Department of Science & Technology
(Government of Gujarat)

सत्यमेव जयते
Government of Gujarat

ISR

INTERNATIONAL SYMPOSIUM

On

Advances in Earthquake Science AES-2013

(1-2 February 2013)

at

Institute of Seismological Research

Raisan, Gandhinagar-382009, Gujarat, India

REPORT
AES 2013

Department of Science and Technology
Government of Gujarat

REPORT ON

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"

SUMMARY

ISR and ISES Organized the 2nd International Symposium on "Advances in Earthquake Science (AES-2013)" on 1st and 2nd February 2013 and International School on "Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent" during February 4-7, 2013 at Institute of Seismological Research (ISR), Raisan, Gandhinagar.

The Symposium was sponsored by Ministry of Earth Science and Nuclear Power Corporation.

The International School was organized under a project funded by Friuli Venezia Giulia Region Service for International Relations and European Integration.

The Symposium was organized to take stock of research in India in the field of Seismology and plan future research directions. It was to promote exchange of ideas amongst the seismologists, geologists, earthquake engineers and geotechnical engineers by discussion on subjects of interests in the field of Earthquake Science.

Symposium Themes were: 1. Earthquake Precursors and Prediction Studies, 2. Seismic /Tsunami Hazard Assessment, 3. Neotectonics, 4. Real-time Seismology and Seismicity Studies, 5. Lithospheric Structure and 6. Engineering Seismology

In the Symposium, 8 foreign and about 150 Indian delegates participated. Foreign delegates were from Italy, Germany and Taiwan. Indian delegates were from different parts of the country from Uttarakhand in the northwest; Delhi and UP in the north; Assam, Arunachal Pradesh and Mizoram in the northeast, West Bengal in the east, Andhra Pradesh, Karnataka and Tamilnadu in the south and Maharashtra as well as Gujarat in the west. There were 65% young delegates.

- Some 80 oral and 20 poster papers will be presented by 8 foreign and about 150 Indian delegates in the Symposium. Lectures were at three levels. Sr. Scientists delivered Key Note Lectures reviewing status of different themes. Experienced scientists presented cutting edge state of the art results, while young scientists presented new research.

- Certificates were given to top 4 oral and 2 poster presentations to young scientists below the age of 40. Due to overwhelming response parallel sessions had to be arranged and most ISR papers were put in poster sessions. Full papers were invited from the delegates to be received within a

month. Selected ones will be included in ISES special volume which will soon to be started as e-journal with ISSN no.

"Indo-German Centre for Early Warning System for Railways"

Prof. E. Hoenecker of the Karlsruhe Institute of Technology, Germany proposed to start at ISR an Indo-German "Centre for Early Warning System". It will carry out research for setting up Early Warning system for Mono and High speed Trains. This will be in collaboration with Karlsruhe Institute of Technology of Germany. ISR will deploy sensors at required locations for earthquake detection. ISR will seek support for manpower and some equipment for Pilot project from the Metro Corporation and Delhi- Mumbai Industrial Corridor. The sensors earthquake early warning system will be deployed from the ISR funds. The other types of sensors for detection of falling rocks or crossing cattle etc. will be installed as pilot project

Indo-Italian Int. School on "Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent", during February 4-7, 2013 at Institute of Seismological Research (ISR), Raisan, Gandhinagar.

The International School imparted training on advanced tools for seismic Hazard Assessment. Training course had 35 participants from different agencies and 7 from ISR. Besides the basic lectures on seismology and strong motion processing, the lectures covered the following topics:

i. Probabilistic and Deterministic methods of seismic hazard analysis and the neo deterministic method devised by the Italian group.
ii. Advanced tools of Seismic Hazard Assessment, and
iii. Use of Worldwide e-infrastructure in GRID or CLOUD way for running our new models enabling more computational power than 'Super Computer'.

There were more computational exercises with some new Programs developed in Italy.

- The faculty consisted of five professors from India: (i) Imtiaz Parvez of C-MMACS, Bangalore, (ii) ID Gupta, Director CWPRS, Pune, (iii) Prof. J.R. Kayal, (iv) Dr. Sushil Gupta of RMSI and (v) Dr. B.K. Rastogi and six from Univ. of Trieste, Italy: The other Italian experts were from Univ. of Trieste: Ms. Antonella Peresan, Franco Vaccari, Stefano Cozzini, Andrea Magrin, Fabio Romanelli, Francesco De Giorgi,
- Prof. BK Rastogi coordinated the International School from Indian side and Prof. Antonella Peresan, University of Trieste, Italy coordinated the Int. School from the Italian side.

THE INAUGURAL FUNCTION

Chief Guest of the Inaugural function was Prof. V.C. Thakur. Prof. BK Rastogi presided over the function. After the welcome address by BK Rastogi the session chairmen informed about the themes of the symposium. Abstract volume was released by the Chief Guest and Guest of Honor Pro. Antonella Peresan.

Minute to Minute Program

2nd International Symposium on "Advances in Earthquake Science" (AES-2013) and Int. School on "Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent", Inaugural Function on 1st Feb. 2013 at 9:30 am.

09:50	Invitation to the dignitaries to occupy the seats on the dais
09:55	Saraswati Vandana and Lighting of Lamps
10:00	Welcome address: Prof. B.K. Rastogi
10:15	Introduction of Symposium Themes by conveners
Theme 1	S1: Earthquake Precursors and prediction Studies: B R Arora
Theme 2	S2: Seismic / Tsunami Hazard Assessment: Sumer Chopra
Theme 3	S3: Neotectonics: V C Thakur
Theme 4	S4: Real Time Seismology and Seismicity Studies: J R Kayal
Theme 5	S5: Lithospheric Structure: M. Ravi Kumar
Theme 6	S6: Engineering Seismology: A. Peresan
10:30	Release of Abstract Volume: VC Thakur, Chief Guest and A. Presan, Guest of Honor
10:35	Inaugural Address by Chief Guest
10:45	Presentations of Mementos to dignitaries
10:50	Vote of Thanks: Sri K Madhusudan Rao
10:55	National Anthem

DIAS PLAN

Dr. M. Ravi Kumar	Prof. J.R. Kayal	Prof. B. R. Arora	Prof. A. Peresan	Prof. V.C. Thakur	DG, ISR	Dr. Sumer Chopra	Shri Jaydeep Dvivedi

WELCOME ADDRESS BY PROF. B.K. RASTOGI

- Chief Guest Prof. V.C. Thakur, Guest of Honor Prof. Antonella Peresan, Conveners of different themes of the symposium Prof. B.R. Arora, Prof. J.R. Kayal, Dr. M. Ravi Kumar, representing MoES Dr. Sumer Chopra, representing S&T Dept. GoG Sri Jaydeep Dvivedi, dignitaries off the Dias, delegates and Guests **On behalf of ISR and ISES,** I welcome you all to the International symposium on "Advances in Earthquake Sc." and International Sch. on "Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent".

- ISR and ISES are jointly organizing the 2nd International symposium on 'Advances in Earthquake Sc. (AES-2013). This symposium is organized alternate years to take stock of new results and chalk out future course. The first AES was in 2011. ISR organizes other symposia also. In October 2012 the Convention of Indian Geophysical Union was jointly organized by ISR, PDPU and GERMI followed by Indo-German workshop on "Electromagnetic and Magnetotelluric Geophysical Surveys" jointly organized by ISR and GERMI. In January 2012 Indo-US workshop on "Intraplate Seismicity" was organized. In earlier years symposia/workshops on focused themes included two on Active Fault Studies, one on Seismic Microzonation and one on Crustal Deformation using GPS.

- Earthquake study involves several types of investigations; its application further involves Engineering Seismology. ISES was started to generate synergy between different groups. Symposia are one of the activities towards that.

  ISR is the only Institute, in India, dealing with different branches of Earthquake studies. VSAT connected Networks of 60 seismographs stations and 25 GPS stations monitor round the clock state wide seismicity and crustal deformation. Geophysical surveys provide subsurface information. Ages of sediments are determined for Paleoseismology to date prehistoric earthquakes and distinguish which faults are active. All these datasets and their analyses were rated top class by US scientists in the INDO-US Workshop on Intraplate Seismicity. Expertise has been developed for seismic hazard and seismic microzonation studies. Seismic hazard is studied from macro to micro level. Hazard Maps for India and Some States are being prepared. Hazard is assessed for Nuclear Power Plant sites, LNG Storage terminals and Sky Scrapers. Seismic Microzonation has been done for several areas now being extended to Himalaya & NE India.

- **Significant Achievements of Institute of Seismological Research (ISR)**

  (1) Earthquake Monitoring and Reporting: Within minutes of occurrence of earthquakes ISR is informing the earthquake information to the concerned authorities like GSDMA, Commissioner of Relief and concerned Dist. Collector as well as media. For this purpose a dense network of 60 state of the art seismograph stations have been established. Data of

36 of these stations are brought on real time through V-Sat to ISR data center which is working round the clock.

(2) Seismic Microzonation and Hazard Assessment:

***Seismic microzonation** has been carried out at Gandhidham (in collaboration with GSDMA & Oyo International Corporation), Dholera-SIR, Gandhinagar and Ahmedabad. Variation of seismic safety factor for different heights of buildings in different areas has been worked out. This work will help in designing earthquake resistant buildings.

*** Earthquake Hazard Assessment of India**: The work for preparation of probabilistic Seismic hazard map of India as assigned by Bureau of Indian Standards, Govt. of India is completed and the map has been handed over to BIS. BIS will inform about it to the concerned Power plants, nuclear plants, Dams, Bridges authority for their use.

*** Earthquake Hazard Map of Gujarat**: For the first time for any state detail seismic hazard map of the Gujarat state has been prepared after several types of geophysical and geotechnical investigations

* ISR provided **seismic safety factor** for (i) the proposed Sardar Sarovar statue at Kevadia Colony (ii) the proposed 13 storey hospital close to VS Hospital at Paldi and (iii) the proposed LNG Storage Terminal at Mundra by GSPC.

(3) Investigations for various societal concerns:

***** Water logging in Olpad town

* Ground water pollution due to a dyes and color factory near Vadodara,

* Rolling down of vehicles first near Khavda in Kutch and then at Tulsishyam in Junagadh District.

(4) Help to Industries by means of suggesting seismic hazard for:

(i) New Railway station coming up at Bhanvad in Saurashtra

(ii) Kakrapar Nuclear Power Plant, Ravatbhata Nuclear Power Plant near Kota, Rajasthan and the proposed Mithi Virdi Nuclear Power Plant site near Bhavnagar. At Kakrapar near Surat and Ravatbhata plants NPCIL was struggling for over 3 years for clearance from Atomic Regulatory Board to construct additional units. With our help NPCIL got clearance within months.

(iii) Patan Solar Park

(iv) Gas pipe lines

(v) Cement Factories.

(5) Human Resource Development:

*****ISR has helped several Universities in Gujarat and other states in various ways. Several PhD and M.Sc. students from Gujarat have worked for their thesis and dissertation at

ISR. One Professor who worked for PhD with ISR has now become Principal of a reputed technical Institute. During the dedication ceremony of ISR in 2011 the Honorable CM invited students from all over India to come to Gujarat to do PhD. Now many students from different states are doing PhD at ISR and they are on paid scholarships and free accommodation.

*About 100 students from Gujarat as well as different parts of the Country are given summer/winter training free of cost in advanced geophysical and geological surveys as well as geotechnical investigations.

*ISR has helped in starting M.Sc. Geophysics Course in Ganpat University, Mehsana. This is for the first time in the three western states of India, namely Gujarat, Rajasthan and Madhya Pradesh.

About the Symposium:

There are six themes of different sessions:

- S1: Earthquake Precursors and prediction Studies, convener: B R Arora
- S2: Seismic / Tsunami Hazard Assessment, convener: B.K. Rastogi
- S3: Neotectonics, convener: V C Thakur
- S4: Real Time Seismology and Seismicity Studies, convener: J R Kayal
- S5: Lithospheric Structure, convener: M. Ravi Kumar
- S6: Engineering Seismology, convener: Antonella Paresan

- In two days seminar some 40 delegates from Gujarat and 110 delegates from other states are participating. Foreign delegates are from Italy, Germany and Taiwan. Indian delegates are from different parts of the country from Uttarakhand in the northwest, Delhi and UP in the north, Assam, Arunachal and Mizoram in the NE, Andhra Pradesh, Karnataka and Tamilnadu in south and Maharashtra and Gujarat in the west.

