NepalEEW: Testing the feasibility of an Earthquake Early Warning System in Nepal

Abstract: Owing to large earthquakes, a dense population, and vulnerable residential buildings, Nepal ranks among the countries with the highest seismic risk in the world. In 2015, a magnitude 7.8 earthquake hit Nepal, claiming about 9000 human lives and leaving many homeless. Yet, even larger earthquakes will likely hit Nepal in future. The impact of large earthquakes could potentially be limited by implementing an earthquake early warning (EEW) system, that is, a system that detects early stages of an earthquake, issues alerts, and provides critical time for users to seek cover or exit a building before the shaking arrives. Recent advances in the Internet of Things and cloud-based technologies have significantly reduced the cost of EEWs, making it available around the world. An open-source initiative, *OpenEEW*, developed a straightforward, low-cost EEW solution open to the public. The system comprises two major components - a network of *OpenEEW* seismometers that continuously monitors the ground motion, and a cloud server infrastructure that receives data from the network, identifies earthquakes and estimates their location and magnitude. The aim of our project is to test the new technology by establishing a real-time earthquake monitoring system in central Nepal, with the ultimate goal of testing the feasibility of EEW in the region. The experiment is a joint effort of the Institute of Geophysics of the CAS (Prague, Czech Republic), Oregon State University (Corvallis, Oregon, USA), the National Disaster Risk Reduction & Management Authority (Kathmandu, Nepal, abbrev. NDRRMA), and *OpenEEW*. During the first half year of the project we deployed 20 *OpenEEW* seismometers in central Nepal, between the cities of Tatopani/Beni on the west and Kathmandu on the east. So far, we have recorded two small earthquakes, one located near the town of Kushma (~M 3.2), the other north of Besisahar (~M 3.6). The network recorded these events well, both of them were characterized in less than 10 seconds after their origin time. The project will last for two years, during which earthquake alerts will not be delivered to the public. After the testing period, we will evaluate the system performance primarily based on alert timeliness and reliability. Besides testing the technical solution, we are concentrating on building local capacities for the EEW system through close cooperation with NDRRMA, education of students and early-career professionals, and dissemination of results through scientific publications, and scientific and public talks.