Curriculum Vitae

Prof. Sankar Kumar Nath, FNAE, FNASc, FWAST, FIGU, MEERI.

Professor (Higher Administrative Grade, HAG+)
& Former Head

Department of Geology and Geophysics
Indian Institute of Technology Kharagpur
P.O. – Kharagpur Technology – 721302
West Bengal, India.
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Research Interest:

- Earthquake and Engineering Seismology
- Seismic Hazard, Vulnerability, Risk and Loss Assessment and Microzonation
- Seismic Prospecting
- Geophysical Signal Processing
- Geophysical Tomography
- Computational Geophysics

Born: 3rd January, 1960
Nationality: Indian

Details of Present Salary: Pay in Payband (level: 15-HAG+): Rs. 2, 24,100/-, Total DA: Rs.38,097/-, Allow. (Tax): Rs.15,000/-, Allow. (Non-Tax): Rs. 1500/-, Transport: Rs. 4212/- ; Total: **Rs. 2,82,909/-**

Education

1979: B.Sc.(Hons) in Geological Sciences from IIT Kharagpur (Department Topper with First Class).

1981: M.Sc. in Exploration Geophysics from IIT Kharagpur (Department Topper).

1993: Ph.D. in Geophysics (Seismics) from IIT Kharagpur.

1995-96: Post-doctoral at Geophysical Institute, University of Alaska Fairbanks, Alaska, USA.

Experience (Academic)

2009 (18 August) – Continuing	Professor [*Higher Administrative Grade*], IIT Kharagpur.
2003 (09 June) – Continuing	Professor, IIT Kharagpur.
1998 – 2003	Associate Professor, IIT Kharagpur.
1993 – 1998	Assistant Professor, IIT Kharagpur.
1995– 1996	Visiting Scientist, Geophysical Institute, University of Alaska, Fairbanks, USA.
1988 – 1993	Lecturer, Indian Institute of Technology Kharagpur

Experience (Industry)

1988	Processing Manager (Geophysics), Computech Ispat Ltd., Kolkata.
1985- 1988	Senior Geoscientist, Oil India Ltd., Duliajan, Assam.
1984- 1985	Geoscientist, Oil India Ltd., Duliajan, Assam.
1982- 1984	Junior Geophysicist, Indicos Computer Services (P) Ltd., Bombay.

Experience (Administrative)

2003 – 2006	**Head** of the Department of Geology & Geophysics, IIT Kharagpur.
2004 – 2007	**Senate Nominated Member** of Central Library, IIT Kharagpur.
2002 – 2006	***Institute Coordinator*** *of the "National Programme in Earthquake Engineering Education (NPEEE)* in India**"** sponsored by the Ministry of Human Resource Development, Govt. of India.
2004 – 2010	***Institute Coordinator*** *of the "National Programme for Capacity Building of Engineers in Earthquake Risk Management (NPCBEERM)*" initiated and funded by the Ministry of Home Affairs, Govt. of India.
2003 – 2010	**Member Expert** of the Research Council of Regional Research Laboratory (now NEIST), Jorhat.
2009 – 2012	***Institute coordinator*** of the "*National Earthquake Risk Mitigation Programme*" (NERMP), an NDMA, and MHA endeavor.
2007 – 2009	**Chairman** of the Working Group of "Seismic Microzonation of Bangalore City" at IISc. Bangalore (on project mode from the Ministry of Earth Sciences, Govt. of India).
2008	**Member** of Director's contingent for MOU signing between IIT Kharagpur & University of Tokyo.
2008 – 2011	**Member** of the "National Steering Committee (NSC) for Seismic Microzonation of Selected Cities in India' Under the Ministry of Earth Sciences, Govt. of India vides Order No. MoES/P.O. (Seismo)/2(04)/2007 dated 27th March, 2008.
2010 – 2013	**Member** of the "Programme Advisor Committee (PAC) on Geoscience Programme" under the Ministry of Earth Sciences, Govt. of India vides Order No. MoES/P.O.(Seismo)/2(2)/2007 dated 15th April, 2010.
2011 – 2016	**Member Expert** of the "Advisory and Monitoring Committee on Seismic Microzonation of Study of the Delhi Region" IMD, MoES, Govt. of India vide Orver No. EREC-110/Delhi/Micro/Adv.Comm. dated 25th January, 2011.
2007- Continuing	**Member** of the School Management Committee of St. Agnes Higher Secondary School, Kharagpur in the capacity of an Educationist.
2005 – 2009	**Chairman**, Technology Staff Canteen Management Committee, IIT Kharagpur.
2009 – continuing	**Member**, Department Administrative Committee, IIT Kharagpur.
2009 – continuing	**Member**, Department Academic Committee, IIT Kharagpur.
2013 - continuing	**Chairman**, Technical Committee for preparation of RFP document for Seismic Microzonation under Earth System Science Organization, Ministry of Earth Sciences, Govt. of India (MoES/CS/EHRA/4/2013 dated 27th August, 2013)
2016	**Chairman,** MoES Special Committee to review "Earthquake Early Warning System deployed by IIT Roorkee in Central India" and other related issues vide MoES Notification No. MoES/P.O(Seismo)/1(144)/2012 dated 7th Dec., 2016.
2016	**Visitor's Nominee** of the Academic Council of Assam University (A Central University), Silchar for a period of three (03) years w.e.f., 16th Dec., 2016 in accordance with Statute 14(1)(xi) of the University.
2017	Member, Governing Council of Indian Institute of Geomagnetism, an Autonomous Body under DST, Govt. of India.

2017 **Chairman** of the Committee for technical evaluation of tender documents etc. under the project "Seismic Microzonation of 30 targeted Cities of the country" by NCS-MoES Vide No. MoES/P.O. (Seismo)/8(12)/2012(microzonation) SFS-CS/EHRA/3/2013-2016/3(B) dated 29th May, 2017 and 31st May, 2017.

2018 **Member**, Board of Studies in Geophysics of Berhampur University, Bhanja Bihar, Berhampur – 760006 vides No. 2894/Acd-I dated 28th April, 2018.

2018 **Chairma**n, CIL, Assam Central University, Silchar.

2018 **Chairman** of the Selection Committee for promotion under Career Advancement Scheme to the post of Professor (Stage – 4 to Stage – 5) in the Department of Geological Science, Jadavpur University (Ref. No.: F. Sc. /Geol. Sc./CAS/2/2018 Date: 03.08.2018.

2018 **Member** of the SSB Prize Advisory Committee for the year 2018 in the field of Earth, Atmosphere, Ocean &Planetary Sciences.

2018 **Member** of the Advisory Committee of the 16th Symposium on Earthquake Engineering (16SEE) to be held during Dec. 20-22, 2018 at IIT Roorkee.

2018 Selected as **Visitor's Nominee of IIT Kanpur** for the period 2018-2021 (Three years) vide MHRD order on Visitor's Nominee for IIT Kanpur; reference no. F. No. 3-5/2014-TS.l (Part) dated 14th August 2018.

2018 **Nominated Subject Expert** for selection of HAG Professors for the Department of Mining Engineering at National Institute of Technology (NIT) Rourkela.

2018 **National Expert** for CWPRS, Pune for Probabilistic Seismic Hazard and Risk Assessment of North-Northeast India on MOA.

2019 **DG-Nominated Member** of the ***Earth & Environmental Sciences and Sub-Committee of Earth Sciences Research Committee on Disaster Preparedness, of CSIR; (D.O. No. 50(CTE)/18-EMR-II Dated 28th December, 2018; Tenure:*** **Three (03) years with effect from 01 .01-2019 to 31-03-2022**.

2019 **Expert Member** of the ***Selection Committee*** for the appointment of Assistant Professor in the Department of Applied Geophysics at IIT(ISM) Dhanbad, the meeting being convened on 21st Feb., 2019 at IIT(ISM) Dhanbad.

2019 **Visitor's Nominee** for ***Rajiv Gandhi University (A Central University)*** at Rono Hills, Arunachal Pradesh for three years.

Visiting Scientist

October 2014 Almaty, Kazakhstan on invitation from UNESCO and its partner organizations, the U.S. Geological Survey (USGS), and the Helmholtz-Centre Potsdam - GFZ German Research Centre for Geosciences for participation and Keynote Address in the "***International Workshop for Regional Cooperation in Seismology and Earthquake Engineering in South and Central Asia***"

September 2013 Member Govt. Delegation on invitation from UNESCO, USGS and NSET, at Kathmandu, Nepal

December 2005 AGU Fall Meeting, San Francisco, USA.

September 2003 Government of India Delegation to Moscow, Russia under ILTP of Cooperation in Science and Technology with IPE, Moscow.

October 2000	Third Meeting of Asian Seismological Commission & Symposium on "*Seismology, Earthquake Hazard Assessment and Earth's Interior related topics*" at Institute of Geophysics, University of Tehran, Iran.
1995-1996	Geophysical Institute, University of Alaska Fairbanks, USA.
April 1996	University of Texas at Austin, USA.
July 1988	Seismograph Services Inc. and other Seismic Data Acquisition & Processing Companies in USA.
March 1988	GSI, Texas Instruments etc., Singapore.

Honors, Awards & Laurels

- **1999: "National Mineral Award"** by the Government of India, Ministry of Mines and Steel under the National Mineral Award Scheme for significant and outstanding contributions in **Geophysics**.
- **2002: "Shanti Swarup Bhatnagar Prize** for Science & Technology**" in** *Earth, Atmosphere, Ocean and Planetary Sciences* by the Council of Scientific & Industrial Research (CSIR), Govt. of India for outstanding contributions to 'Geotomography and its innovative applications'.
- **2003:** "**Fellow**" of the **National Academy of Sciences**, India (**NASI**), (**FNASc**).
- **2004:** "**UGC National Hari Om Ashram Trust Award: Homi J. Bhabha Award for Applied Sciences**" by the University Grants Commission, Govt. of India for outstanding contributions in 'Developing techniques of geophysical exploration and in the strategies towards better mitigation of disaster in mines as well as earthquake hazards.
- **2004:** "**SGAT Award of Excellence**" by **the Society of Geoscientists and Allied Technologists** for eminent and outstanding contribution in Tomography, Earthquake Seismology and Hydro-Physics.
- **2005: Dr. J. Coggin Brown Memorial (Gold) Medal for 'Geological Sciences'** by the Mining, Geological & Metallurgical Institute of India.
- **2006: D. N. Thakur Award *for*** outstanding contributions in '**Earth Sciences**' by the Mining, Geological & Metallurgical Institute of India.
- **2007:** "**Fellow**" **of the Indian National Academy of Engineering (INAE), (FNAE)**.
- **2009:** "**A. S. Arya – IIT Roorkee Disaster Prevention Award**" **for the year** for outstanding contributions in the field of 'Disaster Prevention/Mitigation'.
- **2014**: "**Fellow" of the Indian Geophysical Union (IGU),** (**FIGU**).
- **2015**: **"Decennial Award" by the Indian Geophysical Union (IGU)** for outstanding contributions in Geosciences by a Senior Geophysicist who has formed a school in Earth Sciences.
- **2016**: **"Fellow" of the West Bengal Academy of Science & Technology (FWAST).**
- **2017: "Bharat Ratna Indira Gandhi Gold Medal Award" by Global Economic Progress & Research Association (GEPRA).**
- **2020: "Lifetime Achievement Award" by VDGOOD Professional Association of Scientists, Engineers and Doctors, Tamil Nadu Chapter, awarded** at the ***6th International Scientist Awards on Engineering, Science and Medicine*** on June 20-21, 2020 at Chennai.

- **2020: "Distinguished Scientist Award" by Southern India Professional Council of Science & Technology, awarded** at the ***7th International Scientist Awards on Engineering, Science, and Medicine*** awarded on 04 & 05-July-2020 at Coimbatore, India**.**
- **2020: "Outstanding Scientist Award" in KISA-2020 by** the **11th International Scientist Awards on Engineering, Science, and Medicine** which is going to be held on **17 & 18-October-2020** in **Kolkata.**
- **During Graduation & Post-Graduation**
- **1980-81 :** "**The Commonwealth Geophysical Scholarship**" Sponsored by Shell Canada, Alberta, Canada during the 1980-81 Academic Session of the Master Degree Programme for best performance in the pre-final year of 5-year Integrated Exploration Geophysics.
- **1981: Best Thesis and General Proficiency Awards** for Master's in Exploration Geophysics.
- **1981:** Institute Silver Medal for First Rank in the Masters' course at IIT Kharagpur.
- **1979:** Institute Silver Medal for First Rank in the Bachelors' course at IIT Kharagpur

Distinctions

- **2020**: **Associate Editor,** Springer Journal: "Natural Hazards"
- **2019**: **Chief Guest** at the ***Science Festival*** **SCIENTIA_3.0** celebrated by ***Assam University, Silchar (AUS), a Central University*** on 19th September, 2019. Delivered the ***Key-Note Address*** titled "**Science &Technology for a Better World**".
- **2019**: **Visitor's Nominee** of ***Rajiv Gandhi University (A Central University)*** at Rono Hills, Arunachal Pradesh for three years.
- **2019**: **DG-Nominated Member** of the ***Earth & Environmental Sciences and Sub-Committee of Earth Sciences Research Committee on Disaster Preparedness, of CSIR; (D.O. No. 50(CTE)/18-EMR-II Dated 28th December, 2018***; Tenure: Three (03) years with effect from 01 .01-2019 to 31-03-2022.
- **2019: Expert Member of the Selection Committee** for the appointment of Assistant Professors in the Department of Applied Geophysics at IIT(ISM) Dhanbad, the meeting being convened on 21st Feb., 2019 at IIT(ISM) Dhanbad.
- **2018**: **Nominated Subject Expert** for selection of HAG Professors for the Department of Mining Engineering at National Institute of Technology (NIT) Rourkela.
- **2018**: National Expert for CWPRS, Pune for Probabilistic Seismic Hazard Assessment of North-Northeastern India on MOA between CWPRS, Pune and IIR Kharagpur.
- **2018**: Selected as **Visitor's Nominee** of IIT Kanpur for the period 2018-2021 (Three years) vide MHRD order on Visitor's Nominee for IIT Kanpur; reference no. F. No. 3-5/2014-TS.l (Part) dated 14th August 2018.
- **2018**: **Member** of the Advisory Committee of the 16th Symposium on Earthquake Engineering (16SEE) to be held during Dec. 20-22, 2018 at IIT Roorkee.
- **2018**: **Keynote Address 16SEE** on "Seismic Hazard, Vulnerability and Risk - Â viable Proxy to ascertain Holistic Damage Potential of an Earthquake-prone Terrain like the Megacity of Kolkata and the Hilly terrain of Darjeeling-Sikkim Himalaya, India" at the 16th Symposium on Earthquake Engineering held during Dec. 20-22, 2018 at IIT Roorkee.
- **2018**: **Chairman**, Purchase Committee of Central Instrumentation Laboratory (CIL), Assam Central University, Silchar.