I am glad there are senior scientists as well as young. Young delegates are 65% commensurate with youth percentage in India.

List of foreign delegates from Italy, Germany and Taiwan:

1. Ms. Antonella Peresan, University of Trieste, Italy
2. Franco Vaccari, University of Trieste, Italy
3. Stefano Cozzini, University of Trieste, Italy
4. Andrea Magrin, University of Trieste, Italy
5. Fabio Romanelli, University of Trieste, Italy
6. Francesco De Giorgi, University of Trieste, Italy

7. E. Hohnecker, Karlsruhe Institute of Technology, Germany
8. Vivek Walia, Nat. Centre for Res. in Earthq. Engg. (NCREE), Taiwan

- Some 80 oral and 20 poster papers will be presented by 8 foreign and about 150 Indian delegates. Lectures are at three levels. Sr. Scientists will give Key note Lectures reviewing status of different themes. Cutting edge state of the art lectures will be by experienced scientists and new research by young scientists.

- Certificates will be given to top 2 oral and poster presentations to young scientists below the age of 40.

- Due to overwhelming response we have to arrange parallel sessions and most ISR papers in poster sessions.

- For the selected papers from last year's Indo-US workshop a special volume of the Journal Natural Hazard has been published. The delegates who are interested in full papers may send the manuscripts within a month. Selected ones will be included in ISES special volume which will soon to be started as e-journal with ISSN no.

- The International School is for training in seismic Hazard Assessment. Training course has about 35 participants from different agencies and 7 from ISR. Besides the basic lectures on seismology and strong motion processing, the lectures will cover

I. Probabilistic and Deterministic methods of seismic hazard analysis and the neo deterministic method device by the Italian group.
II. Advanced tools of Seismic Hazard Assessment, and
III. use of e-infrastructure

There will be more computational exercises with some new Programs developed in Italy. The faculty: Six professors from Italy. From India: (i) Dr. Imtiaz Parvez of C-MMACS, Bangalore, (ii) Dr. ID Gupta, Director CWPRS, Pune, (iii) Prof. J.R. Kayal, (iv) Dr. Sushil Gupta of RMSI and (v) Dr. B.K. Rastogi.

- Accommodation is arranged at ISR and GIDM guest houses as well as Hotel Comfort Inn.
- About the entertainment, 1st Feb. evening at 6:30 pm there is a visit to Laser show in Akshar Dham. On Sunday morning 10-11AM kite flying and in the evening at 8-10 pm there will be colorful Garba and Dandiya Dances. Sight-seeing tours will be arranged for Sabarmati Ashram, Science City and Adalaj step well.

- I welcome you all once again. Hope you will have a pleasant stay in Gandhinagar. Thank you.

REMARKS BY CHIEF GUEST PROF. V.C. THAKUR

ISR is located in Gujarat region which is a natural laboratory to study the earthquakes and related science in the stable Indian Continent. The ISR has developed excellent laboratory infrastructure comparable to both national and international standard. Last year, I had the occasion to visit the interior region of Kachchh in a field work undertaken by the scientists of the institute. There I found well developed infrastructure developed through instrumentation for earthquake precursor studies, horizontal velocity measurement through GPS instruments and combined with Seismic Stations Network.

Earthquake science has now become multidimensional in nature involving seismicity, geology and earthquake geology. Study of active faults is one of the important aspects. However identification of the active faults and the potential of faults to generate earthquake needs multidisciplinary approach. The approach needs (a) to find the past historical earthquakes through paleoseismology, (b) to run and monitor closely spread seismic network over the suspected active faults. (c) GPS investigation can be used to identify the high strain zone or located zone across the faults in Kachchh region.

REMARKS BY PROF. J.R. KAYAL - Convener of the theme on Real-Time Seismology

ISR - a Global Research Centre is established under the Dept. of Science and Technology, Govt. of Gujarat, to understand earthquake processes, active faults, crustal deformation, evaluation of seismic hazard & risk to mitigate the earthquake disaster and for extending such services to the Society.

It's a pride Institute of the country equipped with world standard equipments and dedicated scientists. Dr. B.K. Rastogi, Director General, ISR keeps the flag high making it a world centre of research on Earthquakes.

After the 1993 devastation in Killari (Latur) earthquake the country felt need of a Central or National Institute of Seismology in the country. A national committee was made to look into this matter. The committee strongly recommended the need of a National Seismological Institute but nothing came up!

The 2001 devastating Bhuj earthquake similarly jolted the whole country, and the Govt. of Gujarat took no time to establish this world standard Institute of Seismological Research. And it is Dr. Rastogi, DG, ISR who put his efforts and dedication to build this pride institute of the country. I feel proud to be associated to this Institute.

The institute is not only carrying out world class research and publication but taking care of HRD for the whole country through international training courses, workshops, seminars, summer trainings etc.

There are several scientific Institutes or Govt. organizations in the country but it is only the ISR who share the data to the researchers in the country and outside the country for enhancing the research knowledge level.

Today we understand most in real time seismology. Now we do not open USGS website to know the seismological parameters of the earthquakes in Gujarat or surrounding region. It is the ISR website that provides the most precise information on earthquakes in the country.

ISR was a dream of seismologists of the country, the dream has come true. My best wishes to the young seismologists and students to make the best use of the Institute facility to enhance our knowledge further to serve the society mitigating seismic hazards through enhanced knowledge.

REMARKS BY PROF. K.S. MISHRA, DELEGATE

The Govt. of Gujarat is to be complemented for establishing the Institute of Seismological Research. This institute during its nearly half a decade of existence has become a center of excellence, as far as all aspects of Seismology are concerned. Not only in creating infrastructure and research ambience but also generating young, talented minds bubbling with energy and curiosity to learn and pursue leading edge research.

The modern seismology started in India when a geologist of Geological Survey of India recognized that there are two types of seismic waves the P type and S type. Dr. Oldham was also the first to mitigate seismic zonation. As on today the science has not come to a stage where an impending earthquake can be predicted. That means the location, time and magnitude. It is by proper seismic zonation the developed countries the Japan and U.S., have very significantly reduced the number of causalities. It is extremely happy situation that the group working on parameters of seismic zonation at ISR has made significant strides in this direction. Our country is highly vulnerable, our young and rising Himalaya falls in zone V and outside Himalayas this zone V is in Kachchh region of Gujarat. Apart from this an earthquake located in North West region jolts the northern India or an earthquake in China or Burma also shakes the north eastern part of country. Tsunami generated by far flung area in Sumatra created disastrous conditions on our eastern coast. The western coast particularly near Dwarka can be affected by tsunami generated by earthquake in Makran region.

We have learnt a lot in recent years from the earthquakes in Japan, California, Bolivia, Chile, Italy and Iran. It is great misfortune that the science of seismology progresses with this study of

these events. This institute has been amalgamating the lessons learnt of all the earthquakes. Liquefaction recognized during Nigata earthquake in 1964 and Bharuch in 1970 is very potential hazard to buildings. Significant finding of related study in Gujarat will be presented in this Symposium.

Gujarat has unique geological setting where an earthquake with epicenter in Kachchh, damages building in Ahmedabad and up to Billimora. This institute has developed capability to understand this complex setting.

Seismology is science in which many parameters such as geology, geophysics, engineering etc are involved. This institute provides a platform where all the parameters are studied. It provided a platform, which brings specialists of all the related branches to integrate. It provides platform, by symposium to present their results. It provides platform, where young scientists are nurtured by the elderly experienced scientists by lectures and seminars. It provides a platform, from where young ones can take off to take challenges. What I found that the rate of take off of scientists is very fast. Only few young scientists are continuing among those recruited 3 years ago.

Like all other areas, a seismologist also needs stability and a career. I request the decision makers to look in this vital aspect and create cadre similar to our great scientific visionary Dr. Vikram Sarabhai has created for ISRO and PRL so that this institute does not loose the talent but attracts it.

Message / Comments by Delegates:

12.1.2012

Dear Dr. Rastogi,

Please accept my sincere apology for cancelling my visit. India is an important country to study both Intraplate and plate boundary earthquakes; and Indian colleagues have made great progress in this field. I hope to be able to visit you in the near future.

Best wishes for a successful meeting.

Mian Liu, Professor, Dept. of Geological Sciences, University of Missouri

16.1.2012

Dear Dr. Rastogi,

The conference organized by you is very interesting. I am really enjoying it. Thank you very much for inviting me.

Regards,

Satyabala, NGRI

18.1.2012

Dear Dr. Rastogi

Let me take this opportunity in congratulating you and "team ISR" for organising Indo-US workshop very nicely with high scientific content.

Padmashri VP Dimri, CSIR Distinguished Scientist, NGRI

19.1.2012

Dear Dr. Rastogi,
At the outset I congratulate you for the excellent organization of the workshop. The workshop not only helped the researchers in getting direct exposure to various facets of intraplate earthquakes but also helped them to have direct interaction with peers in seismology.
Personally I am thankful to you for giving me excellent exposure. I once again promise to extend needed assistance whenever needed by you.
You also must be congratulated for enhancing the capabilities of ISR scientists and the visibility of ISR.
Regards
Dr. P Ramachandra Reddy
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19.1.2012

Respected Sir,

Many thanks for inviting me to participate in Indo-US Workshop 2012. The field tour with US scientists was rewarding experience for me. I am grateful to you for all that. Sir, I would like to know if any report on this workshop is to be published by ISR? If yes, kindly provide me a copy of the same.

Thanks and regards,
Gadhavi Mahendrasinh
Asst. Professor,
Civil Engineering Department,
L. D. College of Engineering,
Ahmedabad, Gujarat

19.1.2012

Dear sir,

Many thanks for giving me an opportunity to present my recent results as Poster presentation in the important Indo-US workshop held at ISR. I was able to interact with the experts and also able to get suggestions. I am benefited from the sessions which were very useful for my future course of work

I would like to express my sincere gratitude as I felt like at home being there. My sincere thanks to you sir for providing the accommodation also.

Thanks also to the all LOC members of the workshop.

sincerely,

-Shashidhar, NGRI

21.1.2012

Respected Sir,

First of all I wish to congratulate you and your team for such a meticulous and fruitful orgranisation of the workshop. I not only enjoyed participating in to it but, had some learnings too. I also wish to sincerely thank you for giving me this opportunity.

Thanking you once again,

With best regards, sincerely,

Dr. Nilesh P. Bhatt
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other email: nileshbhatt-geology@msubaroda.ac.in

24.01.2012

Dear Dr. Rastogi,

I would like to thank you once more for inviting me to the Indo-US Workshop on Intraplate Seismicity. It was extremely informative and exciting to see the research that is being done on intraplate seismicity in India, to interact with Indian colleagues, and to get feedback on my own work. I also greatly enjoyed the field trip to Kachchh. It seems there are abundant opportunities for research in Kachchh and other regions, and I look forward to future collaborations with the ISR.

Thank you,

Emily Wolin

CONCLUDING SESSION OF THE

INTERNATIONAL SYMPOSIUM ON ADVANCES IN EARTHQUAKE SCIENCE (AES 2013)

The concluding session was chaired by Prof. BK Rastogi with theme conveners as panel members. First of all comments were invited. The comments from delegates are given below:

Remarks by the delegates at the closing ceremony

1. Arun Bapat, former Addl. Director CWPRS, Pune: Total Electron Content (TEC) and Outgoing Long-Wave radiation (OLR) methods may be used for studying earthquake precursors. The TEC can be easily downloaded from the GPS data and OLR is freely available from websites. I am glad ISR has already started working in this aspect.

2. Dr. Debasis Ghose, **formerly with Variable Energy Cyclotron Center and Saha Institute of Nuclear Physics, Kolkata:** There are a number of agencies working on earthquake precursors. There should be forum for discussions among them and assessment of different results / observations. For example, various groups are doing the radon and Helium studies in India separately. This is the time we should have a common platform and work together. This will help in discussing ideas, formulate new things and will be useful in coming to any conclusion regarding a reliable earthquake precursor.
DG, ISR informed that several efforts have been made in this regard. He had approached DST/MoES but nothing could be materialized. He suggested that a working group in earthquake precursor studies will be made under ISES which can meet twice a year and hold regular workshops with the assistance from MoES/DST.

