

Some earthquakes of Kashmir from historical sources

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Collection of information on past earthquakes is essential for proper assessment of the seismicity of a region. Even though the Himalayan continental collision zone is known to be highly seismic, data on earthquakes prior to the eighteenth century are scarce. This may be contrasted with the Eurasian continental boundary zone, wherein past data have been pieced together¹ to go as far back as second century A.D. In recent years due to the increasing human intervention in the river valleys, there has been a heightened sensitivity towards seismic events occurring in the Himalayan region. A question of considerable engineering and scientific significance is the return period of large earthquakes in the Himalayas. Recently Athavale² has highlighted the use of historical records in improving our database on earthquakes in India. We attempt to bring here to the attention of the readers that reliable information is available about a few earthquakes in Kashmir.

History of kings of Kashmir³

Among the innumerable books that were written in Sanskrit language in medieval India, *Rajatarangini* occupies the pride of place as the only one which can be classified under History. The author of *Rajatarangini* is the famous Kalhana who lived in 12th century A.D. The author has attempted the genealogy of the kings of Kashmir starting from very early periods (2448 B.C.) up to 1148 A.D. Kalhana was a contemporary of king Sussala (1112–1127 A.D.) and king Sinhadeva who ascended the throne in 1127 A.D. Kalhana's narration has been continued by Jonaraja as *Rajavali* up to 1412 A.D. Srivara Pandit, a disciple of Jonaraja further covered the period up to 1477 A.D. The last and further part of the history is by Prajya Bhatta who has written *Rajavali Pitaka*. This gives the history of Kashmir up to 1587 A.D. when Akbar conquered the kingdom of Kashmir. All the above books have been translated into English by J. C. Dutt³.

A total of four earthquakes find mention in the history of Kashmir. The details are as follows.

Earthquakes in 12th century A.D.

Kalhana describes the reign of Sussala in great detail. Sussala lost the kingdom for a brief time and regained the same from Bhikshacara (Bhikshu). During his second reign, Sussala had to put down many rebellions and enemies. While the king's soldiers were engaged in battles with the followers of Bhikshu on the banks of river Kshiptika, Kalhana writes³: 'The Sun became fierce, there were earthquakes several times, and terrible storms blew breaking down many trees. The dust raised by the storms seemed like pillars raised to support the sky which was rent by blows.' The description is more graphic about the storm than about the earthquakes. However, Kalhana wrote this part of history pertaining to Sussala from personal knowledge and thus the occurrence of the above earthquakes near Srinagar (capital of the King) during 1121–1125 A.D. may be reliable.

Major earthquake in September–October 1554 A.D.

The most detailed description of an earthquake which occurred in the reign of king Shamsha Shah (1537–1559 A.D.) has been provided by Prajya Bhatta. The translation of Dutt³ is reproduced here: 'In the month of Ashvina of the year 30 there occurred frequent earthquakes on account of the wicked acts of the king, as if the earth suffered from flatulency. The planet which causes calamity is assuaged by various acts, by gifts of land to independent people, by giving back to men their properties which had been robbed, and by like deeds. Now there occurred an earthquake at the second watch of night when all men were asleep, and it destroyed many people. It caused holes

in the ground, and travellers going on their way were misled at every step. Houses fell into these holes at night and the people, anxious to get out from their houses in the morning, issued by breaking through the roof. On this occasion many wooden houses fell into the water of the Vitasta and when they had floated down for seven kroshas, the people who were in them awoke and came out. The confusion, caused by the earthquake in the towns of Hasainpura and Hosainpura, situated at some distance across the river, can be seen even to this day. Pitiabie cries of lamentation of the much afflicted people were then heard calling out "O father", "O mother!", "O friend", "O brother!" in different places, which made the heart feel as if it were struck by a thunderbolt. At this time the sky appeared terrible with the claps of thunder, the movements of the stars were stopped, and the land was agitated like a gourd on the waves. The mind of the people became troubled with the fear of the earthquake, and they felt no affection for sons or friends or wives or for good men or for kind-hearted people or for any object whatever. It was owing to the glory of the holy shrines of Vijayeshvara, Martanda, and Varahakshetra, that fears and apprehension from earthquake were not felt by the inhabitants of these places. The earthquake continued for several days, occurring several times every day, and all the people lived under canvas.'

Two minor shocks

Two earthquakes are passingly mentioned in the text. Both refer to the sixteenth century. The first was during the reign of Gazishah who ruled Kashmir for two years in 1560–1561 A.D. The text reads, 'The king saw conflagrations in different directions and there occurred earthquakes and so he took council of soothsayers....'.

The next event which from its description appears to be an earthquake has been described during the reign of Ali Shah (1569–1577 A.D.). The narra-

tion is as follows: 'But suddenly the sky became red on all sides, like the fierce fire that will appear at the end of the world; it prognosticated destruction by famine. The world showed symptoms of a calamity and trembled, as if unable to bear the weight of a famine.'

The famine is further described in detail. However the trembling of the earth mentioned may not be just figurative.

Conclusion

Search of historical literature and records gives valuable information regarding regional seismicity and may even help scientists in refining recurrence intervals of seismic activity. There are innumerable references and speculations about earthquakes in ancient and medieval Indian writings. But information on the dates and location of actual

shocks is not available. Thus, the description, provided by the historians of Kashmir, of the shock of 1554 A.D. is perhaps unique.

The Cambridge history of India in the chapter 'Kingdom of Kashmir' mentions a great earthquake which changed the course of river Jhelum. This is perhaps the same as the one described previously. Also this may be same as the 1552 A.D. Srinagar event listed in the earthquake catalogues. The description of the shaking: 'It caused holes in the ground and the land was agitated like a gourd on the waves The earthquake continued for several days, occurring several times every day.' indicates severe shaking with a main event of MMI intensity IX-X and Richter's magnitude reaching 7 or higher values. Cross references from other literary sources may throw more light on the felt area of the earthquake. All the places

mentioned in the text are identifiable. For example Varahakshetra or Varahmula, is the present day Baramulla. Hence palaeoseismic studies in the Kashmir valley will also prove to be valuable.

1. 'Catalogue of earthquake in Armenia' in *The Armenia Earthquake of December 1988* (eds Yegian, M. K. and Ghahraman, V. G.), N. E. University, Boston, USA, 1992.
2. Athavale, R. N., *Curr. Sci.*, 1995, **69**, 279-280.
3. Dutt, J. C., *Kings of Kashmira*, Mittal Publishers, New Delhi, India, 1887 (reprinted 1990), vols I-III.

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Erratum

Metallization of hydrogen - Everest conquered?

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Read '140 GPa' instead of '140 megabars' in 1 column, 8th line on page 877.