- **2018: Chairman** of the Selection Committee for promotion under Career Advancement Scheme to the post of Professor (Stage – 4 to Stage – 5) in the Department of Geological Science, Jadavpur University (Ref. No.: F. Sc. /Geol. Sc./CAS/2/2018, dated 03.08.2018.
- **2018**: **Member** of the SSB Prize Advisory Committee for the year 2018 in the field of Earth, Atmosphere, Ocean &Planetary Sciences.
- **2018**: **Member**, Board of Studies in Geophysics of Berhampur University, Bhanja Bihar, Berhampur – 760006 vides No. 2894/Acd-I dated 28th April, 2018.
- **2017**: **Chairman** of the Committee for technical evaluation of tender documents etc. under the project "Seismic Microzonation of 30 targeted Cities of the country" by NCS-MoES Vide No. MoES/P.O. (Seismo)/8(12)/2012(microzonation) SFS-CS/EHRA/3/2013-2016/3(B) dated 29th May, 2017 and 31st May, 2017
- **2017**: **Member**, **Governing Council of *Indian Institute of Geomagnetism***, an Autonomous Body under Department of Science & Technology, Govt. of India for three years, 2017-2020.
- **2016**: **Visitor's Nominee** of the ***Academic Council of Assam University (A Central University), Silchar*** for a period of three (03) years w.e.f., 16th Dec., 2016 in accordance with Statute 14(1)(xi) of the University.
- **2015**: **Member** Organizing Committee of the ***World Summit on Petroliferous Basins-2015***, December 07 - 09, 2015 Philadelphia, USA.
- **2015**: IGU Decennial Award Lecture at 52nd Annual Convention of IGU at NCAOR, Goa during Nov. 3-5, 2015.
- **2015**: **Key Note Address** at **Bharat Chamber of Commerce** at the interactive session on "***Earthquakes in the Sub-Himalayan Region and West Bengal: Future Perspectives***" on 5th June, 2015 at Hotel Hindustan International, Kolkata.
- **2015**: **Moderator** and **Invited Talk** at **MCC Chamber of Commerce & Industry** on 14th July, 2015 at The Park, Kolkata on "***Saving the Earthquake Prone Cities in India***".
- **2014**: **Member**, Indian Delegate on invitation from UNESCO and its partner organizations, the U.S. Geological Survey (USGS), and the Helmholtz-Centre Potsdam - GFZ German Research Centre for Geosciences for participation and Keynote Address in the "***International Workshop for Regional Cooperation in Seismology and Earthquake Engineering in South and Central Asia"*** held in Almaty, Kazakhstan, from 27 to 30 October 2014.
- **2014: Invited for Key Note Address** at the National Workshop on the "Status of Natural Hazards in Himachal Pradesh" held from 6 - 8 November, 2014 in the Department of Environmental Science, SOEES, Central University of Himachal Pradesh under the aegis of the Ministry of Earth Sciences, Govt. of India.
- **2014**: **Mentor** at the **DST - INSPIRE Internship Camp** at NIT Sikkim during 10 - 14th December, 2014.
- **2014**: On the Occasion of the Diamond Jubilee Celebration of the Department of Atomic Energy, delivered a Key Note Address and VECC Colloquium at the Variable Energy Cyclotron Centre, Kolkata on 24th Nov., 2014 on the topic titled "*Natural Disasters in India with emphasis on Earthquake Genesis & its impending Hazard, Vulnerability and Risk showcasing an integrated scenario for the city of Kolkata*"
- **2013**: **Member**, Indian Delegate on invitation from UNESCO, USGS and NSET, Nepal for participation and Keynote Address in the "***International Workshop for Regional Cooperation in Seismology and Earthquake Engineering in South and Central Asia"*** held at Club Himalaya,

Nagarkot, Kathmandu, Nepal during 15-20, Sept., 2013 hosted by the National Society for Earthquake Technology of Nepal.

- **2013: Member** of the Editorial Board of ***International Journal of Earthquake Engineering and Hazard Mitigation (IREHM)*** (PRAISE WORTHY PRIZE s.r.l. PUBLISHING HOUSE, Naples, Italy).
- **2013: Advisory Member** of the Editorial Board of ISET Journal of Earthquake Technology (ISET-JET).
- **2013**: NPDRR Memento for an Invited Talk on "**Seismic Microzonation towards Earthquake Disaster Mitigation**" at the *Thematic Session: 'Making our Cities Safe'* at the ***First Session of National Platform for Disaster Risk Reduction (NPDRR)*** organized by the Ministry of Home Affairs, Govt. of India during May 13-14, 2013 at Vigyan Bhawan, New Delhi.
- **2013:** Biographical Profile included in the **Marquis Who's who in the World** in the ***30th Pearl Anniversary Edition***.
- **2013**: Delivered an **Invited Talk** on "**Seismic Hazard, Vulnerability & Risk Assessment of Darjeeling-Sikkim Himalaya**" at the ***INDO-TAIWAN Workshop*** on "*Earthquake Early Warning System"* during Jan 16-17, 2013 at Prithvi Bhawan, MOES, New Delhi.
- **2012**: Delivered **Key Note Address** on the Theme "**Seismic Vulnerability of the City of Kolkata**" at a Half a Day Seminar organized by the Government of West Bengal, Department of Disaster Management at the Stadel Hotel, Salt Lake City, Kolkata.
- **2011:** Delivered **Key Note Address** on "**Current Scenario of Seismic Microzonation in India**" at the National Workshop on "***Current Scenario of Seismic Microzonation in India****" and the Release Ceremony of Seismic Microzonation Manual & Handbook by the Hon'ble Union Minister of Science & Technology and Earth Science Shri Vilasrao Deshmukh* organized by the Ministry of Earth Sciences, Govt. of India, New Delhi at CSIR Auditorium, Anusandhan Bhawan, Rafi Marg, New Delhi.
- **2011**: Delivered **Key Note Address** on the "**Seismicity in Sikkim Himalaya: Current Scenario**" the Workshop on "***Seismicity in Sikkim Himalaya: Current Scenario"*** *and the Inaugural Function of the Earthquake Monitoring Station at Sikkim Science Center, Marchak, Gangtok,* organized by Sikkim State Council of Science & Technology and the Ministry of Earth Sciences, Govt. of India.
- **2011**: Delivered two **Invited Talks** on "**Probabilistic Seismic Hazard of West Bengal, India**" and "**Site Condition Modeling and First Order Seismic Hazard & Risk Microzonation of Kolkata, India**" at the ***Indo-Norwegian Workshop on Geohazards*** organized by the Ministry of Earth Sciences, Govt. of India, New Delhi.
- **2011**: Delivered an **Invited Talk** on "**Status of Seismic Microzonation Studies in the North East India"** at the two-day *National Workshop on Earthquake Risk Mitigation Strategy in the North East* at Administrative Staff College, Guwahati organized by NDMA, NIDM, Ministry of Home Affairs, Govt. of India.
- **2010**: Delivered the **Keynote Address** on "**Seismic Hazard in Northeast India with special emphasis to the Seismic Microzonation of Arunachal Pradesh**" at the workshop on "Microzonation of Landslide and Earthquake Hazards in Arunachal Pradesh convened on 29th January, 2010 at State Remote Sensing Application Center, Dept. of IT and Science & Technology, Govt. of Arunachal Pradesh.

- **2008:** Delivered an **Invited Lecture** on "***Earthquake Hazard in the Northeast India – A Computer intensive Seismic Microzonation Approach with Typical Case Studies from Sikkim Himalaya and Guwahati city"*** under the aegis of INAE Kolkata Chapter on Feb 12, 2008 at Indian Statistical Institute, Kolkata.
- **2007**: Delivered an **Invited Talk** on ***"Seismic Microzonation Framework – Principles & Applications"*** at the **Microzonation Workshop** at Indian Institute of Science, Bangalore during June 26-27, 2007. ***Also Chaired Technical Session VI*** – "***Summing up, Discussion and Recommendations***".
- **2007**: Delivered an **Invited Talk** on "***Seismic Microzonation Framework – Principles & Case Studies***" at the **National Workshop on Science and Technology in Disaster Management (Earthquake, Land Slide & Tsunami)** 02-03 April, 2007 organized by **National Disaster Management Authority, Govt. of India** at Centaur Hotel, New Delhi.
- **2004:** Delivered an I**nvited Talk** on "***Site Specific Earthquake Hazard in Urban North-Eastern India***" at the **National Workshop** on "**Science & Technology for Regional Development**" jointly organized by Tezpur University, IIT Guwahati and CMMACS Bangalore at IIT Guwahati on 3-6 Feb. 2004.
- **2001:** Delivered an **Invited Talk** on "***Seismic Microzonation Assessment with special emphasis to site response***" at the **Indo-Italian Workshop on Seismic Risk Evaluation** at NGRI, Hyderabad during March 6-9, 2001.
- **2000:** Delivered an **Invited Talk** on "Site Response Analyses" at Asia Seismological Meeting held at Tehran University, Iran.
- **1999**: Delivered a Special Lecture on "***Site response and microzonation studies from earthquake seismology***" at the DST sponsored short-term course and workshop on "**Paleoseismicity & Active Tectonics in NE India**" at Manipur University, Imphal, during Nov.15-20, 1999.
- **1996:** Delivered two **Invited Lectures** on "***Seismic Microzonation***" and "***FEM Simulation of Seismic Responses***" at the Institute for Geophysics, The University of Texas at Austin, USA, during April 04-07, 1996.
- **Associate Editor,** Springer Journal: "Natural Hazards", 2020-2023.
- **Peer Reviewer** of the following Journals:
    1. Geophysical Journal International
    2. Seismological Research Letters
    3. PAGEOPH
    4. Journal of Earth System Science
    5. Journal of Seismology
    6. International Journal of Earth Sciences
    7. Natural Hazards and Earth System Sciences
    8. Natural Hazards
    9. Environmental Earth Sciences
    10. International Journal of Earthquake Engineering, and Hazard Mitigation
    11. British Journal of Applied Science & Technology
    12. Journal of the Geological Society of India
    13. Current Science
    14. Bulletin of the Seismological Society of America

15. Journal of Asian Earth Sciences
16. Environmental Geology
17. Engineering Geology
18. Nature Geoscience
19. Science
20. JGR (Solid Earth)
21. Geophysics

Academy Fellowship

- Fellow, Indian National Academy of Engineering (FNAE).
- Fellow, National Academy of Sciences, India (FNASc).
- Fellow, West Bengal Academy of Science & Technology (FWAST).
- Fellow, Indian Geophysical Union (FIGU).

Membership of Academic / Professional Bodies

- Member (No. 10283967): American Geophysical Union (AGU).
- Member (No. 16472): The Seismological Society of America (SSA).
- Member, SEG.
- Member EAGE.
- Complimentary Member: European Geosciences Union (EGU).
- Member Governing Council, IIG.
- Member Academic Council, Assam Central University.
- Life Member (L/141): The Indian Society of Theoretical and Applied Mechanics (ISTAM).
- Life Fellow (No.236): The Geological, Mining and Metallurgical Society of India (FGMMSI).
- Life Fellow: The Society of Geoscientists and Allied Technologists (FSGAT).
- Life Member Registration No. 8810-LM: The Mining Geological & Metallurgical Institute of India (MGMI).
- External Expert of RAC, DRDO with Registration No. EXPERT2016_591 - RAC/DRDO
- Member Vigyan Bharati and Bharat Vikas Parisad.

Professional Services as Member of Important Committees

- **Associate Editor,** Springer Journal: "Natural Hazards", 2020-2023.
- **Member** of the CSIR Young Scientist Award-2020 Advisory Committee for the year 2020 in the field of Earth, Atmosphere, Ocean &Planetary Sciences.
- **Chief Guest** at the Science Festival SCIENTIA_3.0 celebrated by Assam University, Silchar (AUS), a Central University on 19th September, 2019. Delivered the Key-Note Address titled "Science &Technology for a Better World".
- **Visitor's Nominee** of Rajiv ***Gandhi University (A Central University)*** at Rono Hills, Arunachal Pradesh for three years 2019-2022.
- **Expert Member** of the ***Selection Committee*** for the appointment of Assistant Professor in the Department of Applied Geophysics at IIT(ISM) Dhanbad, the meeting being convened on 21st Feb., 2019 at IIT(ISM) Dhanbad.

- **DG-Nominated Member** of the ***Earth & Environmental Sciences and Sub-Committee of Earth Sciences Research Committee on Disaster Preparedness, of CSIR; (D.O. No. 50(CTE)/18-EMR-II Dated 28th December, 2018)***; Tenure: Three (03) years with effect from 01.01-2019 to 31-03-2022.
- **Nominated Subject Expert** for selection of HAG Professors for the Department of Mining Engineering at National Institute of Technology (NIT) Rourkela.
- **National Expert** for CWPRS, Pune for Probabilistic Seismic Hazard Assessment of North-Northeastern India on MOA between CWPRS, Pune and IIT Kharagpur.
- Selected as **Visitor's Nominee** of IIT Kanpur for the period 2018-2021 (Three years) vide MHRD order on Visitor's Nominee for IIT Kanpur; reference no. F. No. 3-5/2014-TS.l (Part) dated 14th August 2018.
- **Member** of the Advisory Committee of the 16th Symposium on Earthquake Engineering (16SEE) to be held during Dec. 20-22, 2018 at IIT Roorkee.
- **Chairman**, CIL, Assam Central University, Silchar (2016-2020).
- **Chairman** of the Selection Committee for promotion under Career Advancement Scheme to the post of Professor (Stage – 4 to Stage – 5) in the Department of Geological Science, Jadavpur University (Ref. No.: F. Sc. /Geol. Sc./CAS/2/2018, dated 03.08.2018.
- **Member** of the SSB Prize Advisory Committee for the year 2018 in the field of Earth, Atmosphere, Ocean &Planetary Sciences.
- **Member**, Board of Studies in Geophysics of Berhampur University, Bhanja Bihar, and Berhampur – 760006 vides No. 2894/Acd-I dated 28th April, 2018.
- **Chairman** of the Committee for technical evaluation of tender documents etc. under the project "Seismic Microzonation of 30 targeted Cities of the country" by NCS-MoES Vide No. MoES/P.O. (Seismo)/8(12)/2012(microzonation) SFS-CS/EHRA/3/2013-2016/3(B) dated 29th May, 2017 and 31st May, 2017
- **Member**, Governing Council of Indian Institute of Geomagnetism, an Autonomous Body under Department of Science & Technology, Govt. of India, 2017-2020.
- **Member**, ***Board of Studies in Geophysics*** of **Berhampur University** for the academic Session 2017-18 vide Office Order No. 4849/Acd-I dated 2nd July, 2018 in pursuance to Statute 90 of Orissa Universities
- Nominated **Expert** for the CWC sponsored study on "**Seismic Hazard Analysis of North and North –East India**" as per clauses of MoU between CWC and CWPRS (June2018-June2020).
- Subject Expert to the Selection Committee constituted for assessing the eligibility of candidates for recruitment to the Posts of Assistant Professor, Associate Professor and Professor in the Department of Marine Geology & Geophysics of Cochin University of Science and Technology, Kerala, April11-13, 2018.
- **Special Invitee** and resource person as a part of the India-Japan Joint Bilateral delegation on Disaster Risk Reduction under the banner of Ministry of Home Affairs, National Disaster Management Authority, 2018.
- **Member**, Selection Committee for filling up the post of Assistant Professors at the Department of Applied Geophysics in IIT (ISM) Dhanbad on 14th July 2017.
- **Member**, Selection Committee for filling up the post of Scientist 'F' in the Ministry of Earth Sciences, Govt. of India vide: MoES/18/03/2016-Estt. Dated 11th April, 2017.
- **Special Invitee** at the MoES PAMC 3rd Meeting at NEHU, Shillong during May 24-26, 2017.
- **Member** of the Selection Committee for the recruitment of Faculty in Geology & Geophysics at IIT Bhubaneswar, 2017.