3. Mr. U P Singh, NPCIL, Mumbai:
He thanked ISR for organizing the AES 2013 which will benefit the industry. He pointed out that most of the presentations in the symposium showed many lineaments but nothing was said about the ground truth which was to be carried out to establish it as a fault. This is important from the industry perspective so that they can be considered for seismic hazard assessment. He also opined that a comprehensive homogenized catalog for the Indian region is needed for PSHA analysis. He also stressed a need to revise the IS codes for design spectra for soil and rocks. The present spectra provided in the code are very old and since then many strong motion records particularly from the Indian region are available which need to be incorporated in the design spectra. He also opined that ground motion attenuation relationships for the Indian region should be developed by incorporating all the available data sets.

For siting of nuclear power plants we face difficulties in some of the aspects because of lack of sufficient information. Some of the issues are

I. To establish whether fault is active or not and dating of Faults/ Lineaments
II. Earthquake Catalog data needs to be evaluated for its authenticity
III. Work towards preparation of Intensity based Design Basis Ground Motion Prediction
IV. Frequency shift in soil vs. rock as it is very important for designing equipment.
V. Attenuation relations need to be developed for Indian region as we have to still use the relations developed in USA.

4. Prof. V.M. Patel, Principal, Vaghela Institute of Technology

He opined that in future more civil engineers should be invited as at present there is no synergy between seismologists and engineers. This will be helpful to the society in the sense that the research outcome can directly be implemented for the coming infrastructural projects.

A Civil Engineering session may be kept in seminars whereby synergy may be developed between seismologists and earthquake engineers.

Comments by Theme conveners- Concluding Session

1. Dr. V.C. Thakur: **Theme of Neotectonics**

He strongly feels that active fault map for the whole India is required which will help in assessing the seismic hazard of a particular region. He opined that site specific studies for large and critical projects like Nuclear power plants and dams is required. He also said that there is a need to form a working group on active faults. Also, lots of seismic hazard maps are prepared by various agencies/researchers but these are not being used by the end-users. There must be some mechanism to use these maps by the civil engineers. In short the following aspects need to be considered:

I. Active Fault studies need to be carried out along specific faults / areas.
II. For preparation of Hazard maps, study of active faults should be carried out.
III. Involve Earthquake Engineers for giving final hazard map.

2. B.R. Arora: Theme of Precursory studies

The earthquake precursory studies are both skeptic and optimistic. He feels that in this symposium a lot of optimism is seen in the young researchers and which is very encouraging for the science. He opined that the presentations in the earthquake precursor session showed more physics which is a positive sign. He also stressed that at present the precursory research is more like a post mortem and we should move to near real time analysis and assessment of the data set. We still lack in identifying normal and anomalous data sets. There is also a need to integrate all data sets to come to any conclusion. He also opined that young researchers of ISR should also present their research in the form of talks in future.

3. A. Peresan: Hazard Studies and Engg. Seismology

(i) Amazing amount of data of high quality has been generated by ISR and different types of analysis have been carried out.

(ii) This will lead to new important findings.

(iii) Discussions/association with experts from other countries are required for assessing optimum hazard in view of new developments in the field.

(iv) India is a good place to carry out new research and check/validate new models. I am going back with positive feeling.

4. Dr. J.R. Kayal: **Theme of Real-Time Seismology and Seismicity**

I. He complimented ISR for organizing the symposium on annual basis and this will help in disseminating new ideas/research and will certainly help young scientists/researchers.
II. Presentation of online data analysis and different types of analyses with state of the art methods in this Seminar made me so happy.
III. The results from Antarctica which were presented in the symposium were fascinating.

5. Dr. Ravi Kumar: **Theme of Crustal Structure**

I. I am extremely happy to attend the symposium. It was heartening to have seen new and very interesting results being presented by young scientists. Hence, there is hope for future.
II. There was amazing length of discussion after each talk. It necessitated the session chairmen to reduce the presentation time and increase the discussion time.
III. The sessions were learning experience for even Senior Scientists.
IV. He opined that the present research is more tool based. It should be more process based.
V. He stressed a need for a regional crustal model of India as lots of tomographic studies are carried out by various researchers which can be used to develop regional model. It needs to be prepared as it will be useful for hazard modeling also.

Remarks by BK Rastogi

As the delegates have expressed need for forums for frequent in depth discussions and collaboration on various aspects it is proposed to form Working Groups on various aspects under the aegis of ISES as follows:

I. Earthquake Precursors
II. Active Faults
III. Crustal Deformation
IV. Seismic Microzonation and Seismic Hazard
V. Observational Seismology
VI. Physical Seismology: Physics of Earthquake Process and Structure of the Earth

ISES/ ISR will propose holding of workshops on these topics every two or three months or so for funding from MoES/ DST New Delhi.

Remarks communicated afterwards

1. Message from Dr. Sumer Chopra, Sc. E, MoES

It was nice to be at ISR during symposium. It was wonderfully organized. I thank all the persons who are involved behind scenes in making the symposium a grand success.

2. Message from Dr. Arun Bapat

Dear Dr Rastogi,

I am writing this mail for congratulating you for the success of AES 2013. I appreciate you organizational acumen-ship and helping attitude. I am also happy to see that on the last day after the valedictory function, about 15 ISR persons requested me to talk and discuss about TEC and OLR. I had a session of about 45 minutes and was happy to have very useful interactions.

It is also nice that you have instructed the staff to monitor these parameters. If required, I would like to have more interaction on this topic. As I have already mentioned in my talk, the much coveted successful earthquake prediction will be by non-seismic, non-geologic, non-geophysical methods. The TEC and OLR are leading seismic precursory parameters.

3. Santanu Baruah, young delegate from North East Institute of Sc. and Technology (NEIST), Jorhat

First of all thank you very much for your kind support and encouragement regarding my participation in AES, 2013. It was a very nice event and we have learnt a lot. The training course was also very much fruitful for us and will help us in our future research work.

Hope you will encourage me in future also. Thanks again.

ANNEXURES

ANNOUNCEMENT

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"

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

Organizer:

Institute of Seismological Research, Dept of Science & Technology, Govt. of Gujarat and Indian Society of Earthquake Science (ISES)
Themes:

1. Earthquake Precursors and Prediction Studies
2. Seismic /Tsunami Hazard Assessment
3. Neotectonics
4. Real-time Seismology and Seismicity Studies
5. Lithospheric Structure
6. Engineering Seismology

Participants:

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

Travel and subsistence expenses of the participants should be borne by themselves. Only limited funds are available for some participants who are retired or unable to arrange fund form their institutions.

Call for Abstracts:

The abstract should be within one A4 page in MS Word format, Times New Roman, font 12, line spacing1.5. The title of the abstract should be in Times New Roman, font 14, bold, centered aligned followed by authors' names, affiliations, and email of corresponding author. Figures, if necessary, should be accommodated on the same page. The abstract should be sent on the email 2013.aes@gmail.com on or before 15th December 2012.

Registration fees:

Delegates	Rs. 5000
ISES Members	Rs. 4000
Research Scholars	Rs. 1000

- Registration fees will include Conference material and tea/coffee
- ISR guesthouse/hostel accommodation will be arranged on request

International school on "Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent"

Date: 4-7 February 2013
Venue: Institute of Seismological Research, Raisan, Gandhinagar, Gujarat

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.

Young scientists and particularly participants from Indian subcontinent (seismologists, engineers) are planned to attend the School. Thus the School will facilitate and accelerate the practice and the application of the advanced scientific tools in seismic hazard assessment (SHA). The lectures will cover the following specific topics.

- 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-infrastructrure: basic usage of GRID and HPC infrastructure.

Registration fees:

Participants	Rs. 5000
Research Scholars	Rs. 1000

Late date of registration: 15th December 2012

Resource persons for the School:

1. Dr B K Rastogi, Director General, ISR
2. Dr. Stefano Cozzini, CNR-IOM/ Democritos, Trieste, Italy
3. Dr. Antonella Peresan (ICTP-SAND Group and DMG, University of Trieste)
4. Dr. Franco Vaccari (ICTP-SAND Group and DMG, University of Trieste)
5. Dr. Fabio Romanelli (ICTP-SAND Group and DMG, University of Trieste)
6. Dr. Andrea Magrin (ICTP-SAND Group and DMG, University of Trieste)
7. Dr Imtiaz A Parvez, C-MMACS, Bangalore
8. Dr Sumer Chopra, Scientist-E, MoES, New Delhi
9. Mr A G Chhatre, Executive Director, NPCIL, Mumbai
10. Mr Santosh Kumar, Scientist-D, ISR
11. Dr Kapil Mohan, Scientist-C, ISR
12. Dr. B Sairam, Scientist-B, ISR

and some others.

Contact Details for symposium and international school:

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

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

THEMES OF THE SYMPOSIUM

S1: Earthquake Precursors and Prediction Studies, Convener: B R Arora, UCOST, Dehradun

Recognizing that earthquake precursory research hold key to earthquake prediction, search for precursors and their documentation has continued in different parts of the globe. Accumulated evidences bring forth variety of precursory signals including seismological, atmospheric/ionospheric, geodetic/geomagnetic, electrical resistivity/hydrological as well as geochemical anomalies. Despite certain definite success cases, skepticism prevails as noted changes are not observed at all earthquakes sites or even for different earthquakes in the same region. The dilatancy-diffusion model based on behavior of rocks under stresses in laboratory conditions has some success in explaining some of the noted precursory signals. Induction of con-current multi-sensor measurements and availability of satellite data have begun to demonstrate the promising role of non-seismological parameters in earthquake forecasting programs. The present session shall review the advances in earthquake precursory programs to devise road map for future planning and practical application of earthquake precursory research. Papers dealing with any aspect of earthquake precursory research are welcome. Papers focusing on modern mathematical tools to isolate precursory signature in real time, establishing their space-time relation to earthquake cycle and highlighting strategies for integrating multi-sensor data are especially invited.

S2: Seismic /Tsunami Hazard Assessment, Convener: Fabio Romanelli, University of Trieste, Italy

Purpose of the seismic hazard assessment (SHA) is to provide a scientifically consistent estimate of seismic hazard for engineering design and other considerations. The time is ripe to move beyond traditional Probabilistic Seismic Hazard Assessment, because it is not based on earthquake sciences (i.e., invalid earthquake source model, misuse of statistics, and invalid mathematics). PSHA practice has become the "old good paradigms" of widespread ignorance and intolerance to any revision. Although there are many approaches available for SHA, this Session advocates the advanced methods for seismic hazard assessment and seismic microzonation that utilize up to date earthquake science and basic scientific principles to derive the seismic hazard in terms of a ground motion or related quantity and its occurrence frequency at a site, as well as the associated uncertainty.

Also, the Session is addressed to seismologists, engineers and stake-holders, and aims to contribute bridging modern interdisciplinary research and end-users, who have to cope with the problems of the earthquake risk management and natural disasters preparedness. East coast of India is affected by tsunami generated along Andaman-Sumatra subduction zone and west coast from Makran subduction zone. Numerical modelling to determine the tsunami propagation,

potential run-ups and inundation from tsunamigenic sources is recognized as useful and important tool, since data from past tsunami are usually insufficient to plan future disaster mitigation and management planes. Models can be initialized with potential worst case scenarios for the tsunami sources or for the waves just offshore to determine corresponding impact on nearby coast. Models can be initialized with smaller sources to understand the severity of the hazard for the less extreme but more frequent events and also far taking into account the shape of the coast line and shelf. Paleotsunami study is important to decipher pre-historic tsunamis. All this information then forms the basis for creating tsunami evacuation maps and procedures. Papers are invited on these topics regarding tsunami and seismic hazard assessment studies.

S3: Neotectonics, Convener: V C Thakur, WIHG, Dehradun

Neotectonics is the study of young tectonic events which have occurred or are still occurring in a given region after its orogeny or after its last significant tectonic set-up. The tectonic events are recent enough to permit a detailed analysis by differentiated and specific methods, while their results are directly compatible with seismological observations. This approach has been accepted by many researchers. It is also defined as the study of geologically recent motions of the Earth's crust, particularly those produced by earthquakes, with the goals of understanding the physics of earthquake recurrence, the growth of mountains, and the seismic hazard embodied in these processes. Another source of different interpretations for a region is that changes in different tectonic plates of the region may occur at different times, giving rise to the notion of the "transitional time", during which both palaeotectonic and neotectonic features coexist. For example, for central/northern Europe, the transitional period stretches from the middle early Miocene to the Miocene-Pliocene boundary. This session invites papers on the problems of recent tectonic movements occurred in the upper part of Tertiary (Neogene) and in the Quaternary, which played an essential role in the origin of the contemporary topography.

