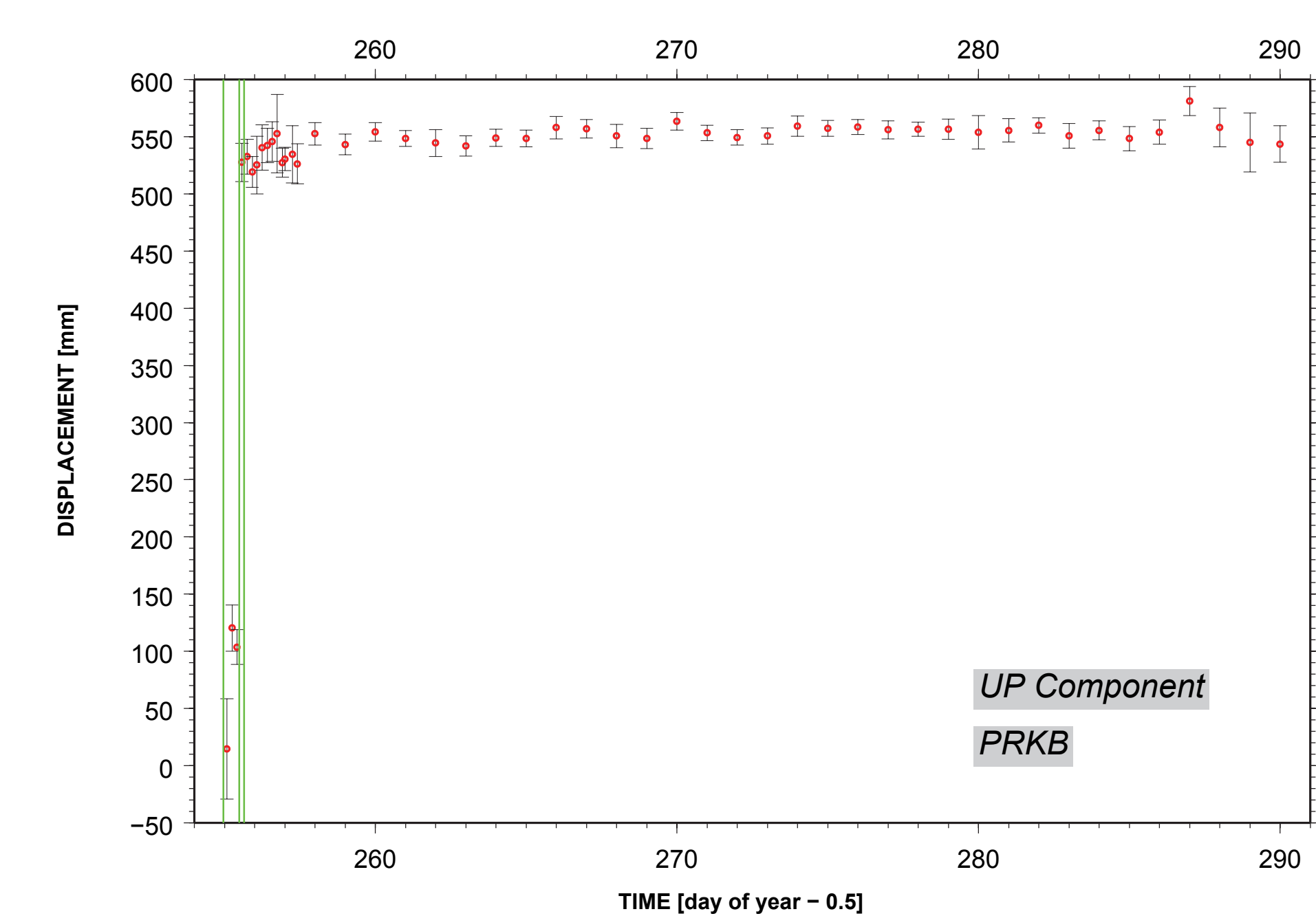
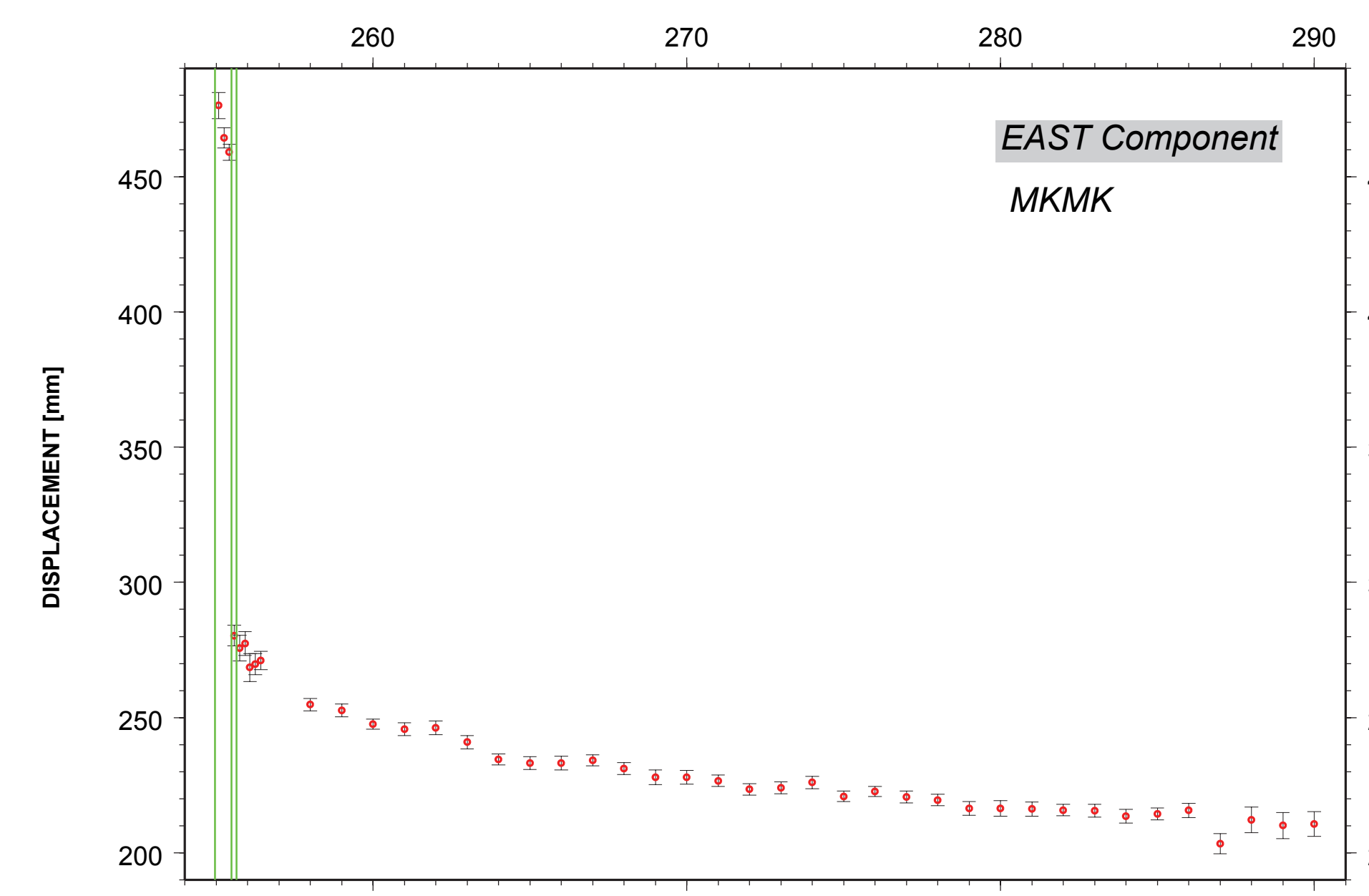
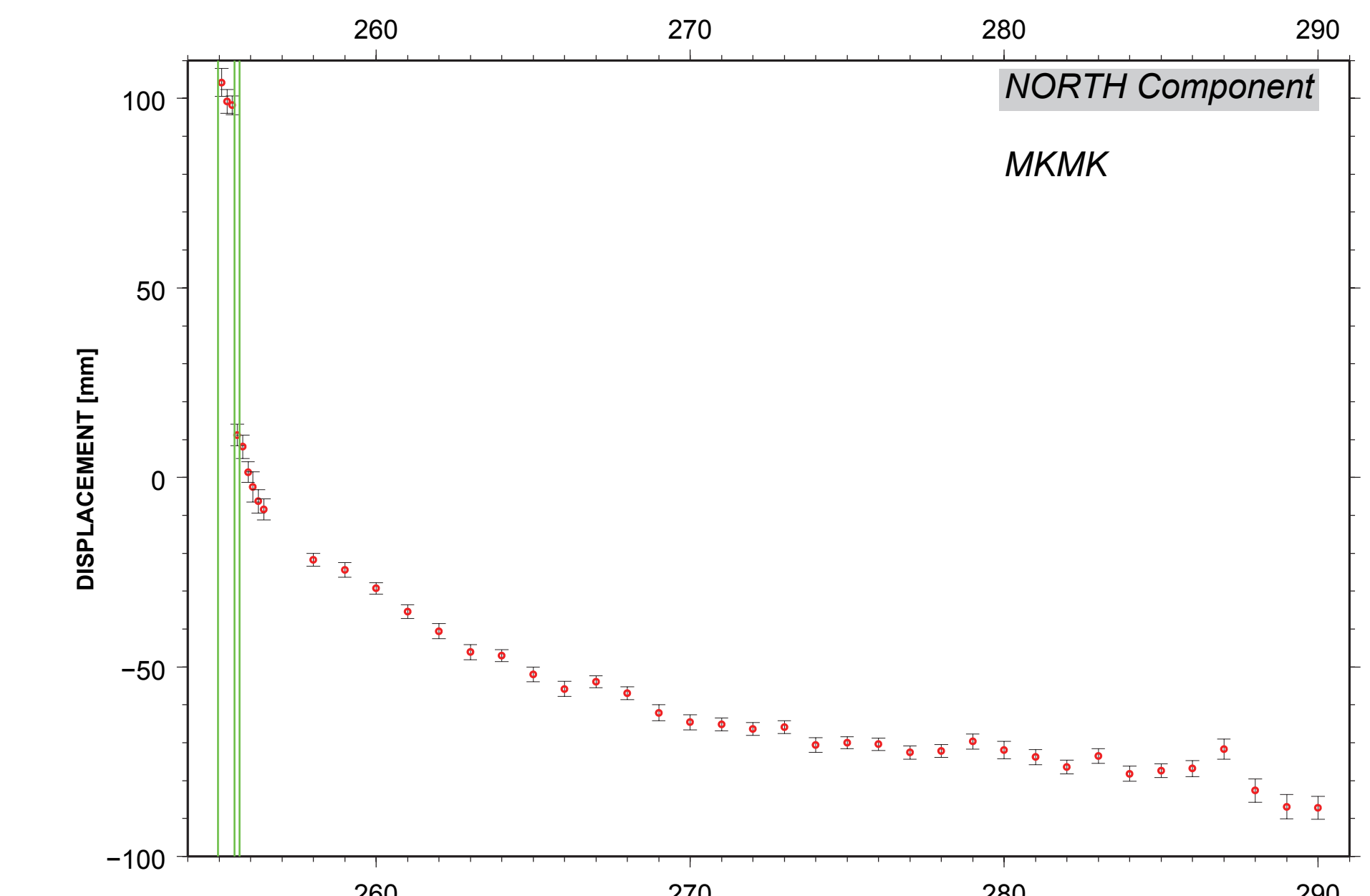


Figure 6. North, East and Up components of postseismic displacement for a time span of 1 month. Estimates for the first 2 days are derived from 4-hour solutions, later estimates from 24-hour solutions. Error bars represent formal one standard deviations.