- **Visitor's Nominated Member** of the ***Academic Council of Assam University (A Central University)***, Silchar for a period of three (03) years w.e.f., 16th Dec., 2016 in accordance with Statute 14(1)(xi) of the University.
- **Mentor** at the **DST – INSPIRE Science Camp** at National Institute of Sc. & Tech, Berhampur, Orissa during 25 - 29th October, 2016.
- **Member**, Brain Storming Meeting on DST sponsored "**Interdisciplinary Cyber Physical Systems (ICPS)**" to be held on 27-28 Sept., 2016 at IIT BHU, Varanasi.
- **Chairman** of the Sectional Scrutiny Committee for Section IV for '**National Geoscience Awards - 2014**', Ministry of Mines, Govt. of India.
- **Member** of ***CSIR Award Advisory Committee for Shanti Swarup Bhatnagar Prize in Science & Technology 2015 in Earth, Atmosphere, Ocean & Planetary Sciences*** (2015).
- **Mentor** at the **DST - INSPIRE Internship Camp** at NIT Sikkim during 10 - 14th December, 2014.
- **Chairman**, ***Technical Committee*** for preparation of RFP document for Seismic Microzonation under Earth System Science Organization, Ministry of Earth Sciences, Govt. of India (MoES/CS/EHRA/4/2013 dated 27th August, 2013)
- **Member** of ***CSIR Award Advisory Committee for Shanti Swarup Bhatnagar Prize in Science & Technology 2013 in Earth, Atmosphere, Ocean & Planetary Sciences*** (2013).
- **Member** of ***CSIR Award Advisory Committee for Young Scientist Award in Earth, Atmosphere, Ocean & Planetary Sciences***, (2013).
- **Chief Guest** of the 64th Republic Day Celebration at St. Agnes Higher Secondary School, Kharagpur on 26th January, 2013.
- **Judge** of the National Level Debate Competition sponsored by KVIC at Spring Fest-2013 at IIT Kharagpur on 24th January, 2013.
- **Member Expert** at the Joint Meeting of Programme Advisory Committee (PAC on Geosciences Programme and Program Management Board (PMB) on NPEP of the Ministry of Earth Sciences at NGRI, Hyderabad on 22nd January, 2013.
- **Judge** of the Interhall debate competitions at IIT Kharagpur (over 10 years from 2003).
- **Member** of ***CSIR Award Advisory Committee for Young Scientist Award in Earth, Atmosphere, Ocean & Planetary Sciences***, (2012).
- **Member Expert** of the *Technical* Committee for setting up of Seismological Network in Bihar under **Bihar State Disaster Management Authority (BSDMA)**, (2011-14).
- **Member** of ***CSIR Award Advisory Committee for Young Scientist Award in Earth, Atmosphere, Ocean & Planetary Sciences***, (2011).
- ***Institute Coordinator****-cum-Principal Investigator and Nodal Coordinator* of the multi organizational MoES sponsored Project titled "Seismic Hazard Assessment, Microzonation, and Evaluation of Vulnerability & Risk of the Urban Kolkata"(2011-2015).
- **Member Exper**t of the Research Council of Regional Research Laboratory (now NEIST), Jorhat (2003-2010).
- **Member** of the School Management Committee of St. Agnes Higher Secondary School, Kharagpur in the capacity of an Educationist (2007- Continuing).
- **Senate Nominated Member** of a 'Three-member Institute Fist Monitoring Committee' of the Institute (2007-2010).

- **Member**, Department Administrative Committee (2009-Continuing).
- **Member**, Department Academic Committee (2009 – Continuing).
- **Member**, Department Purchase Committee (2006-2009).
- **Chairman** of Department Space Allocation Committee (2009- continuing).
- **Member Exper**t as Council Nominee for evaluating M.Tech Computational Seismology interim reports (2008) at Tezpur University.
- UGC Eastern Region **Member Expert** for College Teachers Minor Research Project evaluation (2008).
- **Executive Council Membe**r for faculty selection in Geological Sciences at Jadavpur University (2008).
- **Member** of ***CSIR Award Advisory Committee for Shanti Swarup Bhatnagar Prize in Earth, Atmosphere, Ocean & Planetary Sciences***, (2008).
- **Member** of ***CSIR Award Advisory Committee for Young Scientist Award in Earth, Atmosphere, Ocean & Planetary Sciences***, (2008).
- **Member** of Director's contingent for MOU signing between IIT Kharagpur & University of Tokyo (2008).
- **Expert Member** for **Faculty Selection Committee for the Department of Earth Sciences**, **IIT Roorkee** (2008).
- **Member Expert** of the **National Steering Committee (NSC)** for Seismic Microzonation of selected cities in India (MoES/P.O.(Seismo)/2(04)/2007 dated 27th March, 2008.
- **Member Expert** of the **Programme Advisory Committee** for the *Nationally Coordinatted Programme on Seismicity* under ***the Ministry of Earth Sciences, Govt. of India***. (Vide: MoES/P.O.(Seismo)/2(02)/2007 dated 7th January, 2008).
- **Chairman** of the Working Group of "Seismic Microzonation of Bangalore City" (2007-2009) at IISc. Bangalore.
- **Member Exper**t, **National Mineral Award Scrutiny Committee** (2007).
- **Executive Membe**r, **National Committee** on "***Microzonation of Indian Cities***" under **Earthquake Risk Evaluation Centre (EREC)** at India Meteorological Department under the auspices of the Department of Science and Technology, Govt. of India (2007-2010).
- **Member Expert** of the **Advisory Committee** of the ***National Disaster Management Authority (NDMA), Government of India*** as AICTE Chairman's Nominee (2004-2007).
- **Member** of ***CSIR Award Advisory Committee for Shanti Swarup Bhatnagar Prize in Earth, Atmosphere, Ocean & Planetary Sciences*** (2006).
- **Member** of DST Expert Committee on "***Seismic Microzonation of Guwahati City***" (2002-2007).
- **Member** DST PAMC (2002-2007).
- **Member** of ***CSIR Award Advisory Committee for Young Scientist Award in Earth, Atmosphere, Ocean & Planetary Sciences*** (2003).
- **Member** of the Government Delegation to Moscow, Russia under ILTP of Cooperation in Science and Technology with IPE, Moscow (2003).

Teaching

- Mathematical Methods in Seismology (UG)
- Physics of Earthquakes (UG)
- Computational Seismology (PG)
- Engineering Seismology (UG)
- Seismic Methods of Prospecting (UG)
- Geophysical Signal Processing (UG)
- Advanced Geophysical Prospecting (UG)
- Computational Geophysics (PG)
- Geophysical Tomography (UG)
- Sequence & Seismic Stratigraphy (UG)
- Hydrocarbon Exploration (PG)
- Field Geophysics (Seismic) (UG)

Research

Ph.D., M.S., M.Tech. and M.Sc. Dissertations Guided:

- Ph.D. : Completed 14, In Progress: 08
- M.S. (by Research): Completed: 02
- M.Tech.: 35
- M.Sc., B.Tech. : 170+

Ph.D. Theses Supervised till date:

- "***Some Studies on Numerical Modeling in Cross-hole SeismicTomography***" by Shri S. K. Singh (Institute GATE Fellow), **1997**.
- "***Ground Water Potential Modeling in a Soft Rock Area using GIS based integrated Geophysical Approach***" by Shri S. Shahid (Indo-Bangla Bilateral Exchange Program Foreign Fellow from Rajshahi University), **2001**.
- "***Some studies on seismic transmission tomography and electrical resistivity tomography and their applications in the detection of mining hazards***" by Shri S. Chakraborty (Institute GATE Fellow), **2001**.
- "***Some Site Response Studies and Seismic Hazard Assessment with Special Emphasis to GIS-based Microzonation of Sikkim Himalaya***" by Shri P. Sengupta (Institute Technical Staff), **2005**.
- "***Seismic Hazard Assessment with Special Emphasis to the Microzonation of Talchir, Haldia and Kolkata, India***" by Shri M. Yanger Walling (Institute Fellow), **2008**.
- "***Seismotectonic and Earthquake Hazard Assessment in parts of East and North-East India***" by Shri I. Pal (MoES Project Fellow), **2009** at Vidyasagar University.
- "***Seismicity & Seismotectonism in Northeast India***", B. K. Bansal (MoES), **2010** Osmania University.

- ***"Synoptic Modeling for Probabilistic Seismic Hazard Analyses of India***" by Shri K. K. S. Thingbaijam (MoES Project Fellow, Roll No. 07GG9703), **2011.**
- ***"Probabilistic Seismic Hazard of West Bengal Vis a vis a First Level Integrated Hazard Scenario of Kolkata"*** by Shri Soumya Kanti Maiti (MoES Project Fellow), **2016**.
- ***"A Probabilistic and Geotechnical Approach to estimate Seismic Hazard Potential of Kashmir Basin with emphasis to Seismic Microzonation of Srinagar City"*** by Hamid Sana (CSIR, NET Fellow), **2016**.
- ***"Seismic Hazard, Vulnerability and Risk of the city of Kolkata at the backdrop of Regional Earthquake Risk of the Indian Subcontinent"*** by Shri N. Devaraj (MoES Project Fellow), **2016.**
- ***"Kernel-Based Numerical Methods for Spatial Interpolation and Meshless Modeling of Wave Propagation Problems" by*** Shri Pankaj K. Mishra (Institute Joint MSc-PhD Program Fellow), **2018**.
- ***"Seismic Hazard, Vulnerability, and Risk Assessment of Darjeeling-Sikkim Himalaya"*** by Shri Manik Das Adhikari (MoES Project Fellow), **2018.**
- ***"Site Characterization vis-à-vis Surface Consistent Seismic Hazard Microzonation for the City of Kolkata, India"*** by Ms. Nishtha Srivastava (MoES Project Fellow), **2018**.

M.S. Dissertations:

- *"**Earthquake Vulnerability and Damage Scenario vis-à-vis Seismic Risk of Darjeeling-Sikkim Himalaya**" by* Ms. Chitralekha Ghatak (MoES Project Fellow), **2015**.
- *"**GIS based Landslide Susceptibility Mapping in Darjeeling-Sikkim Himalaya with a view to Understanding Slope Failure Mechanism under both Static & Dynamic Loading"*** by Arnab Sengupta (Roll No: 16GG71P01, MoES Project Fellow), **2018**.

M. Tech. Dissertations guided 35: 20 best given below

1. *"**Seismic Hazard Scenario of the Sikkim Himalaya and Guwahati City by 3D Spectral Finite Element Simulation**" by Sumit Dandapat* (**Roll No. 09CL6010**), 2011.
2. **"Study of the influence of source and epicentral distance on local site response in Kolkata metropolitan city by 2D modeling",** by **Mr. Akhilesh Kumar Verma (Roll No. 08GG6201), 2010**
3. **"Strong Ground Motion Synthesis in the Perspective of Site Effect Study"** by **Jagdish Chandra Vyas**, (**Roll No. 08GG6202), 2010**
4. **"Deterministic Seismic Hazard Scenario in India & Adjoining Regions and a Probabilistic Pilot Study in Gujarat, Western India"** by **Sanjay Singh Bora, (Roll No. 08GG6203)**, 2010.
5. **"Seismic Hazard Assessment in Koyna-Warna Region in both the Deterministic and Probabilistic Framework"** by **Yudhvir Singh**, **(Roll No. 08GG6208**), 2010.
6. **"Seismicity Analysis – Case studies from Northwest frontier province of Indian-Eurasian Plate Convergences, and Andaman-Nicobar Subduction Zone***" by* Chingtham Prasanta Singh (Roll No. 07GG6209), 2009

7. "**Site Characterization for Seismic Response of Soil in Lower Brahmaputra Basin Area of Guwahati City"** by **Naresh Sahai** (Roll No. 07GG6204), 2009.

8. "**Prediction and Modeling of the San Francisco Bay Area transients using Interferometric Synthetic Aperture Radar**" by **Sreeja Nag**, 2009.

9. "**Deterministic Seismic Hazard Assessment through Strong Ground Motion Simulation - a Stochastic and Regional attenuation approach**" by **Shri Arbind Kumar (Roll No. 06GG6201)**, 2008.

10. "**Seismotectonism of Northern and Peninsular India – Seismicity and Tectonic Fractal Analysis**" by **Shri Mude Gobre Naik**, Roll No. 06GG6204, 2008.

11. "**Source and Site Characterization in the Seismo-tectonic Northeast Indian Regime pertaining to Guwahati Megacity**" by **Miss Jyoti Sharma**, (Roll No. 06GG6206), 2007

12. "**Lithospheric Structure of the Bay of Bengal using Aftershocks of the Andaman-Sumatra Earthquake"** by **Kishore Kumar Dhali, (Roll No. 05GG6201),** 2007.

13. **"Foundation of an Expert System for Seismic Hazard and Risk Assessment - Seismicity Analysis and Assessment of Maximum Earthquakes"** by **Thingbaijam Kiran Kumar Singh, (Roll No. 05GG6207), 2007.**

14. **"Fractal and Chaotic Dynamic Study of Earthquakes in Indonesia-Sumatra Region"** by **Nitesh Bhadauria, (Roll No. 05GG6202**), 2007.

15. "**Crustal Structure beneath the Bay of Bengal from Surface Wave Dispersion Studies"** by **Angeleena Thomas, (Roll No. 04GG6002),** 2006.

16. "**An integrated Approach to evaluate the Basinal Characteristic of Mahanadi Basin-its Tectonic and Geo-hazard Regime**" by **Ajesh John K., (**Roll No. **04GG6001),** 2006.

17. "**Attenuation Model for the Sikkim and Garhwal Himalaya from Near Field Seismometry**" by Sudeshna Mukherjee, **(Roll No. 03GG6001),** 2005.

18. **"Seismic Microzonation of Delhi using Geographic Information Syatem"** by M. Yanger Walling, 2005.

19. **"Resistivity Soundings in and around Murshidabad and Berhampore of West Bengal and Arsenic Contamination in Ground Water: A Scrutiny**" by Mainaik Ghosh Roy **(Roll No. 02GG6003),** 2004.

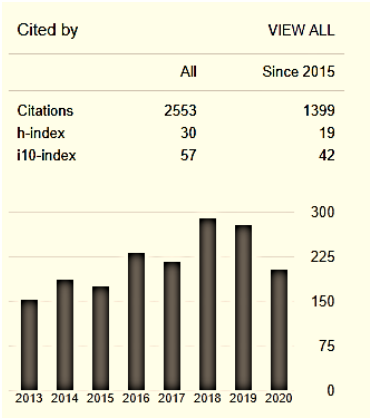
20. "**Evaluation of Hydrogeological setting and Ground Water Potential from Resistivity Survey along the Coastal Stretch of Digha, West Bengal**" by **Shyamsundar Hembrom,** Roll No. **01GG6006**, 2003.

Publications:

- SCI rated refereed Journals, Conference Proceedings etc.: ~**256**
- Books/Atlas/Monographs/Manual: **13**
- *Total Citations* ~ **2650** (Source: Combined Google Scholar+ Scopus+ ISI Web of Science)

- h-index: **37**
- i10-index: **95**
- g-index: **74**

Google Scholar+ Citations only



Sponsored Research:

- Total no. of Projects executed/ongoing: **28** Total Grant handled ~ **Rs. 30.00 Crores**

Collaborations:

- Seismologists from the Geophysical Institute, UAF & USC, USA during the tenure as a Visiting Scientist.
- Microzonation of Rhine graben with a French Summer intern from Ecole de Physique du Globe, The Universite' Louis Pasteur, Strasbourg, France.
- Long-term seismological research collaboration with the Bullard Laboratories, University of Cambridge, UK through a memorandum of understanding between Cambridge University and IIT Kharagpur during 2003-2008.
- NORSAR, Norway.