S4: Real time seismology, Convener: J R Kayal, Visiting Professor, ISR, Gandhinagar

Aim of the real-time seismology is to collect and analyze seismological data rapidly during a seismic crisis and utilize them for developing information on hazard, potential damage of large events, actual damage, and aftershock risk, with the aim of mitigating the earthquake impact on human society. Before a main shock the focus is on providing indications for an impending event by time-dependent assessment of hazard and risk. During a shock an alert and shake maps of ground shaking allow rapid assessment of the damage in affected area for relief work; in many cases several seconds to a minute might be available for early warning of strong shaking with options to shut down critical facilities, secure industrial facilities, and issue alarms where appropriate. After the main shock the rapid damage estimates based on seismological information and on a modeled ground conditions can be delivered to the agencies handling emergency. Also, the risks associated with aftershocks can be assessed. Operational systems covering some of the aspects mentioned above are already in place in Japan, Mexico, Taiwan, Europe and the U.S. The session will explore the state-of-the-art of this evolving technology and highlight application options in the Indian context.

S5: Lithospheric structure, Convener: M. Ravi Kumar NGRI, Hyderabad

Our understanding of the Earth as a dynamic system has primarily evolved owing to development of new incisive tools to probe the Earth's interior from the crust to core, tremendous strides in acquisition of high quality data from dense observational networks coupled with enhanced computational power. Multidisciplinary knowledge accrued from high resolution studies of the continental lithosphere, nature and deformation of subducting slabs, physical and thermal state of the mantle transition zone, the lowermost mantle region and the inner core in conjunction with mineral physics experiments is continually refining the forefront of knowledge thereby unveiling the fundamental global and regional scale dynamic processes of our planetary interior. This session is intended to focus on our current knowledge of the deep structure, evolution and dynamics of the stable continental interiors and actively deforming plate boundary regions in diverse tectonic settings by bringing together researchers from a wide variety of disciplines from active and passive seismology, GPS geodesy, geodynamics, geochemistry, Magnetotellurics and mineral physics. Contributions specific to the evolution of the Indian shield and its plate boundary regions like the Himalaya, Burma and Andaman arc regions are particularly welcome.

S6: Engineering seismology: Advanced approaches and practical implementation

Convenor: Antonella Peresan (University of Trieste and ICTP-SAND group, Italy)

Lessons learnt from recent destructive earthquakes show that a single hazard map cannot meet all the requirements from different end-users. Nowadays it is recognized by the engineering community that peak ground acceleration (PGA) estimates alone are not sufficient for the adequate design of special buildings and infrastructures, since displacements may play a critical role and the dynamical analysis of the structure response requires reliable time series of ground motion. A reliable characterization of the maximum displacement at different periods is essential, for example, to the design of seismically isolated structures and other special infrastructures. Moreover for structures of considerable linear dimensions (e.g. bridges and also some buildings), it is necessary to account for the possible asynchronous ground motion along the base of the structure.

When dealing with the protection of cultural heritage and critical structures (e.g. nuclear power plants), where it is necessary to cope with hazard for extremely long time intervals, the standard probabilistic approach to seismic hazard assessment (PSHA) is by far unsuitable, due to its basic heuristic limitations. Extrapolating ground motion with an infinitely long return period from a few hundred years of the available earthquake catalogues, in fact, may turn out to be a purely numerical exercise with no connection with reality. Another major problem in classical methods for seismic hazard assessment consisted so far in the adequate characterization of the attenuation models, which may be unable to account for the complexity of the medium and of the seismic sources, and are often weakly constrained by the available observations. The recent introduction of the Next Generation Attenuation (NGA) approach may not be able to remove the problem in that NGA reduces the product of earthquake source tensor with the Green function of the medium, i.e. the tensor product routinely used to formally represent a seismogram, to a scalar (peak value) and such a strong simplification can be totally inadequate, in particular when dealing with the complex geological structures which are present, as a rule, in active deformation areas. Therefore the need for an appropriate estimate of the seismic hazard, capable of properly accounting for the local amplifications of ground shaking (with respect to bedrock), as well as

for the fault properties (e.g. directivity) and the near-fault effects is a pressing concern for seismic engineers.

The Session is addressed to seismologists, engineers and stake-holders, and aims to contribute bridging modern interdisciplinary research and end-users, who have to cope with the problems of the seismic risk management and earthquake disasters preparedness. We encourage contributions on advanced tools for seismic hazard assessment at local scale, particularly on the following topics:

- Ground motion modeling
- Site effects characterization
- Source characterization and simulation
- Seismic input definition for special infrastructures
- Interdisciplinary studies about the response of structures to seismic input
- Applications, practical problems and requirements in earthquake engineering

2nd CIRCULAR

Participants

- Research Scholars and Scientists of various organizations in India
- Faculty of various universities

Accommodation & Transport

Travel and subsistence expenses of the participants should be borne by themselves. Only limited funds are available for some participants who are retired or unable to arrange fund from their institutions.

Registration

Registration fees:

For the Symposium

Delegates	Rs. 5000
ISES Life member	Rs. 4000
Research Scholars	Rs. 1000
Foreign Delegates	US$ 100

For the School

Participants	Rs. 5000
ISES Life member	Rs. 4000
Research Scholars	Rs. 1000
Foreign Delegates	US$ 100

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Contact Details

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Ms. Falguni Bhattacharjee
Institute of Seismological Research,
Near Pt. Deendyal Petroleum University,
Raisan, Gandhinagar-382009.
Phone No.: +91-79-66739015 & 17 (O)
Fax: +91-79-66739015.
E-mail: 2013.aes@gmail.com
web: http://www.isr.gujarat.gov.in

About Gandhinagar

Gandhinagar is the capital city of Gujarat, lying on west bank of the Sabarmati river. City presents the spacious, well organized look of an architecturally integrated city. Gandhinagar is located on the west central point of the Industrial corridor between Delhi and Mumbai. The famous Akshardham temple is located in Gandhinagar. Sardar Vallabhbhai Patel international airport located in Ahmadabad provides connectivity with domestic flights to metropolitan and other major cities of India. Airport and Railway station are 15 and 25 km, respectively away from Institute of Seismological Research Campus, Gandhinagar. From December to February, the average maximum temperature is around 29°C (84°F), the average minimum is 14°C (57°F), and the climate is extremely dry.

Symposium and School Chairs / Secretariat

Patrons

Dr. Shailesh Nayak
Secretary, MoES, New Delhi
Shri Ravi S Saxena,
Addl. Chief Secretary, DST, GoG

Chairman

Dr. B. K. Rastogi
President, Indian Society of Earthquake Science (ISES) & Director General, ISR.

Organizing Secretary

Dr. Pallabee Choudhury
Scientist-C, ISR.
E-mail: 2013.aes@gmail.com
web: http://www.isr.gujarat.gov.in

Executive Committee Members of ISES

Dr. B. K. Rastogi .... *President*
Prof. A. K. Singhvi .... *Vice president*
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Shri K. M. Rao .... *Treasurer*
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Prof. R. D. Shah .... *Council member*
Shri Santosh Kumar .... *Council member*
Dr. Pallabee Choudhury..... *Council member*
Shri A. P. Singh .... *Council member*

About ISR

Institute of Seismological Research (ISR) is the only institute in India fully dedicated to seismological research.

2nd International Symposium

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

Organized by

Institute of Seismological Research
Department of Science & Technology
Government of Gujarat
Raisan, Gandhinagar-382009, Gujarat, India
www.isr.gujarat.gov.in
and
Indian Society of Earthquake Science
Gandhinagar-382009, Gujarat, India
www.ises.in

Invitation

It is a great pleasure for the organisers to invite you to attend and contribute to the 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". The themes and technical sessions have been planned to provide an opportunity for scientists, engineers, professionals and research scholars from different countries and institutes/universities to exchange their ideas and experiences in Seismology in all its dimensions. The school helps in 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. Thus the School will facilitate and accelerate the practice and the application of the advanced scientific tools in seismic hazard assessment (SHA).

Organizers

Institute of Seismological Research (ISR), Dept. of Science & Technology, Govt. of Gujarat and Indian Society of Earthquake Science (ISES).

Symposium Themes

- Earthquake Precursors and Prediction Studies
- Seismic /Tsunami Hazard Assessment
- Neotectonics
- Real time seismology
- Lithospheric structure
- Engineering Seismology

Call for Abstracts

The abstract should be within one A4 size page in MS Word format, Times New Roman, font 12, line spacing 1.5. The title of the abstract should be in Times New Roman, font 14, bold, centered aligned followed by authors' names, affiliations, and email of corresponding author. Figures, if necessary, should be accommodated on the same page. The abstract should be sent on the email 2013.aes@gmail.com on or before 15th December 2012.

School Lecture Topics

- 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.

Resource persons for the School

1. **Dr. B. K. Rastogi,** Director General, ISR.
2. **Dr. Stefano Cozzini,** CNR-IOM/ Democritos, Trieste, Italy.
3. **Dr. Antonella Peresan,** (ICTP-SAND Group and DMG, University of Trieste)
4. **Dr. Franco Vaccari,** (ICTP-SAND Group and DMG, University of Trieste)
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7. **Dr. Imtiaz A. Parvez,** C-MMACS, Bangalore
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9. **Mr. A. G. Chhatre,** Executive Director, NPCIL, Mumbai
10. **Mr. Santosh Kumar,** Scientist-D, ISR
11. **Dr. Kapil Mohan,** Scientist-C, ISR
12. **Dr. B. Sairam,** Scientist-B, ISR and some others.

Sponsors

- Ministry of Earth Sciences (MoES), New Delhi, India.
- Nuclear Power Corporation of India Limited (NPCIL), Mumbai, India.

Venue

Institute of Seismological Research (ISR)
Near Pt. Deendyal Petroleum University
Raisan, Gandhinagar-382009, Gujarat, India.

Important Dates

Last Date of Abstract: Submission	15 December 2012
Last Date of registration: for School	15 December 2012

Registration Form:

International Symposium
Advances in Earthquake Science (AES-2013)
and
International school on
"Use of e-infrastructures for advanced seismic hazard assessment in Indian Subcontinent"

Participant's Particulars:

Name: ____________________
Title of Abstract: ____________________

Organization: ____________________
Mailing Address: ____________________

Phone: ____________________
Email: ____________________
Accompanying Person (s) if any: ____________________
Accommodation Required (Y/N): ____________________

Participation Status (Please Tick):

- [ ] I would like to attend Symposium.
- [ ] I would like to attend School.
- [ ] I would like to attend both Symposium and School

For Foreign Delegates:

Passport Details:
Passport No.: ____________________
Place of issue: ____________________
Date of issue: ____________________
Valid till: ____________________
No. of previous visits of India: ____________________

Payment details:

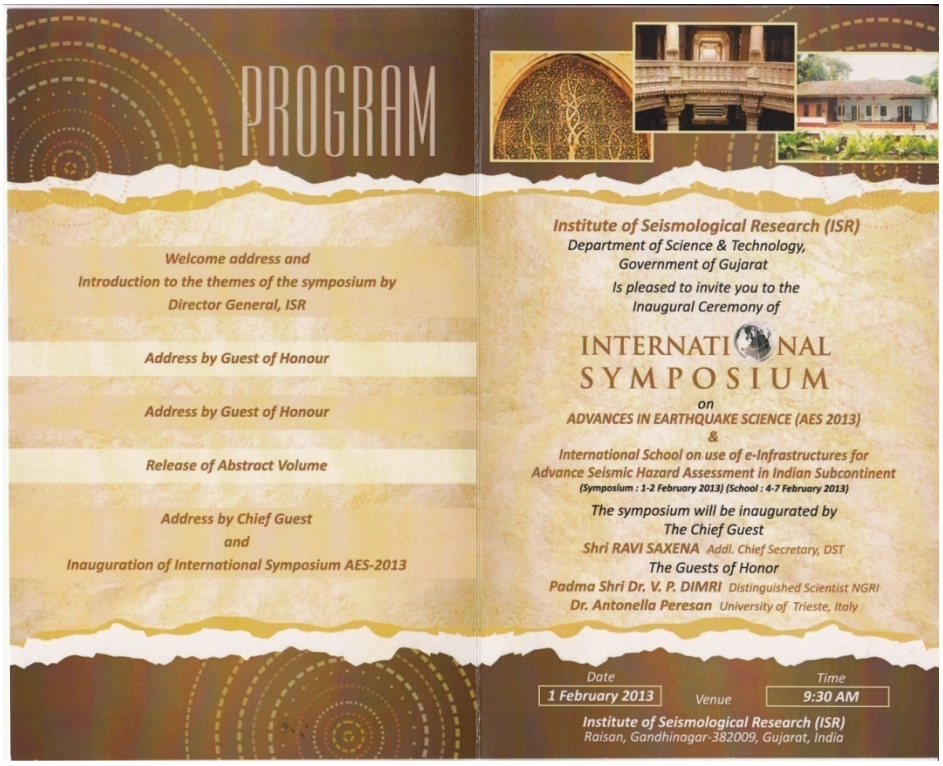
Banker's Cheque/DD No.: ____________________
Date of issue: ____________________
Amount: ____________________
Name of Bank: ____________________