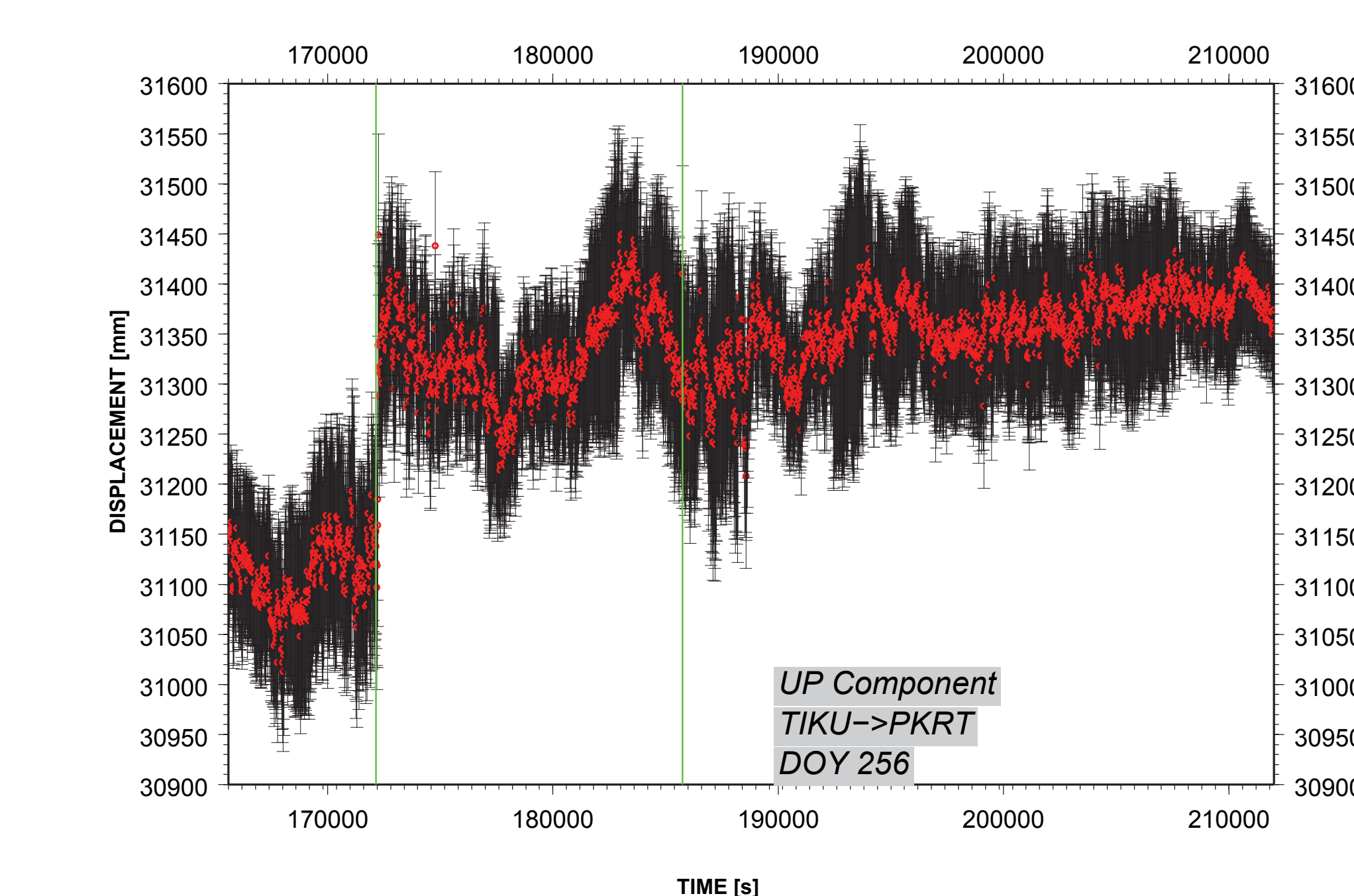
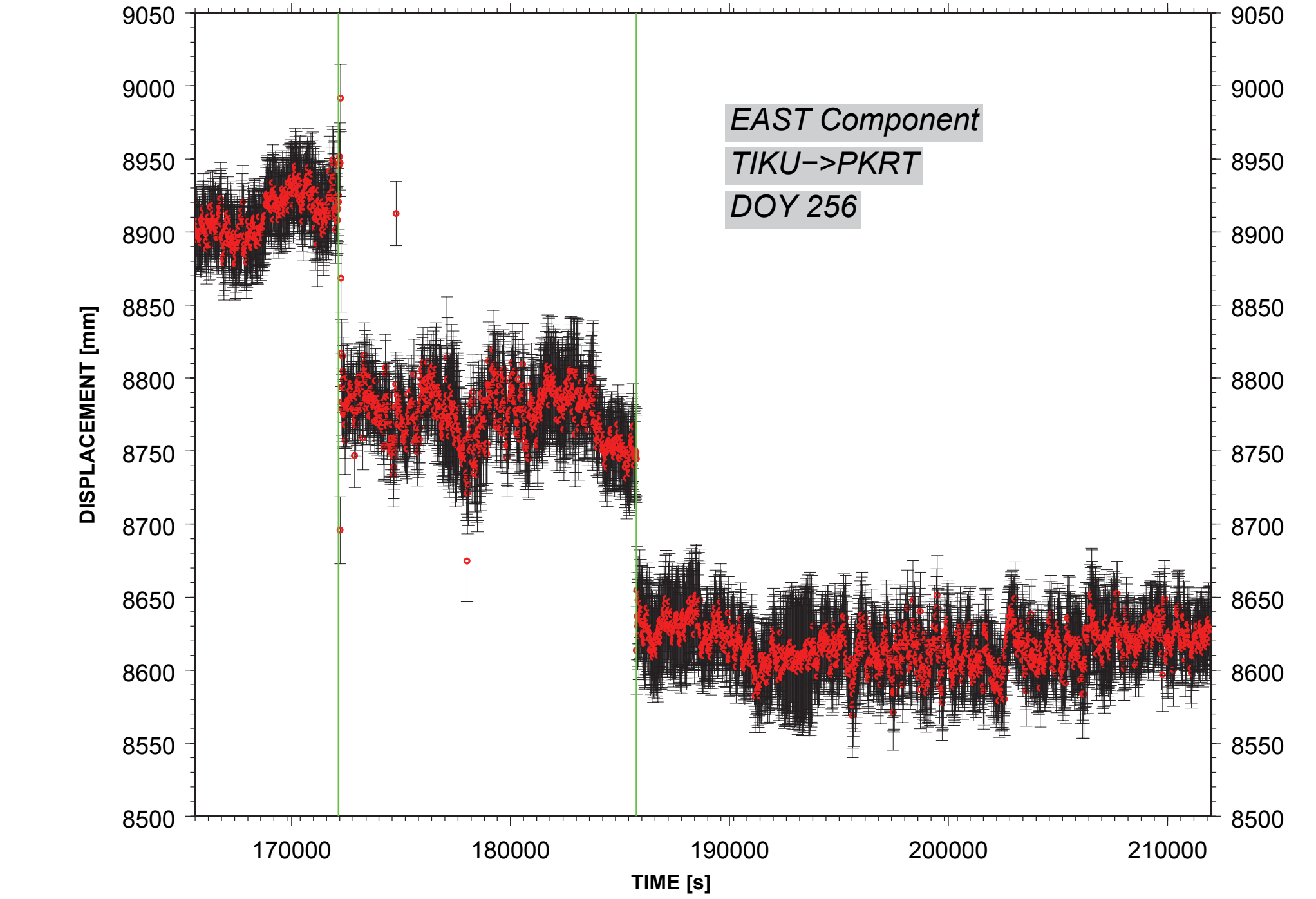
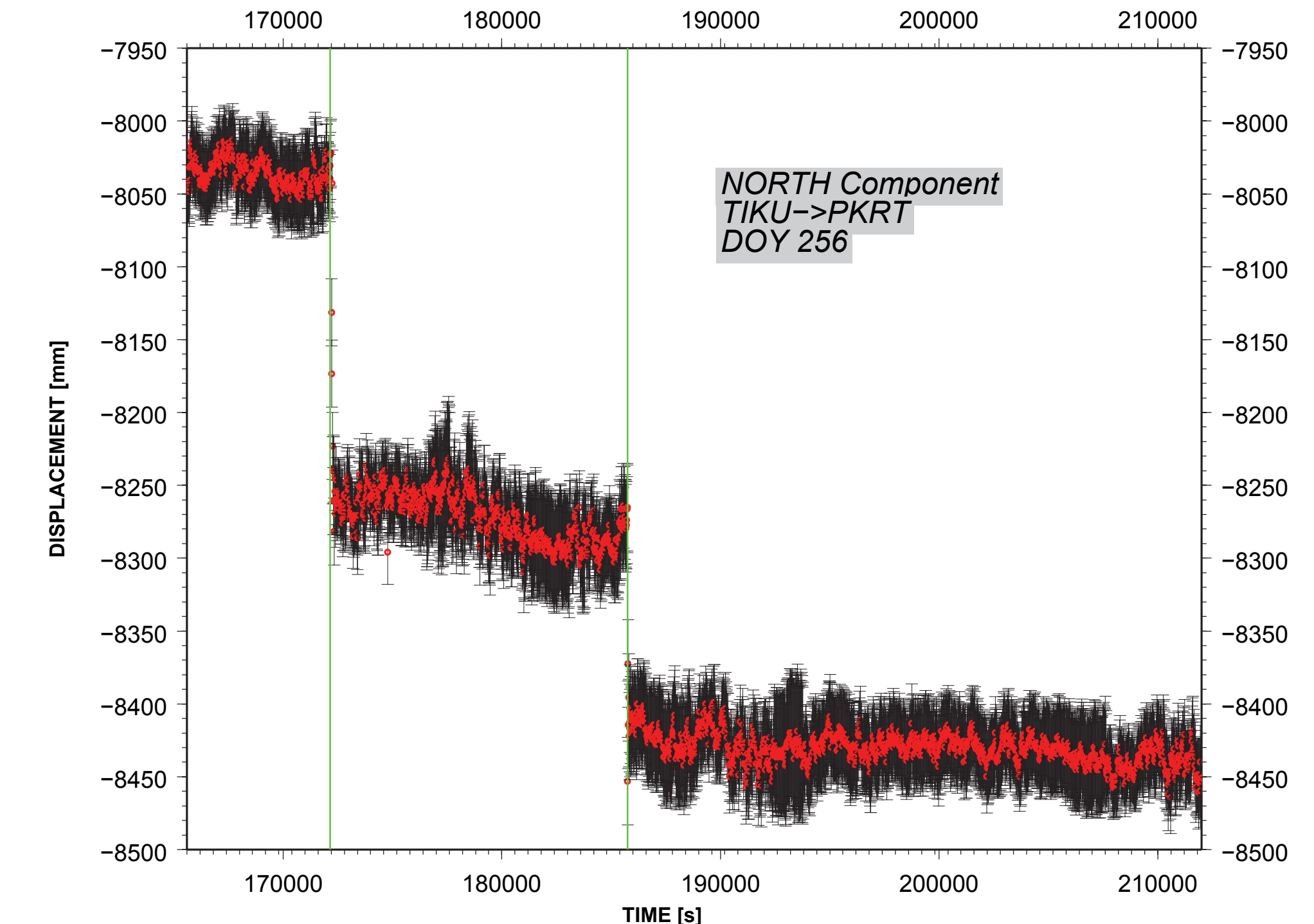


Figure 7. North, East, and Up components of TIKU->PKRT baseline for a 13-hour time span sampled at 15 s. Error bars represent formal one standard deviations. Vertical green lines indicate origin times of M7.9 and M7.0 events.