BHOO-KAMPAN

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Indian Society of Earthquake Science

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Email : ises2009@gmail.com ♦ Web : www.ises.in

Earthquake Hazard in Central Himalaya: *Sumer Chopra, Scientist, Ministry of Earth Sciences, Govt. of India*

The Himalaya is the largest active continent-continent collision region on the earth and has faced four great earthquakes and nine earthquakes of M > 7 since last 114 years. The unruptured zones between the four great earthquakes of Himalaya have been recognized as seismic gaps, and they have been interpreted to have potential for generating future great earthquakes. Four large earthquakes (M>8.0) are forecasted in the Himalaya (Bilham and Ambraseys 2005) within the inferred 'seismic gap areas' which can inflict major damage to life and property. The central part of Himalaya can expect a great earthquake in the immediate future (Bilham et al. 2001) which can affect lives and properties of major cities situated in the Gangetic plains. The seismic hazard of the Garhwal-Kumaun and adjoining regions needs to be ascertained to mitigate the effects of future large/great earthquake in the region.

To evaluate the seismic hazard in the Garhwal-Kumaun region strong motion accelerograph (SMA) recordings of the devastating Uttarkashi (1991), and Chamoli (1999) earthquakes have been considered to constrain the ground motion parameters for the region. The constrained ground motion parameters are used to simulate Mw 8.5 earthquake with epicenter at locations of Uttarkashi and Chamoli earthquakes using stochastic finite fault modelling technique (SFFMT). It has been observed that most vulnerable towns are Dehradun and Almora in Uttarakhand, where expected PGA is in (**Continued in Page 3)**

From the President's Desk

Ist issue of Bhoo-Kampan, Newsletter of ISES came out in February 2012, 2nd issue in June 2012, and the 3rd issue in October 2012 according to the planned three issues annually.

The response to the newsletter is heartening and feedback from members is requested regarding the newsletter and ISES functioning.

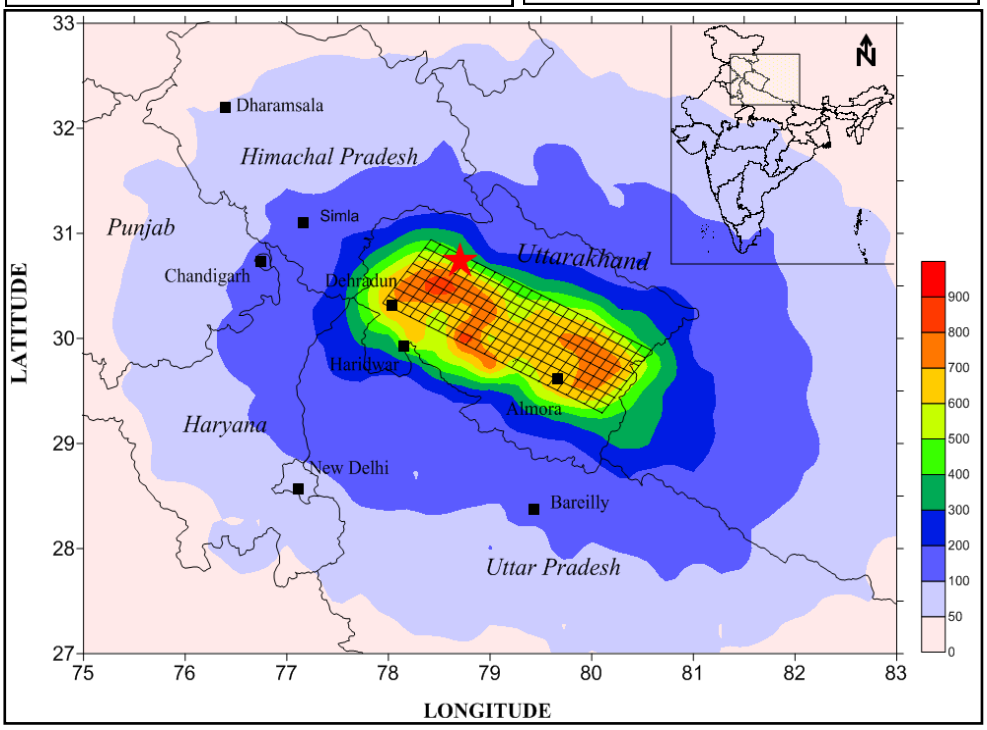


Fig 1 (A). The distribution of PGA from an Mw 8.5 earthquake in CSG region with epicenter at the location of Uttarkashi (1991) earthquake (Chopra et al., 2012).