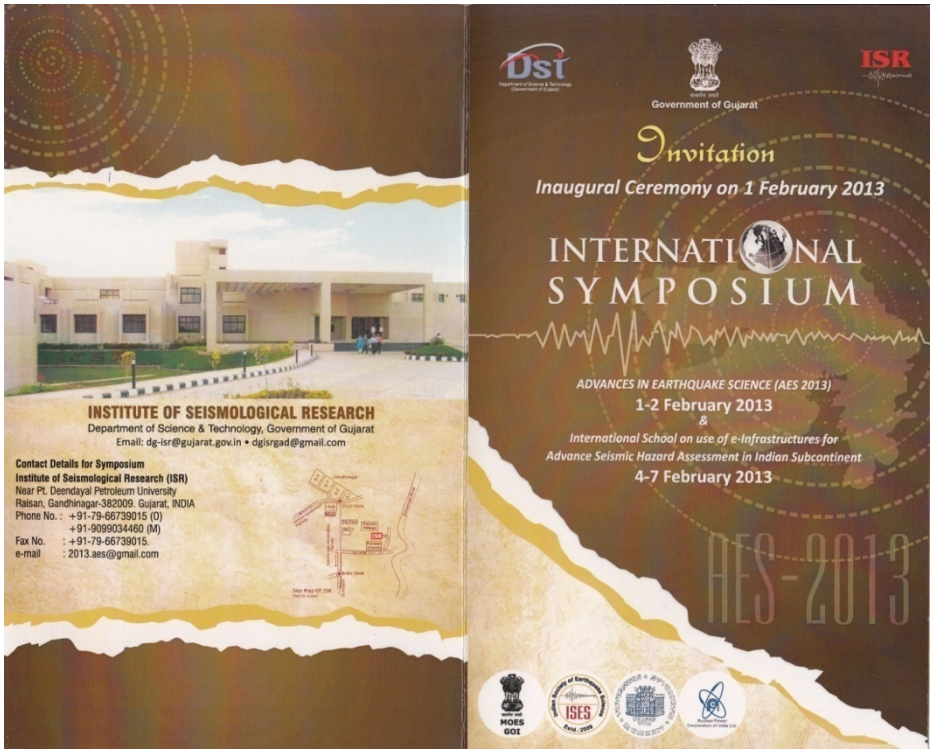
Wire Transfer		
Name of Account	:	ISES
IFSC Code	:	[illegible]
MICR Code	:	[illegible]
Account No.	:	[illegible]

This Registration Form along with demand draft in favour of "Secretary, ISES payable at Oriental Bank of Commerce Gandhinagar" should be sent to Institute address.

Institute of Seismological Research (ISR)
Near Pt. Deendyal Petroleum University
Raisan, Gandhinagar-382009, Gujarat, India.

INVITATION CARD





SYMPOSIUM PROGRAM

1st February				
08:00-10:00			Registration	
09:00-10:00			Tea	
09:30-11:00			Inaugural Programme	
S1: Earthquake Precursors and prediction Studies				
Chairman: B R Arora			Co-Chairman: R C Ramola	
Date: 01.02.2013		**Auditorium**	Time: 11:00- 13:05	
Sl no.	Session	Authors	Title	Time
1.	S1_I1	Baldev R. Arora	STRATEGY FOR ENHANCED DETECTION AND VALIDATION OF EARTHQUAKE PRECURSORS	20 min
2.	S1_C2	Mahesh N. Shrivastava and C.D. Reddy	The Mw 8.6 Indian Ocean earthquake on April 11, 2012: Coseismic displacement, Coulomb stress change and aftershocks pattern	15min
3.	S1_C3	Sangeeta Sharma, Saurabh Baruah, Om Prakash Sahu, Pabon K Bora and	Low b-value prior to the Indo-Myanmar subduction zone earthquakes and precursory swarm studies for 6 May 1995	15min

		Ranju Duarah	M 6.3 earthquake	
4.	S1_C4	O.P. Singh, Vishal Chauhan and Birbal Singh	A precursory ULF signature observed at Agra associated with great earthquake (M=8.6) occurred near Indonesian region	15 min
5.	S1_C5	Vivek Walia, Arvind Kumar, B.R. Arora, T. F. Yang, C-C. Fu, S-J. Lin, K. L. Wen and C-H Chen	Earthquake monitoring studies in Taiwan with special emphasis on soil-gas geochemistry	15min
6.	S1_C6	R. C. Ramola	Radon Monitoring and Earthquake Activities in Garhwal Himalaya	15 min
7.	S1_C9	Kunvar. S. Yadav, S. P. Karia, K. N. Pathak	Ionospheric TEC Variation prior to Japan earthquake in 2011 and Multi-sensor data study associated with some earthquakes 2012.	15min
8.	S1_C10	Arun Bapat	Use of Total Electron Content (TEC) for assessing and confirming Seismic Status of potential seismic region	15 min
LUNCH 13:05-14:00				
S1: Earthquake Precursors and prediction Studies (Continued) Chairman: O P Singh Co-Chairman: Vivek Walia Date: 01.02.2013 **Auditorium** Time: 14:00- 15:00				
9.	S1_C11	Arun Bapat	Successful Prediction of Earthquakes in Australia and South Africa using out going Long Wave Radiation (OLR)	15 min
10.	S1_C14	Chiranjib Barman, Hirok Chaudhuri, Debasis Ghose, Prasanta Sen, Bikash Sinha	Multifractal Detrended Fluctuation Analysis of seismic induced radon-222 time series	15 min
11.	S1_C15	Hirok Chaudhuri, Chiranjib Barman, Debasis Ghose, Prasanta Sen and Bikash Sinha	An Overview of Helium and Radon Release at Bakreswar and Tatta Pani Geothermal Areas	15 min
12.	S1_P1	G.S.Gusain, Mukesh Rawat, Mukesh Prasad, Anoop Dangwal, M.PS.Rana and R.C.Ramola	Variation of radon levels in Soil and Ground water and its relation with Seismic activity in Garhwal Himalaya	POSTER
13.	S1_P2	Vinod Kushwah, Birbal Singh, M.S. Gaur, R.K. Tiwari &	Simultaneous Ultra Low Frequency and Total Electron content (ULF/TEC) amplitude	POSTER

		Rudraksh Tiwari	anomalies observed during seismic activities in Indian region	
S4: Real Time Seismology and Seismicity Studies				
Chairman: J R Kayal				Co-Chairman: A P Pandey
Date: 01.02.2013		**Auditorium**		Time: 15:00- 16:45
1.	S4_I1	J. R. KAYAL	Himalayan tectonic model and the great earthquakes	20 min
2.	S4_C2	Pinki Hazarika, M. Ravi Kumar and G. Srihari Prasad	The September 18, 2011 Mw 6.9 Sikkim Earthquake and its Aftershocks	15 min
3.	S4_C4	A.K. Shukla and R.K.Singh	Real time earthquake monitoring network requirement and capability	15 min
TEA 16:05-16:30				
4.	S4_C6	H.S.Mandal, P.K.Khan and A.K.Shukla	Derivation of focal mechanism using waveform inversion of broadband seismic data over Central India Tectonic Zone (CITZ): tectonic implications	15 min
S3: Neotectonics				
Chairman: V C Thakur				Co-Chairman: K S Misra
Date: 01.02.2013		**Conference room 1**		Time: 11:00- 15:00
1.	S3_I1	S. K. BISWAS	ACTIVE TECTONICS OF WESTERN CONTINENTAL MARGIN OF INDO- PAK CRATON –STRESS SOURCE FOR SCR EARTHQUAKES	30 min
2.	S3_I2	V. C. Thakur	Active tectonics of Himalayan Frontal Fault system in the Himalaya	20min
3.	S3_C1	Sandeep Sathian, P. S. Sunil and S. K. Arora	Stress Field Variations Along the Himalayan Arc Derived From Inversion of Fault Plane Solutions	15 min
4.	S3_C3	Biju John, Yogendra Singh, Sandeep Nelliat, G.P. Ganapathy	Morphotectonic evidence of active deformation- An example from Peninsular India	15 min
5.	S3_C4	K.S.MISRA and ANSHUMAN MISRA	Significance of Lineament Tectonics in Seismic Zonation: A case study form Western India	15 min
6.	S3_C5	Dip Kumar Singha	Stress magnitude and Orientation Determination in the Geohazard Region of Krishna-Godavari Basin, India	15 min

LUNCH 12:50-14:00				
7.	S3_C6	Sundeep K. Chabak, Sushil Kumar and Ajay Paul	Observations from the regional seismicity of Western Himalaya: Implications on active tectonics	15 min
8.	S3_C7	Sunita Aswal, Manjulata Yadav, Veena Joshi, A.A.Bourai and R.C.Ramola	Variation of radon concentration in soil along the Main Central Thrust of Garhwal Himalaya Region	15 min
9.	S3_C8	Anand K. Pandey, Prabha Pandey, Guru Dayal Singh	Neotectonic evolution of Trans-Yamuna Dun in NW SubHimalaya: role of undercritial tectonic wedge in active deformation partitioning	15 min
10.	S3_C9	K.M. Sreejith, B.K. Rastogi, Pallabee Choudhury, A.S. Rajawat, Ajai	Active Deformation along Kachchh Mainland Fault (Kachchh, India) Revealed by SAR Interferometry	15 min
11.	S3_P1	S. P. Prizomwala, V. Ukey, Nilesh Bhatt and M. Kazmer	Signatures of Tectonic Uplift Recorded by Marine Notches along Diu Coast, Western India	POSTER
12.	S3_P2	Girish Ch. Kothyari, B. K. Rastogi, P. Morthekai, R. K. Dumka and Falguni Bhattachrya	Neotectonics attributes of the Gedi Fault, Eastern Kachchh, India	POSTER
13.	S3_P3	S. P. Prizomwala, G. C. Kothyari and Nilesh Bhatt	Is the southern coast of Kachchh uplifted?	POSTER
2nd February				
S4: Real Time Seismology (Continued)				
Chairman: E Hohnecker				Co-Chairman: R D Shah
Date: 02.02.2013		**Conference room 1**		Time: 09:00- 10:00
5.	S4_C7	Santanu Baruah and Saurabh Baruah	State of Tectonic Stress in Northeast India and Adjoining South Asia Region	15 min
6.	S4_C10	Naresh Kumar, Dilip K. Yadav and Devajit Hazarika	Tectonic linkage with along-strike segmentation of seismicity in Northwest Himalaya	15 min
7.	S4_C11	Dr.-Ing. Eberhard Hohnecker	Advanced detection and warning systems for Railways based on ground borne vibrations	15 min
8.	S4_C12	R. D. Shah, Darji Simone, Khatri Khushbu, Oza Rachana	GEOMORPHOLOGICAL INDICATORS TO DETECT THE ACTIVE SEISMICITY IN KUTCH USING REMOTE SENSING AND GIS.	15 min