Research & Consultancy Grant

- *Principal Investigator* of the MoES Project titled ***"Strong Motion Seismometry in Darjeeling-Sikkim Himalaya: Comprehensive Maintenance for round-the-clock Seismic Monitoring by the 10 station DSSMA and enriching Ground Motion Database for relooking into Seismic Source, Site and Path Characteristics from Hazard Perspectives for a Conservative Damage and Loss Estimate in SELENA and HAZUS Environment"*** **MoES/P.O.(Seismo)/1(313)/2017 , Dt. 11-09-2018 (34.405 Lacs), 36 months [SM10].**

- *Principal Consultant* of the CWPRS Project "***Seismic Hazard Assessment of North and North East India (SHAI)***" Central Water and Power Research Station,Ministry of Water Resources, River Development and Ganga Rejuvenation, Khadakwasla, Pune - 411 024, **Sanction Letter No & Date :** DIR/CWPRS/ES , Dt. 12-10-2018 (**Rs. 7.0 Lacs**) for two years till 31 Oct., 2020.

- *Principal Investigator* of the MoES Project titled "***Surface-Nearsurface Geophysical, Geological, Geotechnical, Remote Sensing and D-InSAR integrated Mutihazard Modeling for Susceptibility, Vulnerability and Risk in Northeast India towards its probable Mitigation and Management***" (**87.5 Lacs**) [**New Project, Approved by PAMC**].

- *Principal Investigator* of the Bridge Project titled "***Seismic Hazard, Vulnerability and Risk Assessment – A Bridge Project (VRA)"*** (**Rs. 7.5 Lac**).

- *Principal Consultant* of the RITES Ltd. Consultancy Services for Project Preparation of Package

III : Mogra-Kampa-Barojaguli in the Hoogly and Nadia District of West Bengal including a Major Bridge over River Saraswati, ROB at Bansberia, Elevated Corridor at the Junction of Barrackpore Expressway, Interchange at the Kampa Junction and a State-of Art Extra-dosed Cable Stayed Bridge- Advisory Services for Carrying out Site Specific Response Spectrum Analysis and Liquefaction Analysis (**Rs. 5.13 Lakh**).

- *Principal Investigator* of the MoES Project titled "***Near Surface Geophysical and Geotechnical Investigation for Site-specific Seismic Hazard and Slope Stability studies in and around Gangtok vis-à-vis its Vulnerability and Risk implications"*** (Project MoES/P.O.(Seismo)/1(207) /2013 dated 04/08/2015 for **Rs. 45.12 Lac** for three years and a half).

- *Institute-cum-Principal Investigator and Nodal Coordinator* of the MoES Project titled "***Seismic Hazard Assessment, Microzonation, and Evaluation of Vulnerability & Risk of the Urban Kolkata***" (total sanction amount = **Rs. 4.4781 Crores** for 4 years during May 2011 to May 2015) (MoES/P.O. (Seismo)/1(60)/2009 dated 04.03.2010, 14.10.2013).

- *Principal Investigator* of the MoES Sponsored Project titled "***Strong Motion Seismometry, Probabilistic Seismic Hazard, Vulnerability and Risk Microzonation of Darjeeling-Sikkim Himalaya***" (total projected amount = **Rs. 85.687 Lac** for 3 years during July 2014 to July 2017) (MoES/P.O. (Seismo)/1(155)/2012 dated 24.06.2014).

- *Principal Investigator* of the MoES Sponsored Project titled "***Probabilistic seismic hazard assessment of 30 cities in India***" (total projected amount = **Rs. 41.50 Lac** for 01 year during July 2014 to July 2015) (CS/EHRA/5/2013, Dt. 26-06-2014).

- *Preparation of Seismic Microzonation Handbook and Manual for the Ministry of Earth Sciences, Govt. of India*. (Total sanction amount = **Rs. 8.788 Lac** (MoES/P.O. (Seismo)/7(20)/2011 dated 16.06.2011).

- *Co-Investigator of the NDMA Project* "***Seismic Vulnerability Assessment of Building types in India***" (total sanction amount = **Rs. 25.20 Lac**) (7-36/2009-PMU dated 02.05.2011).

- *Principal Investigator* of the MoES Sponsored Project titled "***Seismic Hazard and Risk Assessment of Darjeeling-Sikkim Himalaya***" (total sanction amount = **Rs. 40.00 Lac** for 3 years during 2009-2012) (MoES/P.O.(Seismo)/1(57)/2009 dated 11.01.2010).

- *Convener* of the ***Third National Steering Committee Meeting on "Seismic Microzonation***" under the aegis of The Ministry of Earth Science, New Delhi held on 6th August 2009 at Salt lake City Extension Center, IIT Kharagpur with the participation of about 25 members. (MoES/P.O.(Seismo)/2(04)/2007 dated 13.07.2009, Funding: **Rs. 10.0 Lac**).

- *Convener* of the ***First National Steering Committee Meeting-cum-workshop on "Seismic Microzonation***" under the aegis of The Ministry of Earth Science, New Delhi held on 23rd October at Salt lake City Extension Center, IIT Kharagpur with the participation of about 20 members. (MoES/P.O.(Seismo)/2(04)/2007 dated 12.09.2008, Funding: **Rs. 10.0 Lac**).

- *Co-Principal Investigator* of the MoES Project entitled "***First Order Seismic Microzonation of Kolkata Area Based on Deep & Shallow Geotechnical and Geophysical Investigations***" (total sanction amount =**Rs.62.10 Lac** for 3 years during 2009-2012, (MoES/P.O.(Seismo)/23(651)/2007 dated 17.03.2009).

- *Principal Investigator* of the MoES (formerly DST) Sponsored Extension Project entitled "***Global Seismic Monitoring by Broadband Seismological Observatory at IIT Kharagpur***" (Total sanction

amount = **Rs.23.59 Lac** for 4 years during 2007-2011) MoES/P.O.(Seismo)/23(635)/2006 dated 1st August 2007.

- *Principal Coordinator* of the MoES (formerly DST) Project "***Create Infrastructure Facilities and Additional Provisions needed for sustaining a 24-Month M.Tech. Programme in Computational Seismology***"at IIT Kharagpur (App. Funding: **Rs. 1.93 Crore** for 5 years during 2004-2010).

- *Principal Investigator* of the MoES (formerly DST) Sponsored Extension Project entitled "***Seismic Microzonation of Sikkim Region***" (total sanction amount = **Rs. 42.19 Lac** for 5 years during 2006-2010).

- *Institute Coordinator* of the "***National Programme for Capacity Building of Engineers in Earthquake Risk Management (NPCBEERM)***" initiated and funded by the Ministry of Home Affairs sponsored by MHA vide memo F. No.30-1/2002-TS.1 dated 14.11.2002 (during 2004-2010) (**Rs. 33.92 Lac**).

- *Nodal Coordinator-cum Principal Investigator* of the DST consorted Project in involving 10 organizations (GSI, IMD, IITG, Assam Engineering College, Jorhat Engineering College, AMTRON and IITKGP) on "***Seismic Microzonation of Guwahati Region***" (Total funding : **Rs. 9.50 Crores**).

- *Principal Investigator* of the DST Sponsored Project "***Broadband Seismological Observatory at IIT Kharagpur for Seismotectonic Study of Bengal Basin"*** vides sanction no. DST/23(312)/SU/2002 dated 01.08.2002 (total sanction amount = **Rs. 64.65 Lac** for 3 years during 2002-2005). A broadband seismological observatory is commissioned at IIT Kharagpur.

- *Principal Investigator* of the DST Sponsored Project ***"Broadband Seismometry in the North-East region with special emphasis to Guwahati for Seismic hazard assessment***" (2003-2004) (DST/23(393)/Guwahati Region/SU/2003 dated 13.10.2003) (Total sanction amount = **Rs. 72 Lac**).

- *Principal Investigator* of the DST Sponsored Project entitled "***Seismic Microzonation of Sikkim Region***" vides sanction no. DST/23(218)/ESS/98 dated 27.12.2000 & 01.08.2002 (Total sanction amount = **Rs. 39.028 Lac** for 4 years during 2001-2005).

- *Institute Coordinator* of the ***National Programme on Earthquake Engineering Education in India*** (**NPEEE**) sponsored by MHRD vide memo F. No.30-1/2002-TS.1 dated 14.11.2002 (during 2002-2007) (**Rs. 103.16 Lac**).

- *Co-Principal Investigator* of the DST project "***Seismicity of Sikkim Himalayas***" vides Sanction No. DST/23(97)/ESS/95 dated 20.3.97 (Total funding = **Rs. 54 Lac** for 4 years during 1997-2001).

- *Co-Principal Investigator* of the CSIR sponsored project "***Development of a joint seismic refraction and geoelectric sounding inversion algorithm for systematic evaluation of aquifers***" vide Sanction No. 24(0227)/95/EMR-II dated 19.12.94 (total funding = **Rs. 5.18 Lac** for 3 years during 1995-1998).

- *Convener* of the DST sponsored Short-term Course & Training Workshop on "***Site Response and Microzonation Studies from Earthquake Seismology***" (SRMSES'98) during May 18-22, 1998 at the Department of Geology & Geophysics, IIT Kharagpur (total funding: **Rs. 4.2 Lac**) vide Sanction No: DST/23(136)/ESS/97 dated 01.01.98.

- *Coordinator* of the DST Review Committee Meeting on the Northeastern region seismology

projects, at IIT Kharagpur during Feb.19-20, 2002 (Funding: **Rs. 6.5 Lac**).

- *Course Director* of the DST Short-term Course & Workshop at Manipur University, Imphal during Sept. 19-22, 2002 (Funding: **Rs. 7.0 Lac**).
- *Principal Consultant* for *PHED* Ground Water Investigation and Pump-Test Development Projects for *Public Health Engineering and Department, Govt. of West Bengal, (Rs. 5 Lac, 1988-1995).*
- *Principal Consultant* for *PHED "Ground Water Investigation and Pump-Test Development Projects"* for **Public Health Engineering and Department, Govt. of West Bengal**, *(Rs. 3 Lac, 1997-2000).*
- *Principal Consultant "Shallow Foundation Study for roads and bridges construction in Arunachal Pradesh for Border Security Forces" subcontracted by* **M/s Gammon India Ltd and Gilcon Project Services, New Delhi**, *(Rs. 2.5Lac, 1989-1992).*

Complete List of Prof. Nath's Publications

A. Books/Monographs/Atlas/Manual

1. The ***chapter*** titled "**Ground Water Exploration and Modelling**" for **Encyclopedia of Life Support Systems (Water, energy, environment and food and agriculture)** by **International Foundation for Water Science and Technology**, P.O. Box 25862, Abu Dhabi, U.A.E.
2. The ***book*** titled "**Schlumberger Geoelectric Sounding in Ground Water (Principles, Interpretation and Application) [H. P. Patra & S. K. Nath]**" published by M/s A. A. Balkema, Rotterdam, Netherlands [ISBN 90 5410 789 8] (Indian Edition by OXFORD & IBH Publishing Co. Pvt. Ltd., New Delhi [ISBN 81-204-1294-X]), © 1999 Copyright, 153p [*Citation: **55***].
3. The ***book*** titled "**Geophysical Prospecting for Ground Water [S. K. Nath, H. P. Patra & S. Shahid]**" published by M/s A. A. Balkema, Rotterdam, Netherlands [ISBN 90 5410 215 1] (Indian Edition by OXFORD & IBH Publishing Co. Pvt. Ltd., New Delhi [ISBN 81-204-1398-9]), © 2000 Copyright, 256p [*Citation: **28***].
4. The ***Atlas*** titled "**Seismic Hazard & Microzonation Atlas of the Sikkim Himalaya [S. K. Nath]**" published by the Seismology Division, Department of Science and Technology, Government of India, New Delhi (2006), © DST, Govt. of India, 226p [*Citations: **27***].
5. The "**Training Handbook for the Faculty of State Resource Institutions [S. K. Nath, N. Dhang & D. Roy]" under the National Programme for Capacity Building of Engineers in Earthquake Risk Management (NPCBEERM)**, Ministry of Home Affairs (National Disaster Management Division), Government of India (2006), © MHA, Govt. of India, 649p.
6. The ***Atlas*** titled "**Seismic Microzonation Atlas of Guwahati Region [S. K. Nath]**" published by the Seismology Division, Department of Science and Technology, Government of India, New Delhi (2007), © DST, Govt. of India, 356p [*Citations: **14***].
7. The ***Atlas*** titled "**Seismic Microzonation of Guwahati Region : Data Volume [S. K. Nath]**" published by the Seismology Division, Department of Science and Technology, Government of India, New Delhi (2007), © DST, Govt. of India, 516p.
8. "**Seismic Microzonation Handbook [S. K. Nath]**" published by Geoscience Division, Ministry of Earth Sciences (MoES), Govt. of India, New Delhi (2011), © MoES, Govt. of India, 531p [*Citations: **7***].
9. "**Seismic Microzonation Manual [S. K. Nath & M. Ravi Kumar]**" published by Geoscience

Division, Ministry of Earth Sciences (MoES), Govt. of India, New Delhi (2011), © MoES, Govt. of India, 236p.

10. "**Seismic Hazard, Vulnerability and Risk Microzonation Atlas of Kolkata**" [**S. K. Nath**] published by Geoscience Division, Ministry of Earth Sciences (MoES), Govt. of India, New Delhi (2016), © MoES, Govt. of India, 578p [*Citations: **12***].
11. "**Seismic Hazard, Vulnerability and Risk Microzonation Atlas of Kolkata : Data Volume**" [**S. K. Nath**] published by Geoscience Division, Ministry of Earth Sciences (MoES), Govt. of India, New Delhi (2016), © MoES, Govt. of India, 1281p.
12. "**Probabilistic Seismic Hazard Atlas of 40 Cities in India**" [**S. K. Nath**] published by Geoscience Division, Ministry of Earth Sciences (MoES), Govt. of India, New Delhi (2017), © MoES, Govt. of India, 500p.
13. **Global Earthquake Model**: ***Global Seismic Hazard Map ©GEM 2018***: adopted the India and surroundings model of [IND]-2012 ***Developed by Nath and Thingbaijam (2012, SRL),*** revised and implemented into the Open Quake engine by N. Ackerley (NaturalResourcesCanada).
https://hazard.openquake.org/gem/images/gem_global_seismic_hazard_map_v2018.1.pdf
• Authors: N. Ackerley, K.K.S. Thingbaijaim, **S.K. Nath**
GEM (Global Earthquake Model) Foundation Via Ferrata, 1 - 27100, Pavia, Italy.

B. Papers in SCI rated refereed Journals

1. **Nath, S. K.**, Majumdar, S. and Sengupta, S., 1991, *Finite element condensation technique in modelling normal incidence synthetic seismograms*, **Indian Journal of Geology**, Vol. 63, No. 1, pp. 06-16 [*Citations: **4***].
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51. **Nath**, **S. K.,** Maiti, S. K., and Dasadhikari, M.**,** 2011, *Probabilistic Seismic Hazard of West Bengal, India*, Indo-Norwegian Workshop on Geohazards, New Delhi, Paper No. S3-2, pp. 54-59.

52. **Nath**, **S. K.,** Dasadhikari, M.**,** and Maiti, S. K., 2011, *Site Condition Mideling and First Order Seismic Hazard & Risk Microzonation of Kolkata, India*, Indo-Norwegian Workshop on Geohazards, New Delhi, Paper No. S3-14, pp. 83-90.

53. **Nath, S. K.,** 2013, *Seismic Hazard, Vulnerability & Risk Assessment of Darjeeling-Sikkim Himalaya*, Indo-Taiwan Workshop Abstract volume, pp. 15-19.

