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The Namche Barwa Temporary Seismic Network (NBTSN) and its performance in monitoring the 18 November 2017 M 6.9 Mainling, Tibet, China, earthquake

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The complex geological structure and highly active surface and tectonic processes of the eastern Himalayan syntaxis (EHS) have resulted in many large earthquakes, making it an important region for studying the dynamics of continental collision. To monitor seismic activity in this region, we deployed a six-station temporary real-time telemetered broadband seismic network, the Namche Barwa Temporary Seismic Network (NBTSN) since December 2016. This network enabled us to obtain more accurate results on the crustal and mantle structures of the Namche Barwa region and to investigate the mechanism of the formation of the EHS. The seismic data obtained from the NBTSN were complemented by additional real-time data acquired from the 24 permanent stations from the Tibetan seismic network. We combined the data from the permanent and temporary stations for uniform processing using the JOPENS software package widely used throughout the China Seismological Network for the past 10 yrs. On 18 November 2017, a shallow M6.9 earthquake occurred in Mainling prefecture, Nyingchi City, Tibet, just within the monitored area. This provided a unique opportunity to test the performance of the NBTSN during a major earthquake. In this work, we reported the key features of the NBTSN, including details of the seismic network deployment, station noise levels, and overall earthquake monitoring capacity. The presence of the temporary stations resulted in an improvement in the minimum detectable magnitude from an original level between M_L2.3–2.8 to M_L1.5–2.2 and the magnitude of completeness decreased to M_C2.0. We obtained preliminary results using seismic data acquired during the 2017 Mainling earthquake, including detailed relocations of the mainshock and aftershocks. A total of 604 aftershocks were detected up to the end of 20 November 2017, and the aftershocks clearly delineated a dominant trend running in a north-northwest-south-southeast direction which corresponded with the north-northwest-trending Xixingla fault. Moreover, we analyzed the frequency-magnitude distribution of the relocated aftershock sequence, and observed a low b-value of 0.86, indicating that seismic hazard in this region remains high. Overall, these results reveal the potential application of this network to explore physical mechanism of large block boundary earthquakes and resultant geological disasters.