9.	S4_P1	BK Rastogi and Santosh Kumar	SEISMICITY OF GUJARAT DURING 2001 to 2012	POSTER

S5: Lithospheric Structure				
Chairman: M Ravi Kumar				Co-Chairman: S N Bhattacharya
Date: 02.02.2013		**Conference room 1**		Time: 10:00- 13:15
1.	S5_C1	Ashu Kapil, M. Ravi Kumar and N. Purnachandra Rao	Crustal thickness variation along Himalayan Front	15 min
2.	S5_C2	Karabi Talukdar, Prakash Kumar, Mrinal K. Sen	Crust and Lithosphere below Antarctica from P- and S-Receiver Function studies using TAMSEIS data	15 min
3.	S5_C3	Ritima Das, S. S. Rai, Sandeep Gupta.	Crustal Structure of Southern Granulite Terrane (South India)	15 min
4.	S5_C4	S.N. Bhattacharya, Supriyo Mitra and G. Suresh	Upper mantle radial anisotropy beneath the Bay of Bengal through inversion of interstation phase velocities of surface waves.	15 min
TEA 11:00-11:30				
5.	S5_C5	Prosanta K. Khan and Suparna Chowdhury	Evolving Seismicity in Northeast India: a new seismotectonic insight	15 min
6.	S5_C6	H. H. Mohamed, S. Mukhopadhyay, J. Sharma	Attenuation of Coda Waves: A case study from the Aswan Reservoir Area, Egypt	15 min
7.	S5_C9	Dipok K. Bora and Saurabh Baruah	Moho depth variation in Shillong-Mikir Plateau and its adjoining region of northeast India	15 min
8.	S5_C10	Utpal Saikia, S.S.Rai, Rishikesh Meena, Satyajit Dutta	Seismicity, one dimensional velocity model and regional phase propagation in Southern Granulite Terrian (SGT)	15 min
9.	S5_C11	Somasish Bose,	Seismic imaging of crust and	15 min

		K.Nagaraju, Sandeep Gupta, K.S.Prakasam, S.S.Rai	upper mantle beneath NW-Himalaya and Ladakh region:	
10.	S5_C14	M. Ravi Kumar, , A. Singh, D. Saikia, D. Srinagesh and R.K. Chadha	Upper Mantle and Transition zone structure beneath India	15 min
11.	S5_C15	K. Veeraswamy, K.K. Abdul Azeez, Kapil Mohan, A.K. Gupta, Sunita Devi , T. Harinarayana and B.K. Rastogi	Electrical conductivity structure beneath the Wagad uplift inferred from Magnetotellurics	15 min
12.	S5_P1	R K Singh, B K Rastogi, Rakesh Dumka, Sunita Sahoo, G Prasad, K Bhukta, J Banerjee	Delineation of Faults and Basement Structure in Kachchh Using High Resolution Gravity Survey.	POSTER
13.	S5_P2	G. Pavan Kumar and A. Manglik	Magnetotelluric impedance tensor analysis for identification of transverse tectonic features in the Sikkim Himalaya	POSTER
14.	S5_P3	P. Mahesh , Utpal Sakia, S. S. Rai and Sandeep Gupta	SEISMOTECTONICS AND CRUSTAL STRESS FIELD IN THE KUMAON-GARHWAL HIMALAYA	POSTER
LUNCH 13:15-14:00				

S2: Seismic / Tsunami Hazard Assessment				
Chairman: Fabio Romanelli				
Date: 02.02.2013		**Auditorium**		Time: 09:00- 13:00
1.	S2_C1	A K Shukla, H S Mandal, R K Singh, A P Pandey, H S Sisodia	Ground Response Analysis of a few representative sites in NCT Delhi	25 min
2.	S2_C2	AK Shukla, RK Singh, AP Pandey, HS Mandal, JS Jaryal, HS Sisodia , BS Meena	Application of Site Response Spectral curves for the interpretation of local ground condition in NCT Delhi	
3.	S2_C3	A.K Shukla, A.P Pandey, R.K Singh, H.S Mandal, H.S Sisodia	Impact of Palaeo and Abandoned channels left as remnant of shifting of the Yamuna River in NCT Delhi on Seismic Hazard	

4.	S2_C8	A. Peresan, A. Magrin, F. Vaccari, V.G. Kossobokov, G.F. Panza	Time-dependent neo-deterministic seismic hazard scenarios: prospective testing for the Italian territory	15 min
5.	S2_C9	A. Peresan, A. Nekrasova, A. Magrin, V.G. Kossobokov, G.F. Panza	PSHA vs NDSHA seismic hazard maps: a comparative analysis over the Italian territory	15 min
6.	S2_C10	A. Magrin, A. Peresan, F. Vaccari, G.F. Panza	Neo-deterministic sesimic hazard assessment and earthquake recurrence	15 min
7.	S2_C15	F. Romanelli, D. Bisignano, G.F. Panza	Lessons from Tōhoku-Oki event: tsunami hazard scenarios along Japanese and Italian coasts	15 min
8.	S2_C4	K.S.Misra and Sowjanya Koppisetti	Subsurface Instability and its Applicability in Seismic Zonation: Events in Peninsular India	15 min
9.	S2_C5	A K Shukla, A P Pandey, R K Singh, H S Mandal	Vulnerability Indices of Ground (K_g) in different part of NCT Delhi	15 min
TEA 10:55-11:30				
10.	S2_C6	V. M. Patel and A. P. Singh	Mapping of Tsunami Hazard due to Makarn Tsunamigenic Source along Dwarka coast, Gujarat, India	15 min
11.	S2_C7	V. M. Patel, M B. Dholakia, A.P. Singh	SIMULATION OF 1945 MAKRAN TSUNAMI IN THE ARABIAN SEA AND TSUNAMI RISK 3D VISUALIZATIONS OF OKHA COAST, GUJARAT (INDIA)	15 min
12.	S2_C11	Mr. Alpesh Adesara and Dr Rajul k Gajjar	Comparative Study of Liquid Retaining Structure Using IS 1893 (Part –II) -2010 And discussion on impact of Response Reduction Factor- "R"	15 min
13.	S2_C14	SUMANTA PASARI and ONKAR DIKSHIT	PROBABILISTIC ASSESSMENT OF EARTHQUAKE HAZARDS: AN APPRAISAL FROM EXPONENTIAL GROUP OF DISTRIBUTIONS	15 min

LUNCH 13:00-14:00				
S2: Seismic / Tsunami Hazard Assessment				
Chairman: S Cozzini			Co-Chairman: Sumer Chopra	
Date: 02.02.2013		**Auditorium**		Time: 14:00- 15:00
14.	S2_C16	K. Jagan Mohan, Ramancharla Pradeep Kumar	Numerical Study on Concrete Gravity Dam Subjected to Fault Motion	15 min
15.	S2_C17	Ashutosh Chamoli	Analysis of seismograms of tsunamigenic and non-tsnunamigenic earthquakes	15 min
16.	S2_C18	V.C.Thakur, R. Jayangondapermal, Mayank Joshi	Reasi Thrust - an extension of Balakot Bagh fault of 2005 Kashmir earthquake: implication for earthquake hazard in Kashmir seismic gap, NW Himalaya	15 min
17.	S2_P1	A.P. Singh and O. P. Mishra	Integrated Seismological Investigations of the Kachchh, Gujarat, India and its Implications for the Earthquake Hazard	POSTER
18.	S2_P2	Mukesh A. Patel, Gautam Dadhich	Liquefaction Potential Assessment of Ahmedabad-Gandhinagar Region Using Penetration based method	POSTER
19.	S2_P3	Chenna Rajaram, A P Singh,Ramancharla Pradeep Kumar	A Study on Comparison between Real and Synthetic Ground Motions of Uttarkashi Earthquake	POSTER
S6: Engineering Seismology				
Chairperson: Antonella Peresan			Co-Chairman: U P Singh	
Date: 02.02.2013		**Auditorium**		Time: 15:00-16:00
1.	S6_I1	B K Rastogi	SEISMIC HAZARD ASSESSMENT AND MICROZONATION BY ISR	30 min
TEA 16:00- 16:30				
2.	S6_C3	F. Romanelli, A. Magrin, A. Peresan, F. Vaccari, G.F. Panza	Scenario based Seismic Hazard assessment: a tool for the realistic definition of seismic input	15 min
3.	S6_C4	Faisal Dastageer, Anshuman Singh, Rahul Mittal, Santosh Khandave, B. Santosh, U.P. Singh, R.N. Bhawal, S.D.	EARTHQUAKE GROUND MOTION GENERATION FOR NUCLEAR POWER PLANTS IN INDIA	15 min

		Bhawsar, S.M. Ingole and A.G. Chhatre		
4.	S6_C5	S. Cozzini, A. Peresan, B.K. Rastogi, I.A. Parvez	Optimal exploiting of e-infrastructures for the computation of seismic and tsunami hazard scenarios	15 min
5.	S6_C6	Rajesh Kumar Mishra, S.M.Ingole, A.G.Chhatre, K.K.Vaze	STUDIES ON PERFORMANCE OF STRUCTURES, SYSTEMS AND EQUIPMENT DURING RECENT EARTHQUAKES IN INDIA	15min
6.	S6_C7	Faisal Dastageer, Anshuman Singh, Rahul Mittal, Santosh Khandave, B. Santosh, U.P. Singh, S.D. Bhawsar, R.N. Bhawal, S.M. Ingole and A.G. Chhatre	PERFORMANCE BASED EARTHQUAKE RESISTANT DESIGN OF DISTRIBUTION SYSTEMS AND EQUIPMENT	15 min
7.	S6_P1	Kapil Mohan, B. Sairam, Vandana Patel, A. G. Chhatre, R. K. Mishra and B.K. Rastogi[1]	Seismic Hazard Assessment of the Industrial sites in Kachchh (Gujarat)	POSTER
8.	S6_P2	Kapil Mohan, Vasu Pancholi, B.Sairam, A.P. Singh and B.K. Rastogi	Seismic Hazard Assessment at micro scale in a part of central Ahmedabad using Geotechnical and Geophysical parameters	POSTER
9.	S6_P3	B.Sairam, B. K. Rastogi and P. Mandal	PROBABILISTIC SEISMIC HAZARD MAP FOR THE GUJARAT REGION INCORPORATING NEAR SURFACE SITE CONDITIONS	POSTER
CONCLUDING SESSION 17:45-18:30				

LIST OF DELEGATES

AES Delegates

Vinod Kushwah	Hindustan College of Science & Technology, Mathura
Sandeep Sathian	IIG, Mumbai
Mahesh Srivastava	IIG, Mumbai
Sushil Kumar	IIG, Mumbai
Dipok Bora	Diphu Government College, Diphu
R C Ramola	H.N.B. Garhwal University
H.S.Mandal	EREC, IMD, New Delhi
A P Pandey	EREC, IMD, New Delhi
R K Singh	IMD, New Delhi
Sagarika Mukhopadhyay	IIT Roorkee
S N Bhattacharya	IISER, Kolkata
Sangeeta Sharma	NEIST, Jorhat
Santanu Baruah	NEIST, Jorhat
O. P. Singh	R.B.S. College, Agra
Prosanta Khan	ISM, Dhanbad
Ashotosh Chamoli	NGRI,Hyderabad
A K Pandey	NGRI, Hyderabad
M.Ravikumar	NGRI, Hyderabad
Pinki Hazarika	NGRI, Hyderabad
Ashu Kapil	NGRI, Hyderabad
Karabi Talukdar	NGRI,Hyderabad
Ritima Das	NGRI,Hyderabad
Utpal Saikia	NGRI,Hyderabad
Somasish Bose	NGRI,Hyderabad
K Veeraswamy	NGRI,Hyderabad
Dipkumar Singha	ISM, Dhanbad
Kiran S.Misra	UPES,Dehradun
Alpesh Adesara	IITE,Ahmedabad
Kunvar Yadav	SVNIT,Surat
Yogendra Singh	NIRM,KGF
Gurupad Gusain	H.N.B.Garhwal University
Anoop Dangwal	H.N.B.Garhwal University
Mukesh Rawat	H.N.B.Garhwal University
Mukeshprasad Bijalwan	H.N.B.Garhwal University
A A Bourai	H.N.B.Garhwal University
Sumanta Pasari	IIT,Kanpur
Arun Bapat	Formerly Addl.Director, CWPRS, Pune
Vijendra Patel	K.D. Polytechnic, Patan

