

## Book Review

# Seismic Activity - Indian Scenario

- B.Ramalingeswara Rao, 2015

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I am happy to review the book titled "Seismic Activity - Indian Scenario" authored by Dr.Buddha Ramalingeswara Rao. At the outset I congratulate the author for a stupendous effort in collating information starting from Vedic times to present day. It requires a monumental effort to collect such information, pertaining to the most complicated natural hazard-earthquake. The effort assumes greater significance as Dr.B.R.Rao has gathered the historical data from various archival sources in order to have comprehensive data coverage. Since applicability of any area specific building code needs information pertaining to maximum credible earthquake, especially in different seismic regions, his focus on providing needed information deserves due recognition. As Himalayas continue to be active and significant deformation is noticed in Narmada-Son lineament, Kutch and even in SGT, the area specific and event specific information provided in this book is very useful to effectively plan collection of additional data and to periodically upgrade Hazard evaluation.

The book is subdivided into 9 chapters. In addition there are 6 Appendixes.

In the first chapter on " Historical Developments in Seismology " a significant effort has been made to cover various aspects starting from -Early Ideas on Earthquakes and ending with Paleo-Seismological Studies in India. This chapter has 16 subsections. It is good that the 38 page long chapter has details of general interest, including a write up on "What is an earthquake". Even though the chapter contains significantly useful information its structuring could have been better organised. Dr.Rao may keep this in view in structuring second edition, which I am sure will come out in due course, on demand from learned scientific and technical community.

In the second chapter on "History of Indian Earthquakes", more than hundred pages in length, author has succeeded in explicitly bringing out various facets of Indian Earthquakes history. It is subdivided into 7 subsections. I am impressed by the contents in the subsection "History of Indian Earthquake Catalogues". Dr.B.R. Rao has provided references of more than 120 case studies. This information will be of immense help to researchers. Other subsection that caught my attention is "Narration of Historical Earthquakes in Himalayas". Since Himalayas cover a span of about 5000 km and as almost entire belt has experienced seismic activity since time

immemorial, the narration helps in having a panoramic view of earthquake activity along and across Himalayas. After witnessing colossal destruction due to recent Nepal Earthquake of 7.8 Mw (25<sup>th</sup> April, 2015) and going through the information provided by Dr.B.R.Rao on Earthquakes in Nepal dating back from 1255 AD, it is evident that this region could have been better fortified through structures that could withstand impact of high magnitude Earthquakes. The information provided in this chapter helps in planning research activities in different segments of Himalayas, apart from planning pre event preparedness and post event rehabilitation measures, following Disaster Continuum approach.

In the third chapter on "Seismicity of Indo-Gangetic Plains and North- East India" author has covered seismic activity details covering the Aravallis, Delhi Region, Bundelkhand craton and North-East India. This chapter is more than 90 pages in length. Chronological coverage of seismic activity in different parts of the studied region provides very useful information about seismotectonics of the region. As any high magnitude Earthquake in Himalayas can affect structurally susceptible zones present even at distances beyond 500 km the input provided regarding the significance of regionally extending exposed and hidden faults and ridges that have direct and indirect linkage with Himalayas assumes importance.

In the fourth chapter on "Indian Peninsular Shield Seismicity" an effort has been made to include as much information as possible on seismotectonics and geodynamics of Peninsular India. The chapter subdivided into 6 subsections is more than 80 pages in length. Since major part of this region comes under the category-"Stable continent", collecting information about earthquake activity requires, eliciting information from different channels. Historical and ongoing seismic activity along Son-Narmada lineament has been explained taking into consideration role of block tectonics. I am also impressed by the coverage on seismicity in and around Ongole region, Kutch, Godavari Graben and different parts of EGMB. Koyna-Warna seismicity could have been covered in this chapter instead of including in the seventh chapter.

In the fifth chapter on "Seismicity of SGT and Andaman-Nicobar Islands & Environment", which is subdivided into 4 subsections (55 pages in length) a reasonably good effort has been made in including as much

information as possible. The seismicity pattern associated with Palghat gap has been succinctly brought out in this chapter. I would have liked separating details pertaining to Andaman-Nicobar and Burmese region, as there is no linkage between SGT and Andaman-Nicobar isles either geologically or tectonically. My observation does not dilute in any way the significant effort made by the author. It may be better to enhance coverage on Andaman-Nicobar isles region and the two prominent oceanic ridges (90 and 85 degree east ridges) and probable northward extension of seismic activity.

The sixth chapter on "Damaging and significant Disastrous Earthquakes in Indian History" is subdivided into 6 subsections (25 pages in total). It contains useful information on Kutch, North Cachar, The Great Assam Earthquake, Kangra earthquake, Nepal-Bihar Earthquake and Assam Earthquake that occurred during 1819 and 1950 time span. Author seems to have segregated these earthquakes as damaging, basically taking into account the significant seismic activity witnessed during this time span.

In the seventh chapter (46 pages and 8 subsections) on "Recent Significant Earthquakes" information pertaining to Earthquakes that occurred during 1967 and 2005 has been clubbed. Except for Bhuj, Sumatra and Muzaffarbad Earthquakes, rest should not have been categorised as significant events, but for their location specific significance. Even though such segregations (in chapter 6 & 7) have some subjective selection, one should appreciate the effort made in providing useful information. The seventh chapter covers Koyna-Warna, Killari, Jabalpur, Bhuj, Uttarkashi, Chamoli, Great Sumatra and Muzaffarbad Earthquake details.

In the eighth chapter (20 pages) on "Miscellaneous Studies on Indian Earthquakes" 8 sub sections have been included. Details given in this chapter cover topics that include Earthquake swarms, failure stress conditions, rheology of deep continental structures and upper crustal block movements and other random topics. Inclusion

of this chapter could be questioned by the learned, as it digresses from the main theme of the book. If necessary, it may be better to include this chapter as second chapter, by restructuring it including other basic aspects covering seismic activity, in addition to the topics included in this chapter. Title of this chapter also needs to be changed, as the word miscellaneous may not convey proper meaning.

In the last chapter (63 pages) "Seismic Hazard Zoning Maps of India" significant information has been provided covering this important subject. The chapter subdivided into 10 subsections covers very useful information on Intensity, Magnitude, probabilistic and deterministic methods, seismic hazard maps, seismic zoning maps, site characterization, utility of new seismic hazard zoning map of India and future perspectives. It is a well structured chapter.

I have liked Appendix-F, as it contains "A modified catalog of Felt Intensity Data" covering time span of more than 500 years (1505 to 2012). But for such data it would have been difficult in updating Seismic Hazard Zoning map of India, the significant input included in the book.

As pointed out by Sri.TM.Mahadevan in his Foreword, the book would be of immense use in identifying active seismic zones in India and addressing the challenging task of seismic hazard evaluation and up gradation of new seismic hazard zoning map of India.

Even though one may notice some minor glitches, I strongly recommend its use by civil engineers, young and senior researchers and students, as the information provided has immense practical utility. As damage due to an earthquake is magnified due to building structural instability and as building codes are area specific the information provided in this book would be of immense use to civil and construction engineers.

I wish the author continued success in his endeavours in better understanding the dynamics of earthquake activity. His wish **to make Indian Infrastructure Earthquake Resistant** is exemplary.

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