BOOK REVIEW

ACTIVE TECTONICS OF KUMAUN AND GARHWAL HIMALAYA by R. Jayangondaperumal, V.C. Thakur, V. Joevivek, Priyanka Singh Rao, and Anil Kumar Gupta. Springer, 2018, ISBN 978-981-10-8243-6.

The recently published book, "Active Tectonics of Kumaun and Garhwal Himalaya" by Jayangondaperumal et al., published in 2018 by Springer in its series on Natural Hazards, is very timely for the region of the Himalayan orogen, which is affected by numerous small and major earthquakes and, thus, is a continuous threat to life and property. This multi-disciplinary work encompasses research combining structural geology, tectonic geomorphology, paleoseismology, soil sciences, geochronology, high resolution survey using RTK-GPS (Real Time Kinematics-GPS) and seismology under the discipline of Earthquake Geology.

This book deals with active tectonics of a portion of Himalaya in the Central Seismic Gap (meioseismic zones between 1905 Kangra Earthquake and 1934 Bihar-Nepal Earthquake) of Kumaun-Garhwal Himalaya region, which is believed to have accumulated adequate elastic strain energy for a future large earthquake. It attempts mapping of active faults for the first time, using remote sensing Cartosat-1A dataset, combined with field investigations in delineating and mapping the earthquake generated landforms (e.g., fault scarps and perched or disjointed terraces along active fault) and developed an interactive web-based fault database. Paleoseismological investigations across the fault scarps include nature of fault, magnitude of vertical offsets and coseismic slip, and dating of paleo- and historical earthquakes.

The book contains four chapters: (i) Introduction, (ii) Mapping of Active Faults, (iii) Active Faults of Kumaun and Garhwal Himalaya, and (iv) Concluding Comments and Structure of online interactive active fault database. The introduction deals with the geological framework, crustal structures, seismicity, horizontal GPS velocity rates and paleoseismologic investigation of the frontal Sub-Himalayan region of Uttarakhand State.

The second chapter elaborates the techniques and methods of mapping of active faults, and includes basics of remote sensing, use of Cartosat-1A data for preparing the Digital Elevation Model (DEM), image calibration and terrain analysis. In addition, this chapter also details necessary pre-processing steps for image calibration, DEM, anaglyph image production, contour extraction, disjointed geomorphic surface identification and active fault mapping specifically for the Indian Satellite products (e.g. Cartosat stereo-pair data). The comparative study of various techniques used in anaglyph image production is highly appreciable. The chapter ends with significant role of paleoseismic investigations. This will be helpful for the readers to understand the fault characteristics in the subsequent chapters. Chapter 3 on active faults of Kumaun and Garhwal gives new data and mapping of active faults region-wise in the Sub-Himalayan fold-thrust belts. The active fault maps include areas between Ganga and

Yamuna, Laldhang-Ramnagar-Kathgodam and Kota dun. Further east, active fault mapping extends to Heidakhan, Shiala, Khatima and Tanakpur. In each of these regions, windows are identified for detailed study that includes mapping of fault scarps displacing the contemporary geomorphic surfaces. The fault scarps are believed to be ruptures produced by paleoearthquakes; their precise height of scarp is estimated using total station surveying instrument and approximate estimate of the magnitude of the earthquakes. The detailed analysis of active faults in each window, handled by the authors, is highly appreciable. The representation of active faults in satellite image, GIS map and 3D-perspective view would be more informative. The field photograph showing fault scarps is an additional asset. The characteristic of the active faults in tabular form is also provided. The representation of anaglyph-type image is the first in the paleoseismic-related books.

The last chapter of the book is creation of data base of the active faults of Kumaun and Garhwal. A web-based Himalayan Active Fault data base interactive interface system (WHADIS) with online data base structure has been generated in the present investigation. Though this book provides self-contained information on active faults, the authors have established this open source database on Google and Cartosat images for helping the readers to visualize the faults in interface screen.

The occurrence of some of the destructive earthquakes, like 1994 Northridge, 1999 Chi-Chi, and 2005 Kashmir earthquakes produced surface ruptures associated with active faults. There are reports of near-total destruction of villages and severe damage to infrastructure close to the active faults in areas affected by moderate earthquakes. This has given rise to recognition that damage caused by an earthquake is much greater in area closer to the active fault. It is therefore imperative that the nearness of active faults to major engineering projects may be considered an additional risk factor for the design of the structure.

The book can be a good teaching aid for active fault study, research on further paleoseismological investigations and adds another aspect in Tectonics of the Himalaya.

In spite of numerous value-added contributions to the Active Tectonics of the Himalaya, hard copy of this book lacks in quality of numerous photographs due to poor contrast and duplicated printing due to no fault of the authors in spite of their quality printing of the soft copy.

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