54. **Nath, S. K.,** 2013, *Seismic Microzonation towards Earthquake Disaster Mitigation*, First Session of National Platform for Disaster Risk Reduction (NPDRR) Abstract volume, pp. 104 - 107.

55. **Nath, S. K.,** 2013, *Next Generation Attenuation Models and Time Independent Probabilistic Seismic Hazard, Vulnerability & Risk Microzonation of Darjeeling-Sikkim Himalaya*, International Workshop on Regional Cooperation in Seismology and Earthquake Engineering in South and Central Asia at Kathmandu, Nepal.

56. Mishra, P. K. and **Nath, S. K.**, 2013, *Variable grid Finite Element Computation of Acoustic Wave field using Implicit Finite Difference Time Integration*, IGU Golden Jubilee Year Celebration, National Workshop on Modern Geological and Geophysical Methods and their Applications held at Jadavpur University during Nov. 28-29, 2013. Abstract Volume pg 94.

57. **Nath, S. K.** and Adhikari, M. D., 2014, *Seismic Hazard Microzonation: An Indian Perspective*, 3rd Annual Convention on "Advances in Earthquake Science" followed by Workshop on "Seismic Microzonation" held at the Institute of Seismological Research in collaboration with GSDMA, GIDM and DST, Gujarat during Jan. 04-06, 2014. Abstract Volume AES 2014, pp 77- 80.

58. **Nath, S. K.**, 2014, "*Preamble on Seismic Microzonation Handbook"*, 3rd Annual Convention on "Advances in Earthquake Science" followed by Workshop on "Seismic Microzonation" held at the Institute of Seismological Research in collaboration with GSDMA, GIDM and DST, Gujarat during Jan. 04-06, 2014. Abstract Volume AES 2014, pp 85- 89.

59. **Nath, S. K.**, Adhikari, M. D. and Maiti, S., 2014, "*Time Dependent and Time Independent Probabilistic Seismic Hazard of Northest India with emphasis on site-specific HAZUS based Risk Modeling for the City of Guwahati and Siliguri"* at the 2nd Indo-Norwegian Workshop on Geohazards organized by the Ministry of Earth Sciences, Govt. of India during Feb 13-14, 2014 at Prithvi Bhawan, Lodhi Road, New Delhi. Abstract Volume, pp. 1-16.

60. **Nath, S. K.,** 2014, **"***Natural Disasters in India with emphasis on Earthquake Hazard, Vulnerability and Risk showcasing an integrated scenario for the City of Kolkata"*, Invited Lecture at the National Workshop on the "Status of Natural Hazards in Himachal Pradesh" held from 6 - 8 November, 2014 in the Department of Environmental Science, SOEES, Central

University of Himachal Pradesh under the aegis of the Ministry of Earth Sciences, Govt. of India. Abstract Volume, pp. 22 – 25.

61. **Hamid Sana** and **Nath, S. K.**, 2014. Maximum Credible earthquake estimation for the Kashmir valley, NW Himalaya. ***International Geographical Union (IGU) Commission Conference, New Delhi.***

62. Mishra, P. K., **Nath, S. K.** and Sawant A. D., 2015, "*RBF-Based Spectral Collocation Method for Orr-Somerfield Eigenvalue Problems in Fluid Dynamics*", Oral Presentation made at **SIAM (Society for Industrial and Applied Mathematics) Conference on Mathematical and Computational Issues in the Geosciences** (GS15), June 29 through July 2, 2015 at Stanford University, Stanford, California, USA.

63. Mishra, P. K. and **Nath, S. K.**, 2015, "*Meshless RBF based pseudospectral solution for acoustic wave equation*", **IAMG 2015, 17th annual conference of the International Association for Mathematical Geosciences**, September 5-13, 2015, Freiberg (Saxony) Germany, short Abstract accepted for oral presentation.

64. Sana, H., Mukhtar, G. A. and **Nath, S. K.**, 2015, "*Seismicity analysis of Chenab Valley Seismic Zone, NW Himalaya: the seismogenic source zone of Kirthai Hydro Electric Projects"*, **"International Conference on "Engineering Geology in New Millennium"**, New Delhi, 27-29 Oct., 2015, Abstract accepted for oral presentation and published in proceeding volume.

65. **Nath**, **S. K.,** Maiti, S. K., Dasadhikari, M. **a**nd Srivastava, N. 2015, "'*Seismic Hazard, Vulnerability and Risk of Kolkata, India Implicating Potential Economic Loss Due to a Probabilistic Scenario*", **6th Annual Conference on International Society for Integrated Disaster Risk Management (IDRIM-TIFAC 2015)**, New Delhi, Oct 28-30, 2015, Abstract and full paper published in the proceeding volume.

66. Dasadhikari, M., **Nath, S. K.** and Ghatak, C. 2015, "P*robabilistic Seismic Hazard, Vulnerability, Risk & Loss Assessment of Darjeeling-Sikkim Himalaya on GIS Platform*", **6th Annual Conference on International Society for Integrated Disaster Risk Management (IDRIM-TIFAC 2015)**, New Delhi, Oct 28-30, 2015, Abstract and full paper published in the proceeding volume.

67. **Nath**, **S. K.,** 2015, "*Incompressible Fluid Flow Modeling in a Reservoir uses Two Point Flux Approximation Method"*, Abstract accepted for oral presentation and published at the **Global Summit on Petroliferous Basins-2015** held during Dec 07-09, 2015 at Philadelphia, USA.

68. **Nath**, **S. K.,** 2015, "*Automated Seismic Reflector Tracing through Modified Generalized Hough Transform"*, Abstract accepted for oral presentation and published at the **Global Summit on Petroliferous Basins-2015** held during Dec 07-09, 2015 at Philadelphia, USA.

69. **Nath**, **S. K.,** 2015, "*Site Characterization of Kolkata Megacity in the light of Seismic Threat to Bengal Basin"*, Abstract published in the Proceeding volume pages 21-22 for the ***52nd*** **Annual Convention of Indian Geophysical Union** on "Near Surface Earth System Sciences" Goa, November 3-5, 2015 (Invited Talk).

70. Adhikari, M. D. and **Nath**, **S. K.,** 2015, "*PSHA of Darjeeling-Sikkim Himalayan tract through a Logic Tree Framework combining Site Specific Surface Consistent Next Generation Attenuation Models and Geohazard regime"*, Abstract published in the Proceeding volume pages 55-56 for the ***52nd*** **Annual Convention of Indian Geophysical Union** on "Near Surface Earth System Sciences" Goa, November 3-5, 2015 (oral).

71. Srivastava, N. and **Nath**, **S. K.,** 2015, *"Liquefaction Susceptibility of Kolkata through Near Surface Geophysical and Geotechnical Investigation"*, Abstract Published in the proceeding volume pages 108-109 for the ***52nd*** **Annual Convention of Indian Geophysical Union** on "Near Surface Earth System Sciences" Goa, November 3-5, 2015 (poster).

72. Ghatak, C. and **Nath**, **S. K.,** 2015, "*Seismic Hazard of Sikkim with a view to Earthquake Risk Reduction considering Deterministic Approach"*, Abstract published in the Proceeding volume page79 for the ***52nd*** **Annual Convention of Indian Geophysical Union** on "Near Surface Earth System Sciences" Goa, November 3-5, 2015 (poster).

73. Mishra, P. K. and **Nath, S. K.**, 2015, "*Global meshless collocation for two dimensional advection-diffusion problems*", Abstract published in the Proceeding volume pages 111-112 for the **52nd Annual Convention of Indian Geophysical Union** on "Near Surface Earth System Sciences" Goa, November 3-5, 2015 (poster).

74. Panda, S. C., **Nath, S. K.**, and Brahma, Niva, 2015, "*Lithological characteristics analysis of Ridderkerk area in the western Netherlands using wavelet transforms*", Abstract published in the Proceeding volume page 132 for the **52nd Annual Convention of Indian Geophysical Union** on "Near Surface Earth System Sciences" Goa, November 3-5, 2015 (adjudged as best poster of the convention).

75. Mishra, P. K. and **Nath, S. K.**, 2016, "*Kernel-based pseudospectral method – a global meshless approach for numerical modeling in geoscience*", Abstract in the proceedings of **Seminar** entitled "***Developments in Geosciences in the Past Decade - Emerging Trends for the future and impact on society***" and **58th Annual General Body Meeting of the Geological Society of India** at IIT Kharagpur during Oct.21-23, 2016, pg. 286 in the Abstract Volume.

76. Ghatak, C., **Nath, S. K.**, and Adhikari, M. D., 2016, "*A spatial Modeling Framework based on Capacity Spectrum Method for the Assessment of Potential Earthquake Damage: An Application to the City of Kolkata, West Bengal, India*", Abstract in the proceedings of **Seminar** entitled "***Developments in Geosciences in the Past Decade - Emerging Trends for the future and impact on society***" and **58th Annual General Body Meeting of the Geological Society of India** at IIT Kharagpur during Oct.21-23, 2016, pp. 198-202 in the Abstract Volume.

77. Sengupta, A., Bhaumick, S., and Nath**, S. K.**, 2016, "*Slope Stability Modeling and Land subsidence mapping using GIS and D-InSAR techniques in Gangtok, Sikkim*", Abstract in the proceedings of **Seminar** titled "***Developments in Geosciences in the Past Decade - Emerging Trends for the future and impact on society***" and **58th Annual General Body Meeting of the Geological Society of India** at IIT Kharagpur during Oct.21-23, 2016, pp. 389-393 in the Abstract Volume.

78. Mishra, P. K., **Nath**, **S. K**., Fasshauer, G. E., and Sen, M. K., and, 2017, "*Frequency-domain meshless solver for acoustic wave equation using a stable radial basis-finite difference (RBF-FD) algorithm with hybrid kernels*", Extended Abstract at **SEG Annual Meet**, Sept. 2017 at Houston, USA.

79. Nath, S. K., 2017, "*Near Surface Geophysical and Geotechnical Investigation for Site-specific Earthquake Hazard and Slope Stability studies in and around Gangtok vis-à-vis its Vulnerability and Risk Implications*", MoES 3rd PAMC Meeting at NEHU, Shillong during 24-26 May, 2017.

80. Nath, S. K., 2018, "*Site Characterization of Northeast India using Geophysical, Geotechnical, and D-InSAR Techniques with a view to Earthquake Inflicted Disaster Mitigation and Management* ", MoES 5th PAMC Meeting at IIT Kanpur during 16-17 July, 2018.
81. Nath, S. K., and Ghatak, C., 2018, "*Seismic Hazard, Vulnerability and Risk - A Viable Proxy to Ascertain Holistic Damage Potential of an Earthquake-Prone Terrain Like the Megacity of Kolkata and the Hilly Terrain of Darjeeling-Sikkim Himalaya, India"*, **16th Symposium on Earthquake Engineering**, December 20-22, 2018, IIT Roorkee, India, ***Paper No. Kn-12***.

82. Sengupta, A., and Nath, S. K., 2019, "*Remote Sensing and GIS based Landslide Susceptibility Zonation in Gangtok*", Oral presentation at the ***National Symposium on Innovations in Geospatial Technology for Sustainable Development with special emphasis on NER***, Abstract Id: 201907075, **ISG-ISRS 2019**, North Eastern Space Applications Centre, Department of Space, Government of India, Umiam, Shillong-793103, Meghalaya. Abstract in the proceeding volume pp. 333-334.

83. Sengupta, A., Nath, S. K., and Kazi , K., 2019, "*Slope failure modeling in Gangtok to understand the impact of gravity loading and seismic impulse on complex landslide mechanism in the terrain*", E-Poster Abstract Number: 2581, **36th International Geological Congress** at Delhi, India, 2-8 March 2020.

84. Ghatak, C., **Nath, S. K.**, and Bhaumick, S., 2019, "*Site Response guided Probabilistic Seismic Hazard, Vulnerability and damage potential for Indo-Gangetic Foredeep Region*", Abstract No.:2579 Oral, **36th International Geological Congress** at Delhi, India, 2-8 March 2020.

85. Srivastava, A., Nath, S. K., Hembram, L., and Bind, A. P., 2019 ,"*Seismic site characteristics assessment of Northeast India through an innovative regional protocol and in-situ measurement towards assessing Seismic Hazard and Vulnerability potential of the region*", E-Poster Abstract No: 2928, **36th International Geological Congress** at Delhi, India, 2-8 March 2020.

D. Invited / Key Note Lectures in India/abroad and/or chairing of any scientific International Conference Symposium/ Workshop

1. Delivered two Invited Lectures on "***Seismic Microzonation***" and "***FEM Simulation of Seismic Responses***" at the Institute for Geophysics, The University of Texas at Austin, USA, during April 04-07, 1996.
2. Delivered a Special Invited Lecture on "*Cross-hole Seismic Tomography"* at the **Training Course on** "***Use of Geophysical Methods in Mine Planning & Safety***", at ISM Dhanbad, jointly organized by Association of Exploration Geophysicists and Indian School of Mines, Sept 19, 1998.
3. Delivered a Special Lecture on "***Site response and microzonation studies from earthquake seismology***"at the DST sponsored short-term course and workshop on "**Paleoseismicity & Active Tectonics in NE India**" at Manipur University, Imphal, during Nov.15-20, 1999.
4. Delivered an Invited Talk on "***Seismic Microzonation Assessment with special emphasis to site response***" at the **Indo-Italian Workshop on Seismic Risk Evaluation** at NGRI, Hyderabad during March 6-9, 2001.

5. "**Bhatnagar Laureate (2002) Symposium**" at Vigyan Bhawan, New Delhi on 12th July 2003 organized by the Human Resource Development Group, Council of Scientific and Industrial Research, Govt. of India, on the day of the SSB 2002 presentation ceremony.
6. Delivered an Invited Talk on "*Physics of the Earthquakes*" at the Indian Academy of Sciences sponsored Refresher Course in "***Physics of Earthquakes***" at Tezpur University, Tezpur during 02-21 Dec., 2002.
7. Delivered an Invited Talk on "***Site Specific Earthquake Hazard in Urban North-Eastern India***" at the **National Workshop** on "**Science & Technology for Regional Development**" jointly organized by Tezpur University, IIT Guwahati and CMMACS Bangalore at IIT Guwahati on 3-6 Feb. 2004.
8. Delivered an Invited Talk on "***Seismic Microzonation Framework – Principles & Case Studies***" at the **National Workshop on Science and Technology in Disaster Management (Earthquake, Land Slide & Tsunami)** 02-03 April, 2007 organized by **National Disaster Management Authority, Govt. of India** at Centaur Hotel, New Delhi.
9. **Chaired** the **National *Workshop* on Science and Technology in Disaster Management (Earthquake, Land Slide & Tsunami) *"Session VI – Tsunamis"*** on 03April, 2007 organized by **National Disaster Management Authority, Govt. of India** at Centaur Hotel, New Delhi.
10. Delivered an Invited Talk on ***"Seismic Microzonation Framework – Principles & Applications"*** at the **Microzonation Workshop** at Indian Institute of Science, Bangalore during June 26-27, 2007. ***Also Chaired Technical Session VI*** – "***Summing up, Discussion and Recommendations***".
11. Delivered an Invited Lecture on "***Earthquake Hazard in the Northeast India – A Computer intensive Seismic Microzonation Approach with Typical Case Studies from Sikkim Himalaya and Guwahati city"*** under the aegis of INAE Kolkata Chapter on Feb 12, 2008 at Indian Statistical Institute, Kolkata.
12. Delivered an Invited Lecture on "**Seismic Microzonation of Guwahati**, ***at the First Meeting-cum-Workshop of the National Steering Committee on Seismic Microzonation of Selected Cities in India under the Seismology Division, Ministry of Earth Sciences, Govt. of India,*** held on 23rd October 2008 at Salt lake City Extension Center, IIT Kharagpur.
13. Delivered an Invited Lecture on the project proposal "**Seismic Hazard Assessment, Microzonation, and Evaluation of Vulnerability, Risk and Socio-Economic Impacts for the City of Kolkata including Greater Kolkata**", ***at the Third Meeting of the National Steering Committee on Seismic Microzonation of Selected Cities in India under the Seismology Division, Ministry of Earth Sciences, Govt. of India,*** convened at IIT Kharagpur Extn Center, Kolkata on 6th August, 2009.
14. Delivered an Invited Talk titled "**Seismic Microzonation – Current Trends and Methodologies**" at a special meeting convened on 12th January, 2010 at Mahasagar Bhawan, MoES, GOI, New Delhi to discuss the Methodologies and Practices of Microzonation.
15. Delivered the Keynote Address on "**Seismic Hazard in Northeast India with special emphasis to the Seismic Microzonation of Arunachal Pradesh**" at the workshop on "Microzonation of Landslide and Earthquake Hazards in Arunachal Pradesh convened on 29th January, 2010 at State Remote Sensing Application Center, Dept. of IT and Science & Technology, Govt. of Arunachal Pradesh.