V M Patel	SVBIT, Gandhinagar
S K Biswas	Formerly, Ex. Director, KDM Inst. Pet. Exploration, ONGC
K M Sreejith	SAC(ISRO), Ahmedabad
Debashish Ghose	VECC, Kolkata
Chiranjib Barman	VECC, Kolkata
Chenna Rajaram	IIIT-H,Hyderabad
K. Jagan Mohan	IIIT-H,Hyderabad
Shri S.M. Ingole	NPCIL,Mumbai
Shri U.P.Singh	NPCIL,Mumbai
Shri Abhijit Harshan	NPCIL,Mumbai
Shri Varun K Mishra	NPCIL,Mumbai
Shri Faisal Dastageer	NPCIL,Mumbai
Pankaj Wani	NPCIL,Mumbai
Mohinder Pal Singh	NHPC, Kolaptukar
Baljit Singh	NHPC, Kolaptukar
S Murugappan	NHPC, Faridabad
D C Tripathi	NHPC, Faridabad
R D Shah	MG Science College, Ahmedabad
Antonella Peresan	Universiry of Trieste, Italy
Franco Vaccari	Universiry of Trieste, Italy
S. Cozzini	Universiry of Trieste, Italy
A. Magrin	Universiry of Trieste, Italy
Fabio Romanelli	Universiry of Trieste, Italy
Francesco De Giorgi	Universiry of Trieste, Italy
E Hohnecker	Karlsruhe Institute of Technology, Germany
Vivek Walia	NCREE, Teipei, Taiwan
B R Arora	UCOST, Dehradun
V C Thakur	WIHG, Dehradun
J R Kayal	Jadavpur Univ, Kolkata
Anil Valvi	SSNNL
Dharmesh Vyas	SSNNL
R P Krsihnani	SSNNL
Sangeeta Sharma	NEIST, Assam
Santanu Baruah	NEIST, Assam
R C Tiwari	Mizoram University
Sumer Chopra	MOES, New Delhi
Tejas Kumar Thakur	PDPU, Gandhinagar
Jaydeep Devedi	DST

Jay Pradhan	DST
Hurbert Christian	DST
Payal B Patel	Ganpat University, Gujarat
Dilip Singh	Ganpat University, Gujarat
Mehul Nagar	Ganpat University, Gujarat
Jignasha Modi	Ganpat University, Gujarat
Pruthul Patel	Ganpat University, Gujarat
Shital Patel	Ganpat University, Gujarat
Bhavesh Patel	Ganpat University, Gujarat
Khusbhu Khatri	M.G. Science Institute, Gujarat
Rachana Oza	M.G. Science Institute, Gujarat
Charmi Maniyar	M.G. Science Institute, Gujarat

ISR Delegates List (AES-2013)

B. K. Rastogi	ISR, Gandhinagar
Santosh Kumar	ISR, Gandhinagar
R.K. Singh	ISR, Gandhinagar
Kapil Mohan	ISR, Gandhinagar
A.P. Singh	ISR, Gandhinagar
B. Sairam	ISR, Gandhinagar
G. C. Kothyari	ISR, Gandhinagar
P. Mahesh	ISR, Gandhinagar
G Pavankumar	ISR, Gandhinagar
S. P. Prizomwala	ISR, Gandhinagar

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Ganpat Parmar	ISR, Gandhinagar
Jignesh Patel	ISR, Gandhinagar
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Utpal Bhatt	ISR, Gandhinagar
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Girirajsinh Chavda	ISR, Gandhinagar
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Nirav Patel	ISR, Gandhinagar
Tejendra Vaghela	ISR, Gandhinagar
Darshit Modi	ISR, Gandhinagar
Swagatika Das	ISR, Gandhinagar

Participants of the International School

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2.	Narendra Kumar	CWPRS, Pune
3.	V. Rambabu	CWPRS, Pune
4.	Sangeeta Sharma	NEIST, Jorhat
5.	Santanu Baruah	NEIST, Jorhat
6.	Pinki Hazarika	NGRI, Hyderabad
7.	Ashu Kapil	NGRI, Hyderabad
8.	Karabi Talukdar	NGRI,Hyderabad
9.	Ritima Das	NGRI,Hyderabad
10.	Alpesh Adesara	IITE,Ahmedabad
11.	Suparna Chowdhury	ISM,Dhanbad
12.	K Sushini	NGRI,Hyderabad

13.	G Anusha	NGRI,Hyderabad
14.	S Prasanna	NGRI,Hyderabad
15.	Amrita Yadav	NGRI,Hyderabad
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18.	Utpal Saikia	NGRI, Hyderabad
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22.	Shri Faisal Dastageer	NPCIL,Mumbai
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27.	D C Tripathi	NHPC, Faridabad
28.	Chiranjib Barman	VECC, Kolkata
29.	Hemali Tanna	SVNIT,Surat
30.	S Sisodia	NIRM, Kolar Gold Fields
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32.	Franco Vaccari	Universiry of Trieste, Italy
33.	Stefano Cozzini	Universiry of Trieste, Italy
34.	Andrea Magrin	Universiry of Trieste, Italy
35.	Fabio Romanelli	Universiry of Trieste, Italy
36.	Francesco De Giorgi	Universiry of Trieste, Italy
37.	B. K. Rastogi	ISR, Gandhinagar
38.	Pallabee Choudhury	ISR, Gandhinagar
39.	Kapil Mohan	ISR, Gandhinagar
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44.	Jyoti Sharma	ISR, Gandhinagar
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47.	I D Gupta	CWPRS, Pune
48.	Sushil Kumar	RMSI, Noida