NEWS / EVENTS

* Gujarat Energy Research and Management Institute, ISR & Pandit Deen Dayal Petroleum University (PDPU) are co-organising the Annual Convention of Indian Geophysical Union (IGU) during 29-31 Oct 2012, at PDPU, Gandhinagar (www.igu.in).
* Post Seminar IGU Workshop on Magneto-Tellurics is scheduled on 1-3 Nov 2012 , at ISR, Gujarat.
* 2nd International Symposium on Advances in Earthquake Science (AES –2013) will be held during 1-2 Feb 2013, at ISR.
* Post AES International school on "Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent" to be held during 4-7 Feb 2013 at ISR.

Inside this issue:

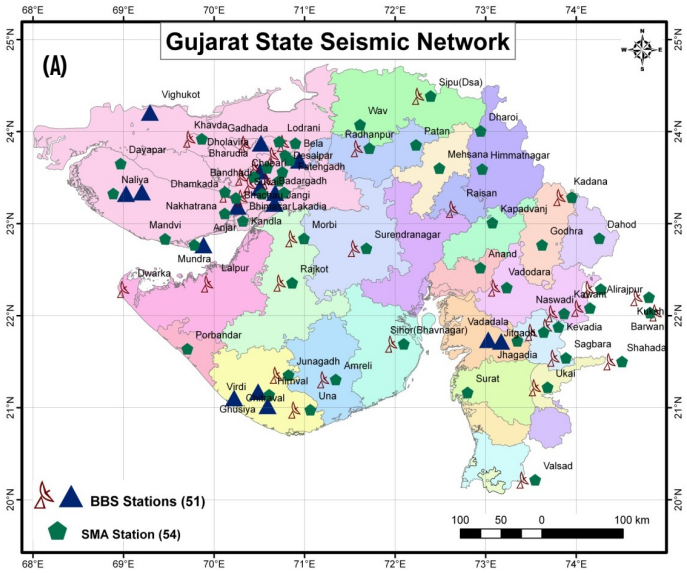
Earthquake Monitoring Program of ISR Gujarat

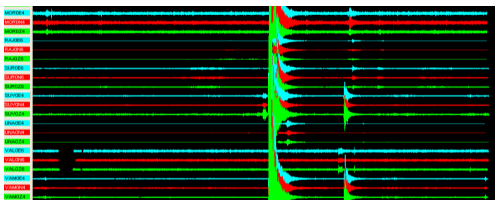
Round the clock seismicity monitoring is being done by the Institute of Seismological Research (ISR) through a dense network of 60 Broadband Seismic Stations (35 online) and 54 Strong Motion Accelerographs in Gujarat. This seismic network is denser than in any other state. Epicentral parameters and magnitude of earthquakes are calculated within 10 minutes of the arrival of seismic waves. During 2006 to 2011, nearly 10,000 shocks of M 0.5-5.1 of state have been recorded, located and stored in Seismic Data Analysis Centre (SeiDAC) of ISR. Apart from the local earthquakes, regional earthquakes of M ≥ 4.0 and teleseismic events of M ≥ 6.0 are also recorded.

ISR is also monitoring the reservoir induced seismicity in and around Sardar Sarovar dam. ISR upgraded the old seismological network of Sardar Sarovar Narmada Nigam Limited (SSNNL) and have installed new state-of-art digital broadband and strong motion accelerographs in 9 seismological observatories. All the 9 observatories have been connected via VSAT and data is coming online in near real time.