16. Delivered a Technical Presentation on "**Seismic Microzonation Practices**" at the workshop on "Microzonation of Landslide and Earthquake Hazards in Arunachal Pradesh convened on 29th January, 2010 at State Remote Sensing Application Center, Dept. of IT and Science & Technology, Govt. of Arunachal Pradesh.

17. Delivered an Invited Talk titled "**Disaster Mitigation and Management for West Bengal with special emphasis to Seismic Microzonation of Kolkata**" at the ***International Symposium*** on "***Interdisciplinary Studies and Promotion of Research on Natural Disaster***" organized by *MICRODIS - Jadavpur University held at HYATT REGENCY, Kolkata* on 14th - 15th January, 2011.

18. Delivered an Invited Talk on "**Status of Seismic Microzonation Studies in the North East India"** at the two-day *National Workshop on Earthquake Risk Mitigation Strategy in the North East* at Administrative Staff College, Guwahati during February 24-25, 2011.

19. Delivered two Invited Talks on "**Probabilistic Seismic Hazard of West Bengal, India**" and "**Site Condition Modeling and First Order Seismic Hazard & Risk Microzonation of Kolkata, India**" at the ***Indo-Norwegian Workshop on Geohazards*** organized by the Ministry of Earth Sciences, Govt. of India, New Delhi during 12-14 Sept., 2011 at India Habitat Center, New Delhi.

20. Delivered Key Note Address on "**Current Scenario of Seismic Microzonation in India**" at the National Workshop on "***Current Scenario of Seismic Microzonation in India****" and the Release Ceremony of Seismic Microzonation Manual & Handbook by the Hon'ble Union Minister of Science & Technology and Earth Science Shri Vilasrao Deshmukh* organized by the Ministry of Earth Sciences, Govt. of India, New Delhi at CSIR Auditorium, Anusandhan Bhawan, Rafi Marg, New Delhi on 14th October, 2011.

21. Delivered two talks on "**Global Seismic Monitoring by Broadband Seismological Observatory at IIT Kharagpur**" and "**Seismic Hazard and Risk Assessment of Darjeeling-Sikkim Himalaya**" at the Group Monitoring Committee Meeting of the Ministry of Earth Science, Govt. India at Kashmir University, Srinagar on 4th November, 2011.

22. Delivered Key Note Address on the "**Seismicity in Sikkim Himalaya: Current Scenario**" the Workshop on "***Seismicity in Sikkim Himalaya: Current Scenario"*** *and the Inaugural Function of the Earthquake Monitoring Station at Sikkim Science Center, Marchak, Gangtok,* organized by Sikkim State Council of Science & Technology and the Ministry of Earth Sciences, Govt. of India on 7th November, 2011.

23. Delivered Key Note Address on the Theme "**Seismic Vulnerability of the City of Kolkata**" at a Half a Day Seminar organized by the Government of West Bengal, Department of Disaster Management at the Stadel Hotel, Salt Lake City, Kolkata on 28th September, 2012 at 10:30 Hrs.

24. Delivered Key Note Address on the Theme "**Seismic Vulnerability of West Bengal with an emphasis on the City of Kolkata**" at the *Training Programme* on "***Urban Risk Mitigation***" conducted by the Administrative Training Institute, Government of West Bengal during November 07-09, 2012 at 14:30 Hrs. at Salt Lake City, Kolkata.

25. Delivered an Invited Talk on "**Seismic Hazard, Vulnerability & Risk Assessment of Darjeeling-Sikkim Himalaya**" at the ***INDO-TAIWAN Workshop*** on "*Earthquake Early Warning System"* during Jan 16-17, 2013 at Prithvi Bhawan, MOES, New Delhi, organized by IIT Roorkee.

26. Delivered an Invited Talk on "**Seismic Microzonation towards Earthquake Disaster Mitigation**" at the *Thematic Session: 'Making our Cities Safe'* at the ***First Session of National***

Platform for Disaster Risk Reduction (NPDRR) organized by the Ministry of Home Affairs, Govt. of India during May 13-14, 2013 at Vigyan Bhawan, New Delhi.

27. Delivered an Invited Talk on "**Recent Earthquakes in South & Central Asia with special emphasis to Seismic Scenario in India**" in the ***Recent Earthquake Session*** of the "***International Workshop for Regional Cooperation in Seismology and Earthquake Engineering in South and Central Asia"*** held at Club Himalaya, Nagarkot, Kathmandu, Nepal during 15-20, Sept., 2013 on invitation from UNESCO, USGS and NSET, Nepal and hosted by the National Society for Earthquake Technology of Nepal.
28. Delivered an Invited Talk on "*Seismic Microzonation: Principles, Protocol on Indian Scenario*" on 7th Jan., 2014 at the Institute of Seismological Research after the 3rd Annual Convention on "Advances in Earthquake Science" followed by the Workshop on "Seismic Microzonation" held at the Institute of Seismological Research in collaboration with GSDMA, GIDM and DST, Gujarat during Jan. 04-06, 2014.
29. Delivered an Invited Talk on "*Time Dependent and Time Independent Probabilistic Seismic Hazard of Northeast India with emphasis on site-specific HAZUS based Risk Modeling for the City of Guwahati and Siliguri*" at the 2nd Indo-Norwegian Workshop on Geohazards organized by the Ministry of Earth Sciences, Govt. of India during Feb 13-14, 2014 at Prithvi Bhawan, Lodhi Road, New Delhi.
30. Chaired the Session on the theme: "*Crustal deformation in stable Continental Regions*" at the 2nd Indo-Norwegian Workshop on Geohazards organized by the Ministry of Earth Sciences, Govt. of India during Feb 13-14, 2014 at Prithvi Bhawan, Lodhi Road, New Delhi.
31. Chaired the Session on the theme: "*Seismic Microzonation (Site Amplification)*" at the National Workshop on the "**Status of Natural Hazards in Himachal Pradesh**" held from 6 - 8 November, 2014 in the Department of Environmental Science, SOEES, Central University of Himachal Pradesh under the aegis of the Ministry of Earth Sciences, Govt. of India.
32. Delivered an Invited Talk on "*Earthquakes- Genesis, Induced Hazard, Vulnerability and Risk posed on Urban Centers in India*" as a Mentor at the **DST - INSPIRE Internship Camp** at NIT Sikkim during 10 - 14th December, 2014.
33. Delivered a VECC Colloquium on the topic titled "*Natural Hazards in India with special emphasis on Earthquake Genesis, its induced Hazard, Vulnerability and Risk showcasing an integrated scenario for the City of Kolkata, West Bengal, India*" at the Variable Energy Cyclotron Centre, Kolkata on 24th Nov., 2014.
34. **Key Note Address** at **Bharat Chamber of Commerce** at the interactive session on "***Earthquakes in the Sub-Himalayan Region and West Bengal: Future Perspectives***" on 5th June, 2015 at Hotel Hindustan International, Kolkata.
35. **Invited Talk** at **MCC Chamber of Commerce & Industry** on 14th July, 2015 at The Park, Kolkata on "***Saving the Earthquake Prone Cities in India***".
36. **IGU Decennial Award Lecture on 3rd Nov., 2015** at 52nd Annual Convention of IGU at NCAOR, Goa on "*Contribution to Geosciences with special emphasis on Seismic Hazard, Vulnerability and Risk Microzonation*"
37. Delivered an Invited Talk on "*Seismic Hazard, Vulnerability and Risk Scenario in the Darjeeling-Sikkim Himalaya*" on 7th April, 2016 at Sikkim Disaster Management Authority, Gangtok.

38. Delivered an Invited Talk on "*Slope vulnerability Assessment and its Stability Analysis in the Sikkim Himalaya*" on 8th April, 2016 at Hotel Hotlik, Gangtok organized by the Department of Mines and Geology, Govt. of Sikkim.

39. Delivered the Atlas release Key-note Address on "*Seismic Hazard, Vulnerability and Risk Microzonation Atlas of Kolkata*" on 22nd February, 2016 at the Ministry of Earth Sciences, Govt. of India, New Delhi.

40. Delivered invited talk on "Cyber Physical Systems" at Brain Storming Meeting on DST sponsored "**Interdisciplinary Cyber Physical Systems (ICPS)**" to be held on 27-28 Sept., 2016 at IIT BHU, Varanasi.

41. Delivered Invited Talk on "**Earthquake- from Genesis to Hazard, Vulnerability & Risk**" at DST-Inspire Science Camp at National Institute of Science & Technology, Berhampur, Orissa during Oct. 25-29, 2016.

42. Delivered Project review talk on "**Strong Motion Seismometry in Darjeeling-Sikkim Himalaya: Comprehensive Maintenance for round-the-clock Seismic Monitoring by the 10 station DSSMA and enriching Ground Motion Database for relooking into Seismic Source, Site and Path Characteristics from Hazard Perspectives for a Conservative Damage and Loss Estimate in SELENA and HAZUS Environment"** at MoES PAMC Meeting held at ISR Gandhinagar on 16th Dec., 2016.

43. Delivered Project review talk on "**Probabilistic Seismic Hazard Assessment of 40 Cities in India"** at MoES PAMC Meeting held at ISR Gandhinagar on 16th Dec., 2016.

44. Delivered Project review talk on "**Near Surface Geophysical and Geotechincal Investigation for site-specific Earthquake Hazard and Slope Stability Studies in and around Gangtok vis-à-vis its Vulnerability and Risk Implications"** at MoES PAMC Meeting held at ISR Gandhinagar on 16th Dec., 2016.

45. Participated in the 3-Day short course on **Reservoir Simulation & Management and Socio-environmental issues in Conventional & Unconventional reservoirs: A Trans Disciplinary Approach Leading to Convergence** during 5-7 January, 2017 at Asoke Deysarkar and Ruma Acharya Center of Excellence in Petroleum Engineering, IIT Kharagpur.

46. Resource Person at **Science Academy Refresher Course on "Crustal Strength Rheology and Seismicity" (CSRS-2017) at IIT-ISM Dhanbad** during May15-26, 2017. Delivered a three hour Invited Lecture on "***Seismotectonism of the Indian Subcontinent in the light of Seismic Hazard and Risk***". Manuscript published in the Proceedings Volume, pp. 171 – 192.

47. Invited Talk at IMPRESS – 2018 and International Workshop on "***NONLINEAR PROCESSES AND EXTREME EVENTS IN EARTH AND SPACE" during 19-23 Feb., 2018 at IIG, Navi Mumbai.*** The Key-Note Address delivered on 21st Feb., 2018 is titled "**Extreme Events as Nonlinear processes as perceived from initiation to impact on Man and Environment with major focus on Earthquakes, Tsunamis and Landslides**".

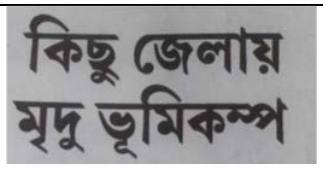
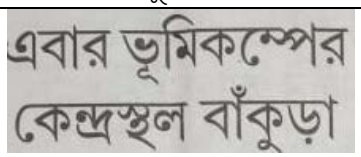
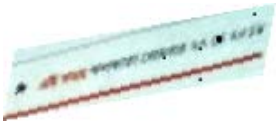
48. Invited Talk at **India-Japan Workshop on "Disaster Risk Reduction"** held at Vigyan Bhawan, New Delhi on 19-20 March 2018 sponsored and hosted by the National Disaster Management Authority, Ministry of Home Affairs, Govt. of India. The top[ic of presentation is ***"Earthquake Occurrence as an Extreme Event as conceptualized from Genesis to Prognosis implicating Hazard, Vulnerability and Risk in the Indian and Japanese Peninsula"*** delivered under the technical session **'Risk Assessment'** on 19th March, 2018.

49. **Keynote Address** titled "***Seismic Hazard, Vulnerability and Risk - a viable Proxy to ascertain Holistic Damage Potential of an Earthquake-prone Terrain like the Megacity of Kolkata and the Hilly terrain of Darjeeling-Sikkim Himalaya, India***" at 16th Symposium on Earthquake Engineering, December 20-22, 2018,IIT Roorkee India,Keynote-12, Extended Abstract Published in the Proceedings Volume.

50. Delivered the **Key-Note Address** titled "***Science &Technology for a Better World***" at the **Science Festival SCIENTIA_3.0** celebrated by *Assam University, Silchar (AUS), a Central University on 19th September, 2019.*

51. Invited Talk titled "*Regional-Local Hybrid Seismic Hazard and Disaster Modeling of the Five Tectonic Province Ensemble consisting of Westcentral Himalaya to Northeast India* **" (Authors: Nath, S. K.**, Ghatak, C., Sengupta, A., Biswas, A., Madan, J., and Srivastava, A.), At the 7th International Conference on Recent Advancements in Geotechnical Earthquake Engineering (7ICRAGEE), at IISc. Bangalore, July13-15,2021, Proceedings with Springer (In press).