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			DR. MEHTA	9426011031
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Pawan Kumar	9574012249		R.K.SINGH - Gravity & Mag.	8905229598
			VASU PANCHOLI - GEOTECH	81407 62131
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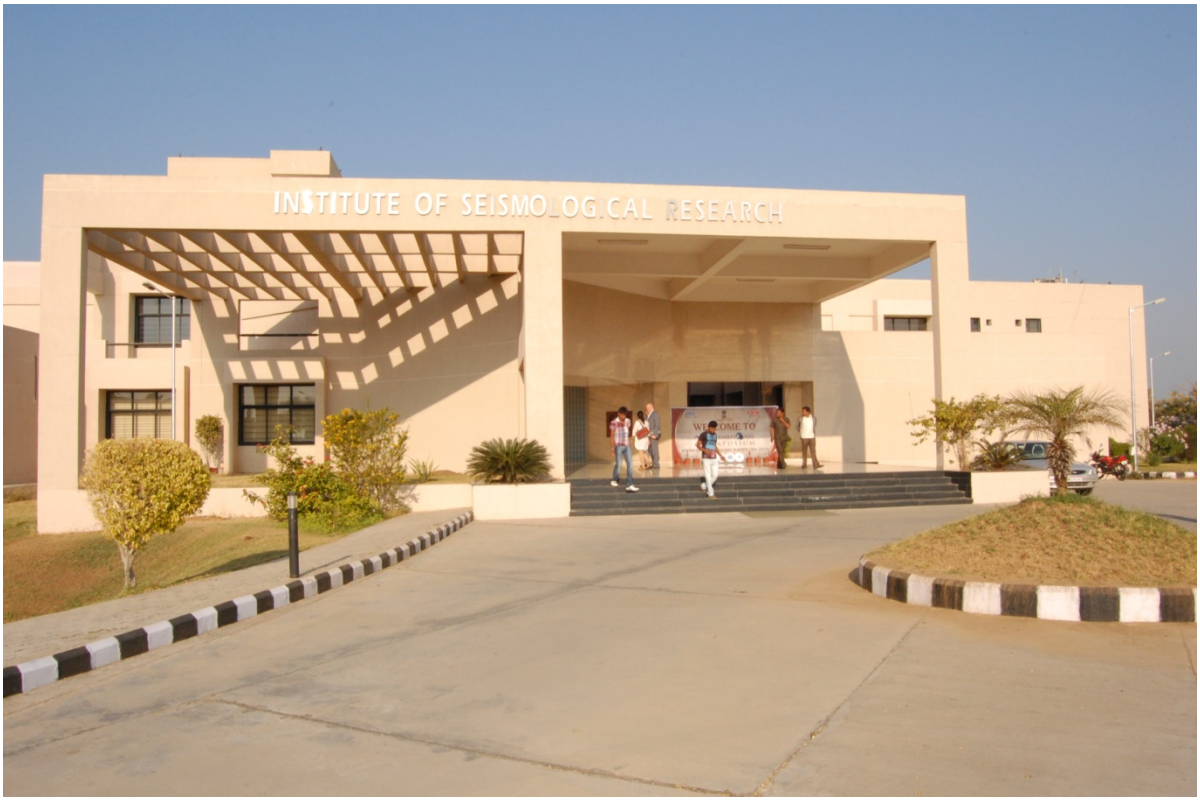
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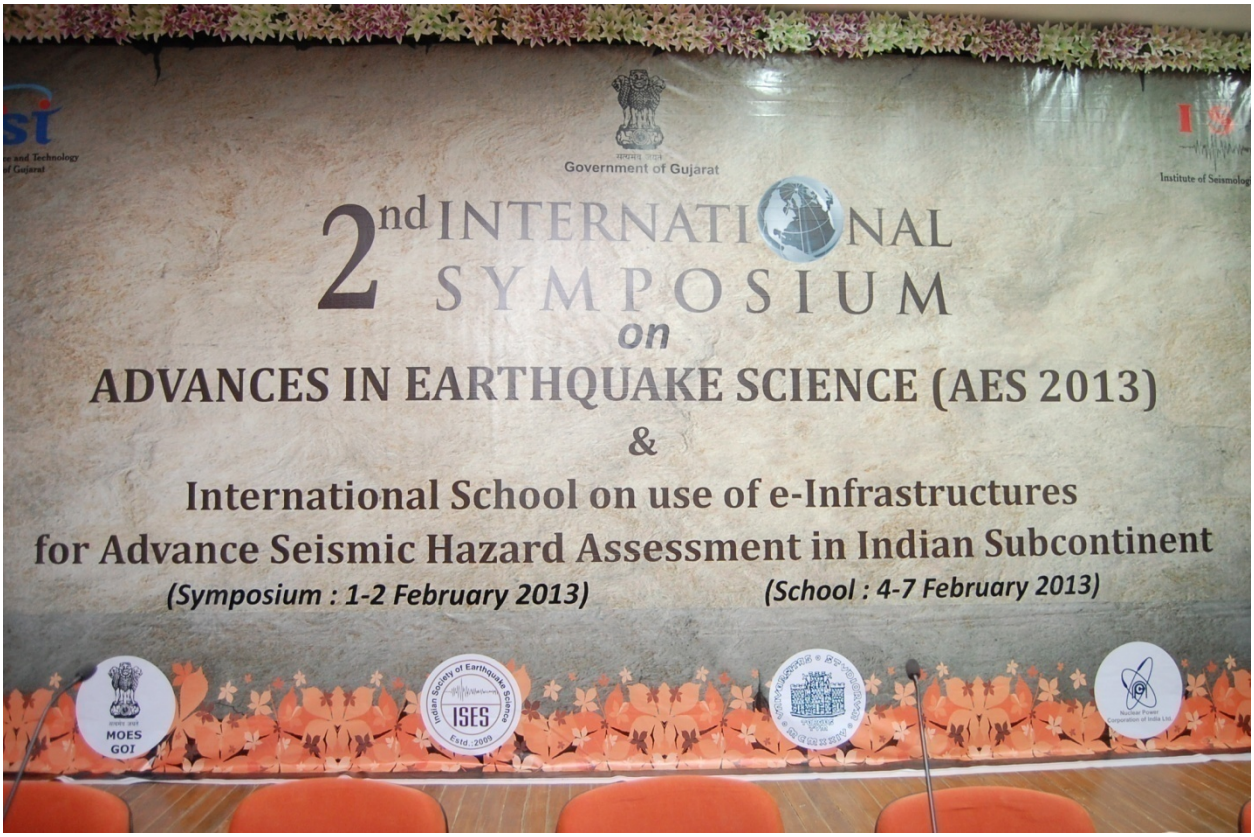
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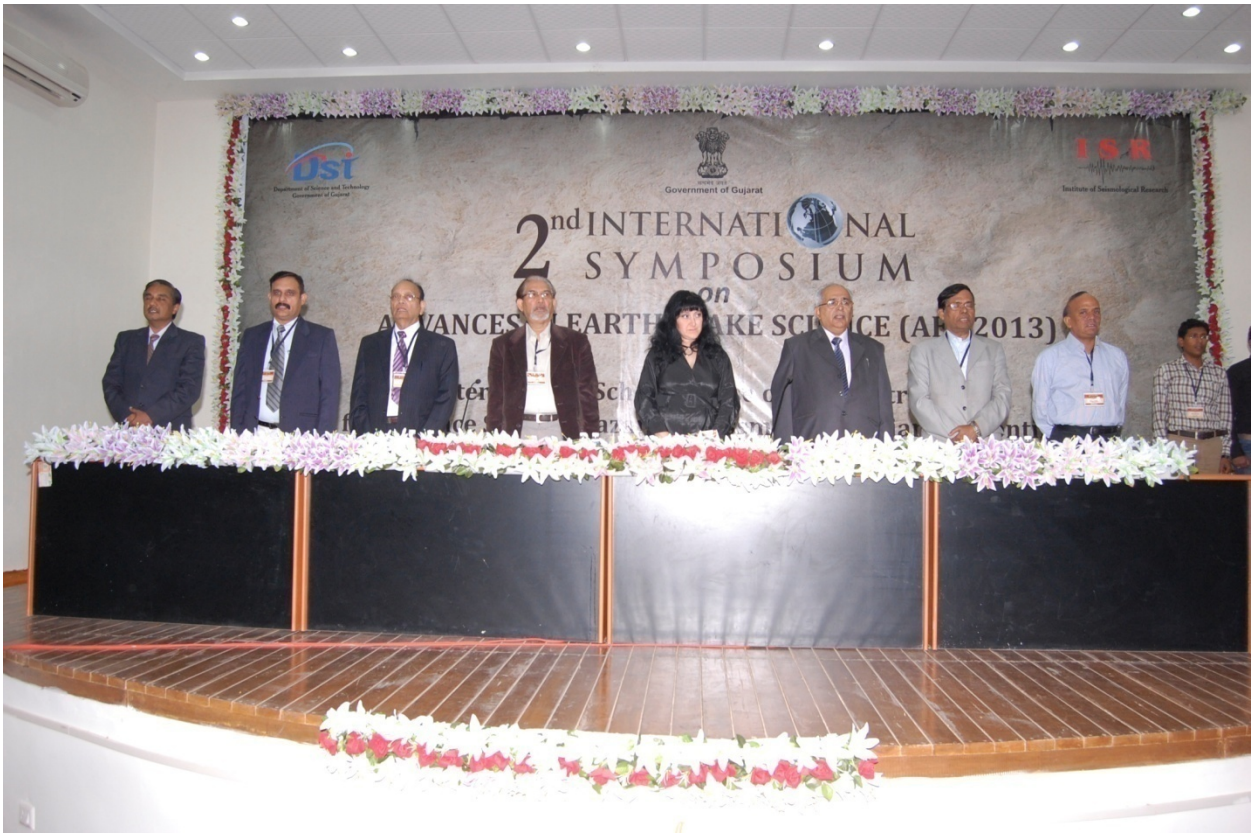
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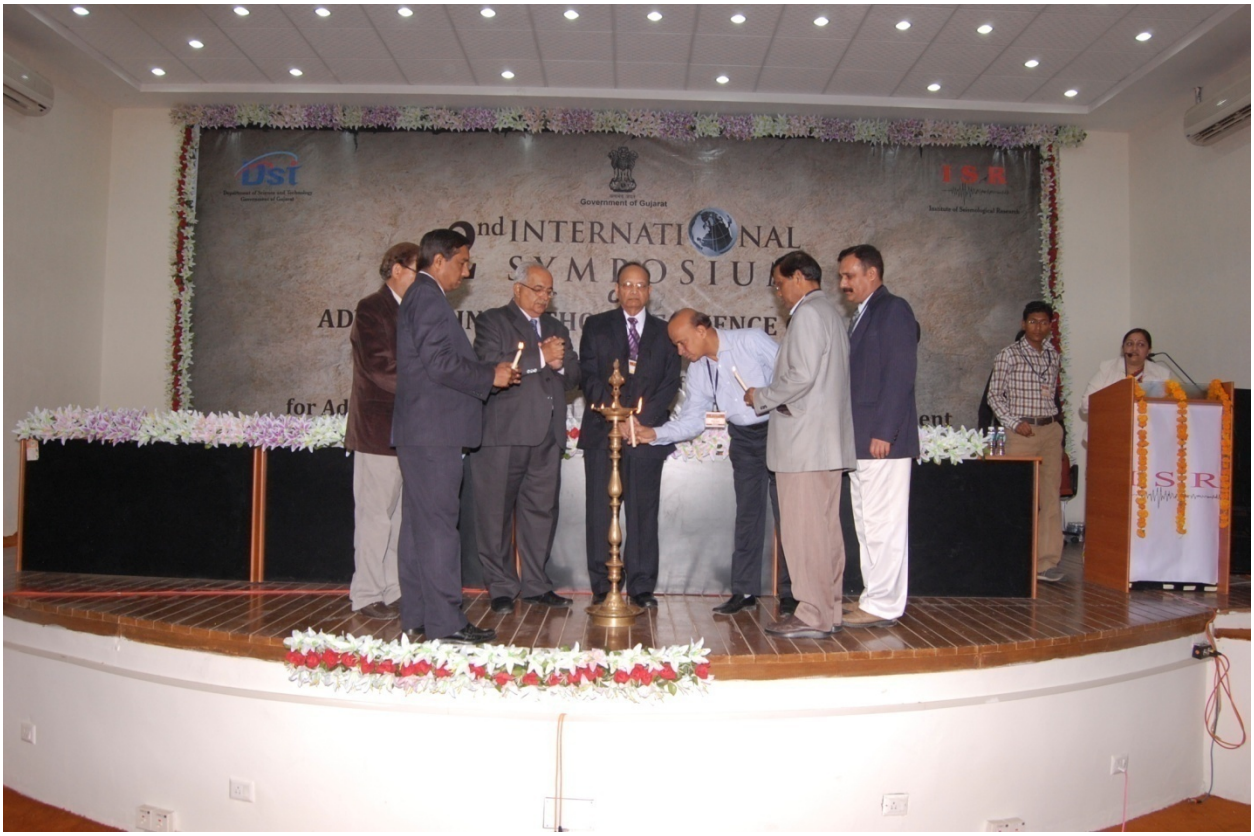
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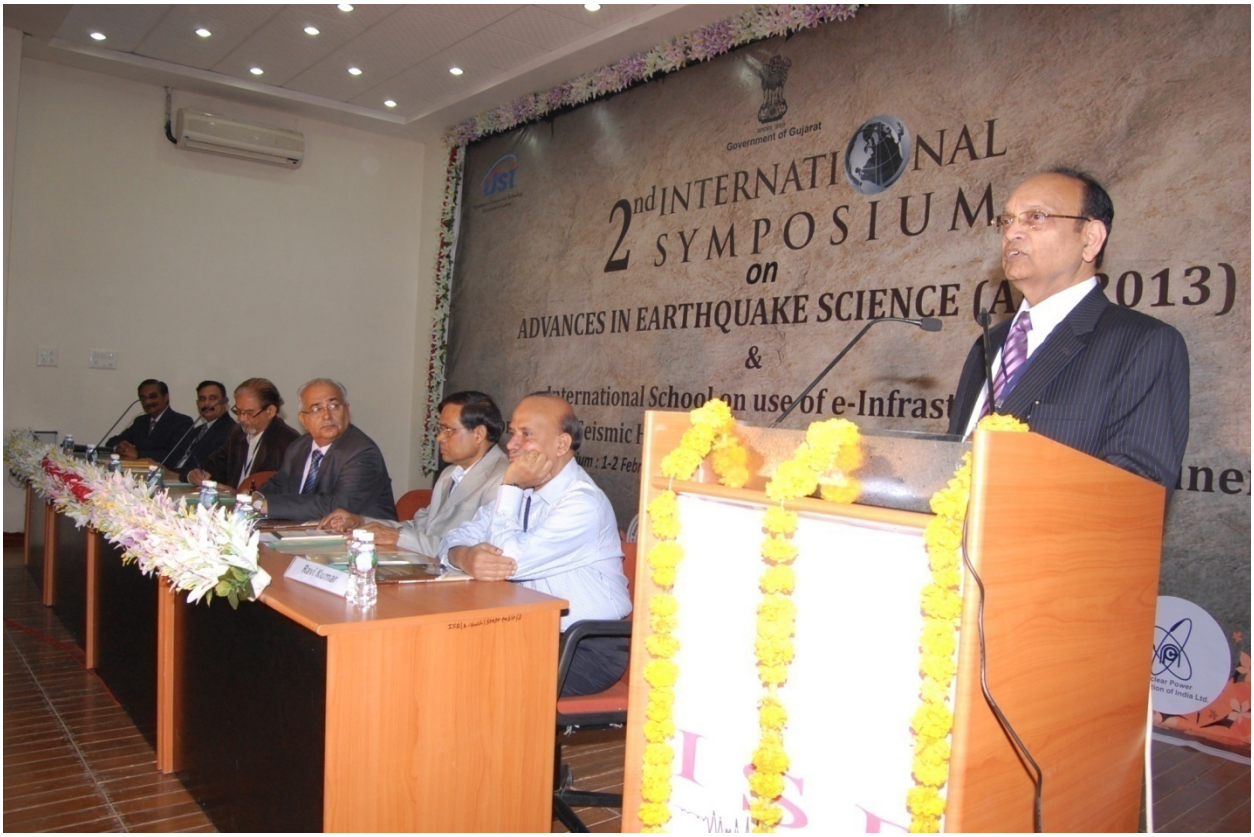
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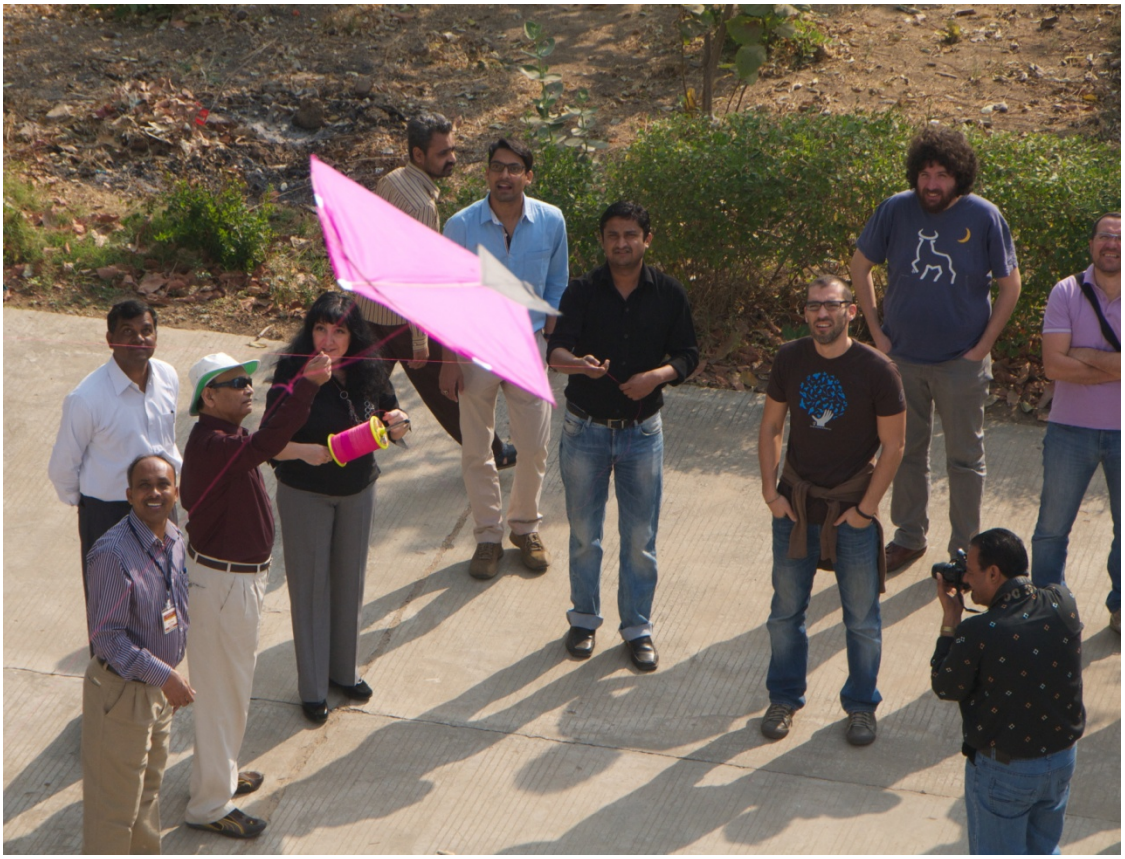

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