We investigate the anomalous signals prior to about 30 large earthquakes (with seismic magnitude moment larger than 6.9) occurred in the period ranging from 1 Jan. 2008 and 31 June 2010 using 1-Hz data recorded by a superconducting gravimeter (SG) at Hsinchu station, Taiwan and by more than 10 broadband seismometers (BS) distributed over the globe. We compute the power density spectra (PDS) of the records both in the quiet period (the period several days before or after which there occur no large earthquakes) and possible-anomalous period (the period that covers one or several days just prior to large earthquakes), and compare the quiet-period PDS with the possible-anomalous-period PDS to see whether there are anomalous signals prior to large earthquakes. In another aspect, we apply Hilbert-Huang transformation (HHT) technique to the SG and BS records to establish the time-frequency-energy paradigms to examine whether there are anomalous signals prior to large earthquakes. The results of the PDS comparisons and the examinations of HHT time-frequency-energy paradigms show that there are anomalous signals prior to more than half of the examined large earthquakes. In addition, our investigations suggest that the anomalous signals prior to large earthquakes may be related to the magnitude, focal depth, fault orientation and distance between the observation station and the epicenter. However, the origin of the anomalous signals needs further investigations. This study is supported by Natural Science Foundation China (Grant No. 40974015).