Data bank information is used in seismic microzonation and hazard analysis. Further, data is being used for various studies. Other geophysical parameters are integrated in the study. Additionally, an Earthquake Early Warning (EEW) system is being proposed for big cities like Ahmedabad, Surat, and Vadodara etc of the state. **(Continued in page 3)**

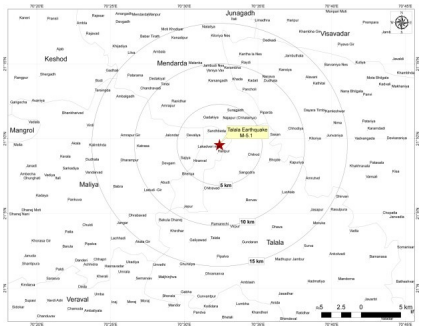
Gujarat Seismic Network





The online V-SAT connectivity is installed at earthquake prone areas.

(B)



The seismic network includes the adjoining areas of Maharashtra & Madhya Pradesh also.

Parameters Provided

- Location
- Magnitude
- Focus
- Likely affected areas

Communication within 10 minutes to the concerned authorities through
SMS
Phone
Fax
email

24X7

Fig 2 . (A) ISR seismic network (includes 9 SSNNL stations).
(B) Epicentral map and other information which is provided to concerned authorities.

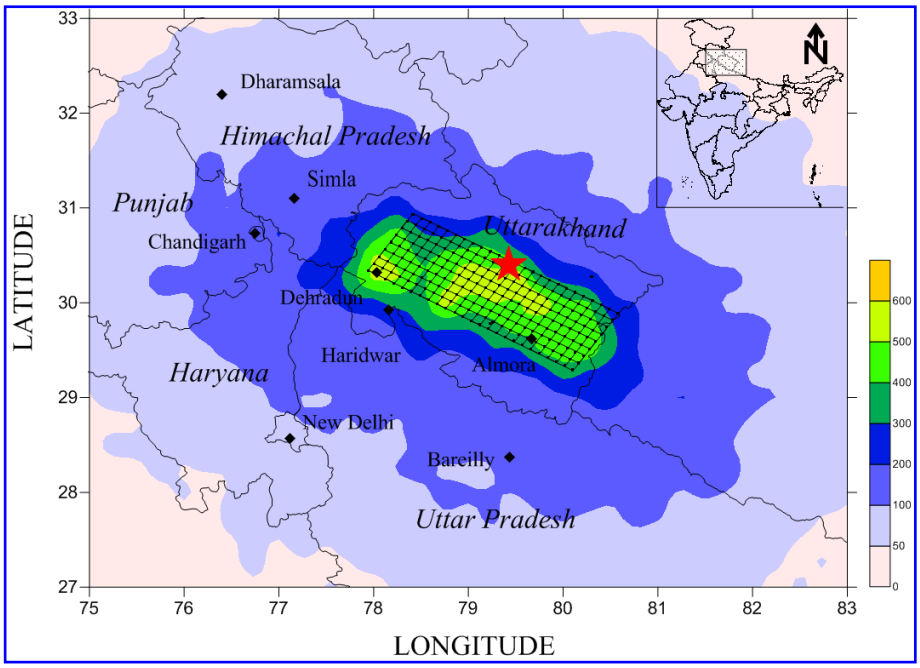


Fig 1 (B). The distribution of PGA from an Mw 8.5 earthquake in CSG region with epicenter at the location of Chamoli (1999) earthquake (Chopra et al., 2012).