E. List of articles/ reports/ expert opinion in Popular Magazines and Newspapers

Sl. No	Date	Title	Name of Magazine/ Newspaper
95	কলকাতা, বৃহস্পতিবার ৩ সেপ্টেম্বর ২০২০, ১৮ ভাদ্র ১৪২৭	বারবার মৃদু ভূমিকম্পের আশঙ্কা ভূ-বিজ্ঞানীদের	বর্তমান
94	26th August, 2020, Wednesday		আনন্দবাজার পত্রিকা
93	29thJuly, 2019 ১২ শ্রাবণ ১৪২৬ সোমবার ২৯ জুলাই ২০১৯	ভোরে কাঁপল পুরুলিয়া, বড় ভূমিকম্পে কেঁপে উঠতে পারে কলকাতাও! আশঙ্কা বিজ্ঞানীদের নিজস্ব সংবাদদাতা কলকাতা| ২৯ জুলাই, ২০১৯, ১২:২৩:৪৩ শেষ আপডেট: ২৯ জুলাই, ২০১৯, ১৩:৩০:২৯	আনন্দবাজার পত্রিকা
92	27th May, 2019		এই সময় 
91	কলকাতা মঙলবার | ১ জানুয়া□র ২০১৯	খাদের কিনারে কলকাতা-সহ তামাম বাংলা	সংবাদ প্রতিদিন
90.	২৬ িডেস□র, ২০১৮,	ভয়াল ভূিমকে_র ভয় িনেয় দাঁিড়েয় পাক_ ি_ট, স_েলক,রাজারহাট... বলেছ আইআই_-র	Anandabazar Patrika আনন্দবাজার পত্রিকা

	০৯:৩৫:৩২ □শষ আপেডট: ২৮ িডেস□র, ২০১৮, ১৩:৪১:১৮	**ি◌রেপাট**	
89.	২৪ িডেস□র, ২০১৮, ০২:৫৭:৫১ □শষ আপেডট: ২৪ িডেস□র, ২০১৮, ০৭:১০:৫৭	আ_য়িগিরর □াচীর □ফেট সমু□গেভ_ ধস	Anandabazar Patrika আনন্দবাজার পত্রিকা
88.	31st Dec., 2018	IIT Kgp maps to help during earthquakes	TelanganaToday)
87.	December 24, 2018 16:12 IST	IIT Kharagpur's city-level maps to help cut damage from earthquakes	*PTI | Roorkee*
86.	Monday, 24 Dec, 2.49 pm	IIT-Kharagpur scientists making detailed maps to calculate earthquake damage	*NewsBytes*
85.	Wednesday, December 26, 2018, 13:04 [IST]	Massive quake can devastate huge parts of Kolkata in no time, warns IIT report	*Oneindia News*
84.	Dec 29, 2018 11:25 AM IST	**ে◌য- ে◌কানo সমেয় ভয়াবহ ভূ◌িমকেm ে◌কঁেপ uঠেত পা◌ের ি◌নu টাuন, পাকর্ ি◌sট, শয্◌ামবাজার, দমদম**	*News18 Bangla*
83.	December 25, 2018 4:58:22 pm	**IIT Kharagpur's city-level maps to help cut damage from earthquakes**	*The Indian Express*
82.	Dec 24, 2018 13:41 IST	**Scientists at IIT Kharagpur developing city-level maps to help cut damage from earthquakes**	*HindustanTimes*
81.	30th Sept. 2018	সুনামির গ্রাসে যেতে পারে গাঙ্গেয় পশ্চিমবঙ্গও!	আনন্দবাজার পত্রিকা
80.	13th Sept. 2018	কম্পনের শক্তি ছিল হিরোশিমায় ফেলা পরমানু বোমার আড়াই গুণ!	আনন্দবাজার পত্রিকা
79.	30th Aug. 2018	Temblor's 10km depth kept city safe	The Times of India
78.	30th Aug. 2018	মাটি কাঁপলে ঘোর বিপদ শহরের	আনন্দবাজার পত্রিকা
77.	30th Aug. 2018	মামুলি কম্পন, কিন্তু হাল আমলে সবচেয়ে বড়	এই সময়
76.	29th Aug, 2018	Quake in Hooghly, city unshaken	The Telegraph
75.	29th Aug, 2018	মাঝারি কম্পন ৭ জেলায়, কেন্দ্রস্থল হুগলি	আনন্দবাজার পত্রিকা
74.	1st Feb. 2018	সুপারমুনে ভুকম্প, সঙ্গী আকাশকুসুম	আনন্দবাজার পত্রিকা
73.	17th Oct. 2017	Red flags fill quake hazard map	The Telegraph METRO
72.	14th April, 2016	মায়ানমারি ঝাঁকুনিতে টলোমলো বঙ্গ	আনন্দবাজার পত্রিকা

71.	14thApril,2016	গভীর কেন্দ্র কাঁপল কলকাতাকে	এই সময়
70.	15th April, 2016	ভূমিকম্পরোধী ‘অচল’ বিধানই সম্বল শহরের	এই সময়
69.	15th April, 2016	জলস্তরের পতন বাড়িয়ে দেবে কলকাতায় কম্পনের অভিঘাত	এই সময়
68.	15th April, 2016	ভূমিকম্প হলে ২২ হাজার মানুষের মৃত্যু হতে পারে কলকাতায়	এই সময়
67.	23rd Feb. 2016	পায়ের নীচে কাদা, শিয়রে ভুমিকম্পের সমন	আনন্দবাজার পত্রিকা
66.	23rd Feb. 2016	Dr. Harsh Vardhan and Shri Y.S. chowdary release semismic Microzonation reports for Delhi and Kolkata.	India Education Diary.com
65.	22rd Feb, 2016	Quake impact to be highest in areas along Yamuna, Hooghly: Study	Business Standard
64.	22rd Feb, 2016	Harsh Vardhan, Y.S. Chowdary release Seismic Microzonation reports for Delhi, Kolkata	www.newkerala.com
63.	5th Jan. 2016	Say Manipur zone is one of world’s deadliest, can have earthquakes up to magnitude 9	The Indian Express
62.	5th Jan. 2016	Kolkata Sitting on a Faultine	Hindustan times
61.	15th Feb. 2016	Sensor network to predict landslide	The Times of India
60.	5th Jan. 2016	উত্তর-পূর্বে বারুদের স্তূপে, থরহরি কলকাতাও	আনন্দবাজার পত্রিকা
59.	16th Jul, 2015	Large areas in Kolkata could sink if earthquake strikes: IIT Study.	Hindustan times
58.	15th Jul, 2015	কলকাতায় হবে আরও বড়ভূমিকম্প, কেন্দ্রীয় হুঁশিয়ারি	খবর ৩৬৫ দিন
57.	15th Jul, 2015	শহরের ভূ-কম্পনপ্রবণ মানচিত্র প্রকাশ এ বছরেই	বর্তমান
56.	15th July, 2015	বিপদ ডাকছে শহরের বহুতলঃ ভূকম্পের আগাম বারতা সম্ভব, প্রশ্ন ব্যবস্থা নিয়ে	প্রতিদিন
55.	15th July, 2016	তীব্র ভূমিকম্পের মুখে দুই বাংলা, মায়ানমার?	আনন্দবাজার পত্রিকা
54.	14th July, 2016	বাংলার ঘাড়ের উপর ৯ তীব্রতার মগা-কম্পনের ইঙ্গিত	এই সময়
53.	28th April, 2015	বিপর্যয়ের উৎসে বসে কলকাতা	আনন্দবাজার পত্রিকা
52.	2nd July, 2015	ঘুমন্ত দার্জিলিংয়ে ধসে মৃত ৩৬	এই সময়
51.	29th April,2015	শঙ্কা সত্যি করেই ফুঁসে উঠল অস্থির পাহাড়	আনন্দবাজার পত্রিকা
50.	29th April,2015	কাঁপল হিন্দুকুশ, বিজ্ঞানীদের মতে শাপে বর	আনন্দবাজার পত্রিকা
49.	29th April,2015	ভূমিশয্যার ফারাকেই বিপদ এড়াল দার্জিলিং	এই সময়
48.	27th April, 2015	The QUAKE Fresh jolt gives the jitters	The Telegraph

47.	27th April, 2015	কাদামাটির কোলে ডুবতে পারে কলকাতা	এই সময়
46.	22nd April, 2015	আরও বড় বিপর্যয়ের ইঙ্গিতই দিল নেপাল, বলছেন বিজ্ঞানিরা	আনন্দবাজার পত্রিকা
45.	27th April, 2015	আরও বড় কম্পনের আশঙ্কা শহরে	খব্র ৩৬৫ দিন
44.	27th April,2015	নাসার নামে গুজবে নাকাল হাওয়া অফিস	আনন্দবাজার পত্রিকা
43.	27th April,2015	ভূকম্প দুই প্লেটের রেষারেষিতেই পাঁচশো হিরোশিমার শক্তি	আনন্দবাজার পত্রিকা
42.	27th April, 2015	কলকাতা সহ দেশের ৪২ শহরে ভূমিকম্পের ভ্রুকুটিঃ রক্ষা পেতে খড়্গপুর আইআইটি'র শরণাপন্ন কেন্দ্র	দৈনিক স্টেটসম্যান
41.	27th April, 2015	Quakes unlikely in Sikkim for next few years, says expert	Hindustan times
40.	27th April, 2015	Expert says, this one was big but the big one is yet to come	News Hour
39.	27th April, 2015	আবার ভূকম্পন, ফের আতঙ্কে কাটল ছুটির দুপুর	এবেলা
38.	27th April, 2015	This one was big but the big one is yet to come, say exparts	www.dhakatribune.com
37.	26th April, 2015	ভারত ও নেপাল আরও ভয়ঙ্কর ভূকম্পের সম্ভাবনা, আশঙ্কা বিষেশজ্ঞদের	এবিপি আনন্দ ওয়েব ডেক্স
36.	7th August, 2014	নগরায়ণের নয়া নীতিতে ভূমিকম্পের সিঁন্দুরে মেঘ	আনন্দবাজার পত্রিকা
35.	7th August, 2014	মহানগরের নীচেই ভূমিকম্পের বারুদ	এই সময়
34.	26th Sep. 2013	আবার সাগরে জাগল কাদা পাহাড়ের দীপ	আনন্দবাজার পত্রিকা
33.	2nd June,2013	কাঁপল কলকাতা, উৎস খুবেই কাছে, সুন্দরবনের নীচে	আনন্দবাজার পত্রিকা
32.	12th April, 2012	সমুদ্র কাঁপিয়েও এলনা সুনামি	আনন্দবাজার পত্রিকা
31.	13th April, 2012	আতি তীব্র ভূমিকম্পের আশঙ্কা উত্তর-পূর্ব জুড়ে	আনন্দবাজার পত্রিকা
30.	13th April, 2012	Indonesians feel lucky after escape from quakes	International
29.	12th April, 2012	আতঙ্ক, গুজবে পথে নামল শহরঃ মৃদু ভূকম্পনে আতঙ্ক দুই মেদিনীপুরে	আনন্দবাজার পত্রিকা
28.	13th April, 2012	মানতে নারাজ বিপর্যয় মোকাবিলা মন্ত্রীঃ ভূকম্পনে কলকাতায় বড়সড় বিপর্যয়ের শঙ্কা ভূতত্ত্ববিদদের	বর্তমান
27.	13th April, 2012	Quake alert: Warning bells for kolkata buildings	The Times of India Kolkata
26.	13th April, 2012	ভূকম্পে সুনামি আতঙ্ক	সকালবেলা
25.	8th Nov.,2011	**'No relation between hydel projects and earthquiakes': Prof. S.K. Nath**	The Daily Encounter Sikkim

24.	8th Nov., 2011	**IIT Prof. rejects hyddel projects as Sept 18 quake suspects**	Sikkim Express
23.	8th Nov., 2011	IIT Kharagpur expert discards all relation between HEP and 18/9 Earthquake in Sikkim	Sikkim Mail
22.	8th Nov., 2011	**'No relationship between earthquake and dydro project': Prof. S.K.Nath**	Sikkim Reporter
21.	8th Nov., 2011	Minister Dhungel inaugurated Earthquake Monitoring Station	Himalayan Mirror
20.	8th Nov., 2011	Earthquake monitoring station inaugurated at Marchak: People should be watchful of building collapse: SIR report	Sikkim Now
19.	मंगलवार, 08 नवम्बर 2011 से अब तक सिक्किम में दो सौ से अधिक भूकंप आ चुका है : प्रो. नाथ		अनुगामिनी
18.	20th Sep. 2011	Kolkata may be facing greater risk, IIT and govt to measure 1 lakh houses damaged	The Indian Express Epicenter (Sikkim)
17.	20th Sep. 2011	The long night after	The Indian Express
16.	19th Sep. 2011	Kolkata in higher quake risk zone : IIT-Kgp	The Times of India Kolkata
15.	19th Sep. 2011	Ministry seeks IIT-Kgp report on earthquake	The Times of India Kolkata
14.	24th Sep. 2011	ভূকম্প প্রবনতা মাপতে সিসমিক মাইক্রোজোনেশন	সকালবেলা
13.	20th Sep. 2011	Kolkata and nearby areas to be mapped for sesimic activity	Indian express.com
12.	16th Dec., 2011	Time for a shake-up	**Special Report**
11.	14th Dec., 2005	মেদিনীপুর ও খড়্গপুরে মৃদু ভূকম্পন	বর্তমান
10.	14th Dec., 2005	মেদিনীপুর ও খড়্গপুরে ভূকম্পন	আজকাল
9.	14th Dec., 2005	মেদিনীপুর ও খড়্গপুরে মৃদু ভূকম্পন	আনন্দবাজার পত্রিকা
8.	बुधवार, 14 दिसम्बर 2005 खड़गपुर में महसूस किये गये भूकम्प के झटके		सन्मार्ग
7.	14 दिसंबर, बुधवार, 2005 खड़गपुर में भी महसूस हए भूकंप के झटके		प्रभात खबर
6.	कोलकाता बुधवार १४ दिसंबर खड़गपुर में महसूस किए गए भूकंप के हल्के झटके		जनसत्ता
5.	बुधवार, 14 दिसंबर, 2005 मेदिनीपुर समेत देश के कई हिस्सों में भूकंप के झटके		दैनिक जागरण
4.	27th Feb., 2005	Tsunami lifts disaster management education	The Asian age Kolkata
3.	26th Feb., 2005	New courses on IIT-Kgp jubilee	The Times of India Kolkata
2.	26th Feb., 2005	IIT Kharagpur plans to raise Rs. 200 crore from research	The Economic times Kolkata
1.	25th Feb., 2005	IIT Charts course to gauge disaster	The Statesman

Contribution of Prof. Nath to Science & Technology during the last 39 years (1981-2020-continuing)

https://en.wikipedia.org/wiki/Sankar_Kumar_Nath

Professor (Dr.) Sankar Kumar Nath, a Senior **Professor** in the ***Higher Administrative Grade*** and a **Former Head** of the Department of Geology & Geophysics at the Indian Institute of Technology Kharagpur has emerged as a leading and prolific Geoscientist in the country and in the international Earth Science Horizon teaching mainstream Classical, Exploration and Computational Geophysics courses, writing Text and Reference books, publishing papers, supervising UG/PG/ Research students, conducting sponsored research and industrial consultancy, setting up strong motion & broadband seismological observatories in the East and Northeast regions of the country, coordinating Mission Projects & Earthquake Engineering Education and Research both in the country as well as at the Institute, collaborating with the Research Agencies in India and abroad. He has been amply successful in making an excellent blend of Exploration & Solid-earth Geophysics and Earthquake Hazard Science & Engineering with front ranking contributions in the delineation of near-surface structures, source, site and ground response characterization and integration for Seismic Microzonation, Vulnerability and Risk Assessment so vitally needed for our country. Immediately after Master's in Exploration Geophysics from IIT Kharagpur he joined Oil Industry serving for nearly a decade working extensively on various facets of Hydrocarbon Exploration and Geophysical Tomography, especially 2D/3D CDP/CMP Seismic Data Acquisition, Processing, Interpretation and Reservoir Seismic Modeling. His innovative research endeavors at IIT for nearly three decades and the Post-Doctoral Research at the Geophysical Institute, University of Alaska, Fairbanks, USA have resulted in the development of many efficient techniques for site-specific studies for disaster mitigation inflicted by earthquakes and in mine disasters in the collieries.

