Title
Preface

Authors
Rao, N Purnachandra
Bürgmann, Roland
Mugnier, Jean-Louis
et al.

Publication Date
2017

DOI
10.1016/j.jseaes.2016.11.025

Peer reviewed

Preface

Author links open overlay panelN.Purnachandra RaoRolandBürgmannJean-LouisMugnierVineetGahalautAnandPandey
Show more

https://doi.org/10.1016/j.jseaes.2016.11.025Get rights and content

- **Previous** article in issue
- **Next** article in issue

The 25 April 2015 Gorkha, Nepal earthquake of magnitude 7.8 devastated parts of Nepal and northern India with a death toll of more than 8000. Several aftershocks of moderate size were recorded, including one of M7.2 on 12 May 2015 on the eastern periphery of the main rupture. A matter of great concern is its occurrence in the Central Himalaya regarded as a major seismic gap awaiting a much greater earthquake of magnitude higher than 8.0, or even 9.0 according to some researchers. The largest instrumented earthquake in Himalaya is the 1950 Assam earthquake to the east that reached a magnitude of 8.5. The largest historic earthquake in the Nepal region was the 1934 Great Bihar-Nepal earthquake, which produced extensive ground deformation and liquefaction, causing severe damage. The other important large earthquake in this region was the 1905 Kangra earthquake of magnitude 7.8 further west. The gap region between the ruptures of the 1905 and the 1934 earthquakes has been relatively quiet, and hence warrants serious monitoring in the coming years considering the inhabitation by vast populations in the bordering cities and towns with extremely poor construction standards.

The current special issue focuses on the earthquake of 25 April 2015, and is therefore an extremely important and pertinent endeavor, since this is the largest earthquake recorded in Central Himalaya during the modern instrumented era. The earthquake has provided vast amounts of high quality data with a tremendous scope for analysis with state-of-the-art techniques enabling a fresh understanding of earthquake processes in general and the details of seismogenesis in specific, in this part of the unique continent–continent collision zone. The paper by Arora et al. (p2) provides the required background of the regional seismotectonics and sheds due light on the seismogenesis of the 25 April Gorkha earthquake. Currently, the region is monitored by dense seismic and GPS networks by various international agencies in Nepal, India and China, which has enabled characterizing the ground motion in this region (Sharma et al., p12) and providing isoseismal distribution for obtaining a realistic attenuation relation for the region (Prajapati et al., p24). This has important connotation for site specific seismic hazard assessment in the surrounding regions in future, where empirical relations have been routinely used in the past causing severe limitations to the ground motion predictions.

Vast GPS networks deployed in the past two decades around the Himalayan arc, the Indian shield and the Tibetan plateau regions, have played a major role in deciphering the stress changes (Zha and Dai, p38; Chan et al., p46) and coseismic displacements (Yadav et al., p56) enabling an independent estimation of the rupture characteristics. Jouanne et al. (p62)have studied the rheology of the Main Himalayan Thrust by quantifying the interseismic coupling from years of geodetic data. Jayangondaperumal et al. (p89) use detailed geological field observations to characterize great thrusts manifested by previous ruptures in the backthrust areas of northwest Himalaya.

Further, using broadband seismic data and applying multiple-array back-projection techniques, Qin and Yao (p72) have estimated the detailed rupture process time history including the sub-event distribution of this earthquake, which further enhances our understanding over and above the conventional point source static models.

In an interesting study Catherine et al. (p80) correlate the ionospheric TEC count from GPS observations with the disturbance caused by the Gorkha earthquake. These kind of studies have important implications for earthquake precursory studies in future, and call for building useful models connecting observations of the earth-atmosphere system.

Important geotechnical simulations are reported by Badry and Satyam (p102) related to soil-structure interaction analysis for asymmetrical buildings supported on piled raft. The damage caused by the 2015 Gorkha earthquake has provided a unique opportunity to earthquake engineers to study the impact of ground shaking on structures of different types, dimensions and strengths in the Himalayan collision zone.