(Continued from page 1)

excess of 600 cm/s^2 when epicenter of great earthquake is placed at the location of the Uttarkashi (1991) earthquake (Chopra et al., 2012). Whereas when the epicenter of the great earthquake is placed at the location of Chamoli (1999) earthquake, Dehradun and Almora can expect PGA of around 500 and 400 cm/s^2, respectively (Chopra et al., 2012). These PGA values are estimated at bedrock with V_{S30} around 500 m/s. The National Capital Region, Delhi can expect accelerations of around 80 cm/s^2 in both the cases (Chopra et al., 2012). The PGA obtained in this analysis will increase around 2 times at the surface where thick alluvium is present. The PGA contour maps obtained in this study can be used to assess the seismic hazard of the region and identify vulnerable areas in and around central Himalaya from a future great earthquake. **(Continued in Page 3)**

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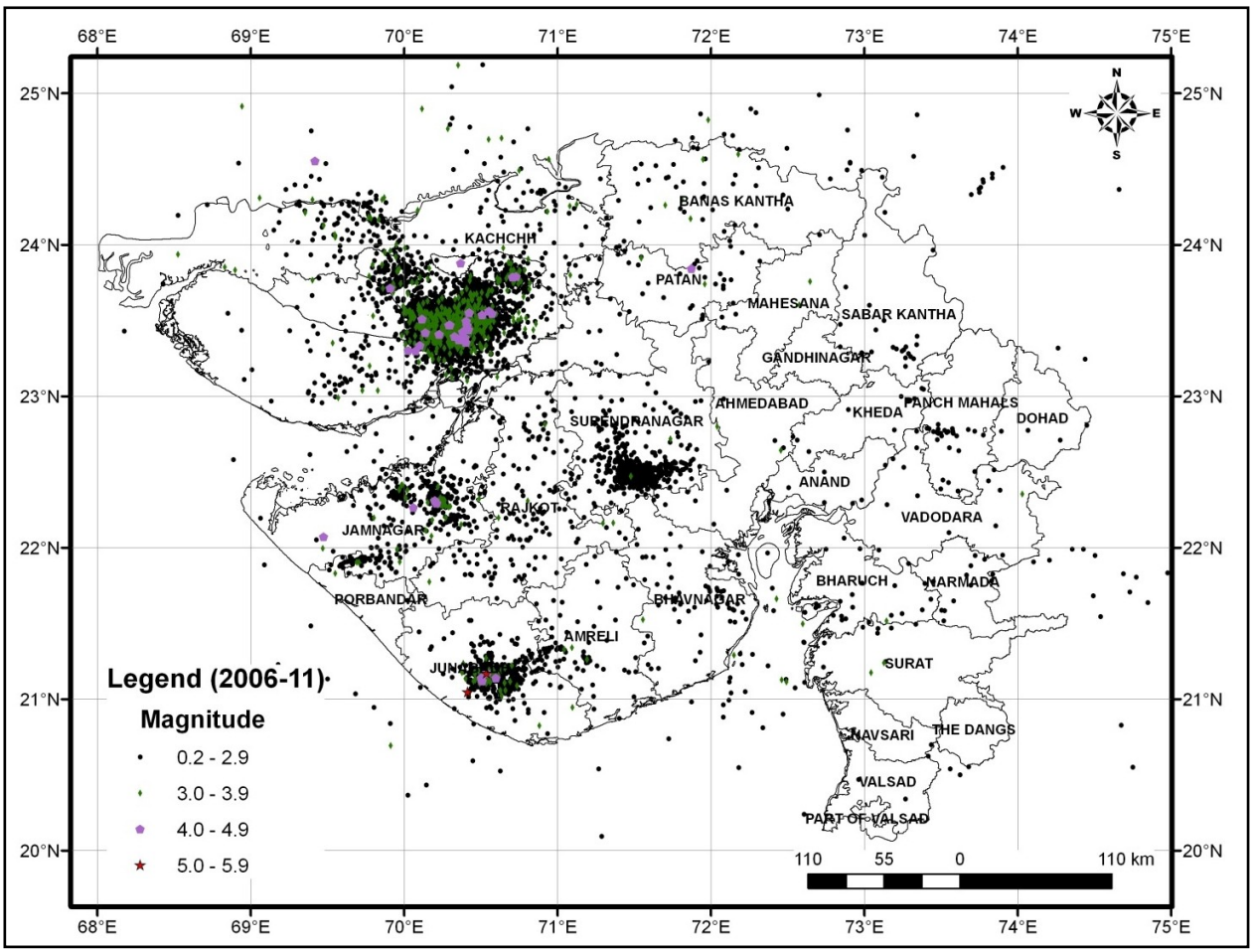

Fig 3. Seismicity in Gujarat region during 2006-2011 recorded by ISR seismic network.

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References

- Bilham R, Ambraseys N (2005), Apparent Himalayan slip deficit from the summation of seismic moments for Himalayan earthquakes, 1500-2000, Current Science 88:1658-1663.
- Bilham R, Gaur VK, Molnar P (2001), Himalayan Seismic Hazard, Science 293:1442-1444.
- Sumer Chopra, Vikas Kumar, Anup Suthar and Pankaj Kumar (2012), Modeling of strong ground motions for 1991 Uttarkashi, 1999 Chamoli earthquakes and a hypothetical great earthquake in Garhwal-Kumaun Himalaya, Natural Hazards, doi : 10.1007/s11069-012-0289-z.

Indian Society of Earthquake Science

Bhoo-Kampan

Institute of Seismological Research, Near Pt. Deendayal Petroleum University
Raisan, Gandhinagar-382009, Gujarat

www.ises.in

Editor

Jyoti Sharma

(jyotisharmaiitkgp@gmail.com)

Miscellaneous News

Institute of Seismological Research (ISR) and Indian Society of Earthquake Science (ISES) are organizing **2nd International Symposium** on ***"Advances in Earthquake Science"*** **(AES-2013),** and **International school** on ***"Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent"***

Symposium: 1-2 February, 2013
School: 4-7 February, 2013
Venue: Institute of Seismological Research, Raisan, Gandhinagar, Gujarat

Themes of the International Symposium

1) Earthquake Precursors and Prediction Studies
2) Seismic /Tsunami Hazard Assessment
3) Neotectonics
4) Real time seismology
5) Lithospheric structure
6) Engineering Seismology

Participants:

1) Research Scholars and Scientists of various organizations in India
2) Faculty of various universities

The purpose of the school is facilitating the development and application of a scientifically consistent approach to seismic hazard assessment; disseminating latest knowledge in engineering practice, advanced reliable tools for seismic hazard estimates; and exploiting , as much as possible, the advantages provided by computational resources and e-Infrastructures.

Topics to be covered in the School

* General issues of the SHA. The classical deterministic and probabilistic (DSHA and PSHA) and innovative approaches – neo-deterministic and scenario based ones (NDSHA and SBSHA) - advantages and disadvantages;
* Seismic wave propagation modelling. Strong ground motion data bases and strong motion processing;
* Advanced SHA tools. Seismic zonation at regional, national and metropolitan scale: case studies in Europe and Asia;
* Basic Concepts on e-infrastructure for computational sciences
* How to port scientific applications on e-infrastructure: basic usage of GRID and HPC infrastructure.

Registration fees:

For the Symposium

Delegates	Rs. 5000
Research Scholars	Rs. 1000

For the School

Participants	Rs. 5000
Research Scholars	Rs. 1000

Important Details

The abstract should be sent on the email id: **2013.aes@gmail.com**
Last Date of abstract submission and registration: **15th December 2012**

Contact Details for Symposium and School

1) Dr. Pallabee Choudhury
2) Ms. Falguni Bhattacharjee

Institute of Seismological Research,
Near Pt. Deendyal Petroleum University,
Raisan, Gandhinagar-382009.
Phone No. +91-79-66739015(0), +91-79-66739017(0)
Fax: +91-79-66739015.
e-mail: **2013.aes@gmail.com**
web: **http://www.isr.gujarat.gov.in**

ISES at a glance

- First General body meeting of ISES is scheduled at 08:00 hrs on 30th October 2012 at ISR.
- A total of 113 members are on roll of ISES.