Prof. Nath has diversifying research interests keeping pace with the advancements in geophysical industry and the critical issues inviting global Geoscientific attention. He is one of the very few geophysicists working in India who has embarked on intellectually demanding and challenging aspects of methodological and conceptual developments with an eye to applications to Geophysical and Geo-environmental problems. He developed several algorithms and codes in Seismic Prospecting & Pattern Recognition, Geophysical Tomography, Groundwater Geophysics and Earthquake Seismology. Prof. Nath has been executing a large volume of sponsored projects ever since 1995 primarily in the field of Earthquake Seismology with funding till date exceeding 30 Crores of Rupees from CSIR, DST, MHRD, MHA and the Ministry of Earth Sciences (MoES). His major research focus has been on Seismicity, Physics of Earthquakes, Strong Motion Seismometry, Seismic Hazard, Vulnerability and Risk Microzonation, Computational Geophysics and Geotomography.

Prof. Nath's major contributions in the multi-faceted aspects of Geophysics he remained engaged over a period spanning over three decades and a half can be enunciated under four major groups as highlighted below.

A. Computational Geophysics, Exploration Seismology Hydrocarbon Exploration: Prof. Nath worked extensively in Exploration Seismology and Hydrocarbon Exploration performing **Seismic Waveform Modeling and Geotomographic** imaging of the Near-Surface Anomalies. Prof. Nath's

doctoral research dwelt with the Finite Element Simulation of Seismic Wave Propagation in both two and three dimensions. He introduced a new kinematic condensation technique (e.g., **Computers & Structures**, 1993; **Geophysical Transactions**, 1994) for the semi-infinite prototypes to reduce the nodal degrees of freedom through Fourier transformation and mapping of the nodal variables onto a parametric domain. Simultaneously he had been working on seismic refraction prospecting, developing interpretation packages on workstations. His algorithm based on the principle of ray-inversion for near-surface estimation, downward continuation of refracted rays with the lowering of the observation plane and subsequent stripping of the overlying layer coded in SEISPACK-An "HP-C" program was published in **Computers & Geosciences** (©Elsevier Science Ltd., 1996). This package is more powerful than any of the existing techniques including the commonly practiced generalized reciprocal method (codes available in **Geophysical Prospecting for Groundwater**, Nath et al., ©AA Balkema, 2000). He used signal enhancement engineering seismograph for acquiring seismic refraction data and designed a weight-dropping source for achieving greater depth of penetration. For several years Prof. Nath and his group had been working on **Pattern Recognition** and **Pattern Classification in Seismics** using advanced level non-linear signal processing techniques viz. Hilbert, Hough and Wavelet Transforms, Spectral Decomposition for the extraction of Source Wavelet, Empirical Mode Decomposition, Fractal & Chaos, Back Propagation Neural Network, Genetic Algorithm and Markov Chain Analysis (e.g., **Current Science**, 2007) with special emphasis to phase identification and Simulation of seismic wave propagation, which are directly used in high resolution hydrocarbon exploration and phase picking in Earthquake Seismology (e.g., **Acta Geophysica**, 2003). He performed Fractal Analysis for thin bed stratigraphy (e.g., **Geophysical Prospecting**, 2002) which is vitally needed in reservoir seismic analysis. He performed Seismic Depth Imaging through Layered Tomography, Coherency Inversion, Time Migration and 3D Depth Migration for Chimney detection in a Gas Reservoir and delineation of Horst and Graven structures in a Hydrocarbon Reservoir. He and his group performed Frequency dependent Seismic Attribute Analysis for Fractured Reservoir & Hydrocarbon Play and Time Lapse Seismics. A least area approach of Hough Transform is used by Prof. Nath for pattern recognition in seismic reflection. His group also contributed significantly in Transient Signal Processing by Short Time Fourier Transform and Wavelet Transforms.

The growing need for higher resolution in the subsurface imaging has put '**Geotomography**' at the frontiers of modern exploration geophysics. Prof. Nath ventured into this field and added new analytical approaches for solving forward and inverse problems, some of which are even used in Ultrasonic Medical Tomography. He developed a new forward modeling technique using the Principle of Reciprocity and Dynamic Programming Approach (e.g., **Computers & Structures**, 1997). He also worked on algebraic methods in crosshole seismic tomography. The quest for model-free estimators led him to the field of pattern recognition implementing forward-only counter propagation neural network (e.g., **Geophysical Journal International**, 1999). He slowly moved on to the global optimization and search technique implementing simulated evolution. What stands out in his work is the introduction of a new genetic operator called 'Region-growing mutation' to speed up the search process. The potential of these algorithms is benchmarked on the real field imaging at Raniganj Coalfields (e.g., **Geophysical Journal International**, 1999; **Exploration Geophysics**, 2000). Since crosshole or vertical seismic profiling (VSP) suffered from incompleteness, he along with his graduate students explored the possibility of a combined crosshole-VSP interpretation leading to a complete transmission imaging of the subsurface. He succeeded in doing so using both Simultaneous Iterative Reconstruction Technique (SIRT) and Simulated Evolution (both Genetic Algorithm and Evolutionary Programming). He used fractal analysis for automated first arrival picking. He also performed a complete 3D seismic transmission tomographic interpretation of the Raniganj Coalfield, 2D electrical resistivity tomography (ERT) using Genetic Algorithm, 3D resistivity tomography using Conjugate Gradient method and Quasi-3D subsurface modeling for the identification of galleries in the coal seams, and finally a combined analysis of the SWST and ERT raster images for the enhancement of resolution of the evolved models. He used joint Seismic Transmission and Electrical Resistivity Tomography for the delineation of mine galleries in the Raniganj Coalfield (e.g., **First Break**, 2004).

Recently Prof. Nath with one of his PhD student initiated Convergence Analysis of iterative methods and pseudoinverse approach in global meshless collocation in solving various potential distribution problems in Geophysics (e.g., **International Journal of Applied and Computational Mathematics**, 2016; **Engineering Analysis with Boundary Elements**, 2017). In order to compute the interpolant over

nodes in the domain, a new family of radial basis functions has been used by them, which is a hybridization of a Gaussian and a cubic kernel. Such a hybrid kernel improves the condition of the system matrix and allows the use of infinitely smooth Gaussian kernels with small shape parameters, which often leads to better convergence. Through various numerical tests, they analyzed different node arrangements, and their effect in the algorithm in terms of sparsity, accuracy, condition, eigenvalue stability, and the computational time of the presented approach. They also identified that the presented RBF-FD method does not have the well-known 'pollution effect' at large wavenumbers. As an application, they used the RBF-FD discretization to simulate frequency-domain seismic (acoustic) wave propagation in a 2D homogeneous as well as layered media. In order to suppress spurious reflections from truncated computational boundaries, absorbing boundary conditions are effectively incorporated by them while constructing the discrete operators (e.g., **Geophysics**, 2017).

B. Ground Water Geophysics: Groundwater is the most important component in our life support system. To exploit groundwater resources, one must study the disposition of the water bearing aquifer and the total groundwater potential available. Water shortage occurs alarmingly depending on the regional water balance. Considering that groundwater exploration becomes essential for an advance preparation for probable drought condition, Prof. Nath studied Groundwater Exploration and Modeling covering various facets ranging from Surface-subsurface Geophysics to Remote Sensing and Geographic Information System. He took up a large number of research projects; the most significant among those being the CSIR sponsored "***Development of a joint seismic refraction and geoelectric sounding inversion algorithm for the systematic evaluation of aquifers***". His principal contribution in this field lies in the data processing and interpretation. He developed computer codes for the inversion of VES data using ridge regression aided by singular value decomposition. He also used evolutionary programming for an optimal solution of the model parameters within a specified domain. His book "**Schlumberger Geoelectric Sounding in Groundwater** (Principles, Interpretation and Application) [Patra & Nath]" was published by M/s A. A. Balkema, Rotterdam, The Netherlands (Indian Edition by OXFORD & IBH Publishing Co. Pvt. Ltd.) © 1999. Prof. Nath introduced a joint seismic refraction and DC resistivity inversion scheme in SEISRES in Visual C++ to overcome blind zone problems in seismic, suppression and equivalence problems in geoelectric (e.g., **Computers & Geosciences**, 2000; **Current Science**, 1999). Keeping in view the growing need of GIS in groundwater investigations for potential demarcation, vulnerability assessment, modeling and management, Prof. Nath proposed a GIS integration tool for the demarcation of groundwater potential zones in a soft rock terrain (e.g., **International Journal of Remote Sensing**, 2000). In his technique the subsurface parameters viz. electrical resistivity and thickness of the aquifer, resistivity and thickness of the overburden obtained through sequential inversion at different survey points are contoured by Krigging and the corresponding thematic maps are prepared. These maps along with the physiographical maps of soil, slope, and net recharge are integrated using the Hierarchical Process. Semi-empirical relations worked out between the aquifer parameters derived from sequential inversion of seismic and VES data and hydraulic parameters estimated from pumping tests are used for the assignment of ranks to different aquifer parameters. His group has also been engaged in the delineation of Well Head Protection Area of a medium range public supply well at Keshpal, Midnapore District, in the development of a Combined Geophysical and Hydrogeological Approach for Ground Water investigation around Nazarganj near Kasai River bed, Midnapur Dist., West Bengal and also in performing Earth Resistivity Tomography (ERT). His second book based on the entire spectrum of his groundwater research titled "**Geophysical Prospecting for Ground Water** [Nath, et al.]" © 2000 is also published by M/s A. A. Balkema, Rotterdam, The Netherlands (Indian Edition by OXFORD & IBH Publishing Co. Pvt. Ltd., New Delhi).

C. Earthquake Seismology in Solid Earth Perspective: Prof. Nath has made pioneering contributions in the field of Earthquake Seismology, especially Seismic Microzonation. In the year 1995 he joined the Geophysical Institute, University of Alaska Fairbanks, USA as a Visiting Scientist to work in the project "***Seismic Microzonation of Anchorage***". He conducted surface measurements for high frequency Rayleigh

waves to estimate shear wave velocity at thirty-six sites in the 0-50m-depth range and formulated linear regression relations between the surface and down-hole shear velocities and blow counts (e.g., **Earthquake Spectra**, 1997; **Seismological Research Letters**, 1996, 1997, **Geophysical Journal International**, 2000). His significant contribution, however, is in the estimation of site response (SAF) in Anchorage using IRIS-PASSCAL short-period 3-component weak motion sensors and Reftek recorders. From the direct S-wave spectra corrected by that of the background, the receiver-function-type horizontal-to-vertical spectral ratios as representative of SAF were computed by him and his group at 1-9 Hz frequency band and correlated with the soil susceptibility zonation in Anchorage (e.g., **PAGEOPH**, 2002). Using about 42 events he computed the receiver function-type site response for Sikkim (e.g., **Current Science**, 2000, **JGR**, 2005). He recently estimated site response in Sikkim covering Lesser Himalayas and Siwaliks using receiver function, standard spectral ratio and generalized inversion using 150 strong motion events with the magnitude M_w between 3 and 6.5. He has also established the shear-wave attenuation relation in the South-central Sikkim. Prof. Nath and his group were engaged in Seismic source parameterization**,** Seismicity analysis, fractal analysis and maximum earthquake prognosis for Northeast India (e.g., **Journal of Seismology**, 2008, **PAGEOPH**, 2008), Northwest Frontier Seismic Province (e.g., **SRL**, 2009), the entire Indian Territory and South Asia (e.g., **Natural Hazards**, 2016) using the earthquake catalogue and the fault, fracture and tectonic framework. The compilation has been done by them for the existing records of earthquake occurrences covering a period of 2004 years (0010-2014AD) in the form of a homogenous earthquake catalogue in a Generic M_W Scale.

Teleseismic data recorded at the broadband seismological observatory of the Indian Institute of Technology (IIT) Kharagpur are analyzed by his group to determine the seismic characteristics of the crust beneath the western Bengal basin. Receiver functions calculated from the teleseismic P waveform for a range of back azimuths show little variation in the Moho Ps arrival time, indicating a nearly one-dimensional crustal structure beneath Kharagpur. Transforming the time domain receiver functions into the H-Vp=Vs domain for a stack of all receiver functions reveals a 38 ± 2 km thick crust with a Vp/Vs of 1:73 ± 0:01 (e.g., **BSSA**, 2008). His group also imaged the Crustal Structure beneath the Darjeeling-Sikkim Himalaya from Teleseismic Receiver Functions (e.g., **EOS Trans**, 2006).

The finite fault algorithm is used by Prof. Nath to estimate the source characteristics along the rupture plane (e.g., **SRL**, 2009). The fault rupture area estimated by him shows an increasing trend with the magnitude as is expected. The rupture area for the scenario earthquake can also be estimated using a similar procedure as adopted by him. The inference of an average stress drop of 65 bars can be considered adequate for the estimation of seismic scenario in the Sikkim Himalayan region. The average stress drop in the Sikkim Himalaya has been found to be less than that in the Garhwal Himalaya, which can be attributed to different tectonic environments and earthquake mechanisms. MCT, a brittle shear zone, is a major contributor in the Garhwal Himalaya, while MBT, a ductile shear zone, controls the seismicity in the Sikkim region. The results obtained by Prof. Nath and his group are extremely useful in understanding the source mechanism and rupture processes in the complex tectonic settings of the Sikkim and Garhwal Himalaya thus providing a realistic picture of propagation of energy, Q_s and Source Parameterization in those territories as well as in the Guwahati Region from Seismic Analysis from Northeast India.

Fractal analysis performed by Prof. Nath and his group using boxcounting method for the major fault networks across the country estimates fractal dimension, Df, values to be varying between 0.88 and 1.36. The fault segments in parts of northwest Himalayas, northeast India and Indo-Gangetic plains, are observed to be associated with higher Df values implicating high seismicity rates. On the other hand, low Df values in the peninsular India indicate isolated pattern of the underlying faults. The fractal dimension is observed to be indicative of predominant faulting types – higher values conforming to thrust faulting mechanism while lower to strike slip tectonism (e.g., **JGSI**, 2011).

Layered Seismogenic Source Zonation is performed by Prof. Nath for the Indian Subcontinent by Modeling Time-Independent Seismicity Employing an M_w Consistent Earthquake Catalog after updating the appropriate Depth Entries. Three models of gridded seismicity represented by activity rates at regular interval of 0.1° were constructed by applying Gaussian smoothening. For each seismogenic layer, three sub-catalogs covering different temporal spans were used, which prescribe to threshold magnitudes of M_W

4.0, M_W 4.5 and M_W 5.5, respectively. The computed models exhibit strong conformity to the distribution of tectonic fabrics in India (e.g., **SRL**, 2012). These finally culminated into the development of a next generation Probabilistic Seismic Hazard Model of India at Engineering Bedrock (e.g., **SRL**, 2012).

Prof. Nath and his research students worked out Functional Relation for Earthquake Interarrival Times and Magnitude for Source Zones from Northeast India and Surrounding Region. While combined with the time lapse since the last earthquake of a given magnitude, it describes the seismic activity rate in the time-dependent Probabilistic Seismic Hazard Analysis. The lognormal model is fitted to understand the variation in interarrival time computed from the complete catalog by selecting two time windows A and B based on the time completeness test. The coefficients of the lognormal model as estimated from both the time widows of the complete catalog exhibit mild differences limited to ± one standard deviation uncertainty in the coefficient which is found to decrease with an increase in the catalog time window length (e.g., **Annals of Geophysics**, 2017).

Prof. Nath and his group have drawn new insights into Path Attenuation of Ground Motions in NE India and NW Himalayas (e.g., **BSSA**, 2011). In this work Source-normalized vertical-component Fourier amplitude S-wave spectra are used by them to study path attenuation characteristics, namely, geometrical spreading and quality factor, in the two regions. A trilinear model of geometrical spreading of $R^{-1.0}$ for hypocentral distance R < 125 km, $R^{0.0}$ for R between 125 km and 140 km, and $R^{-1.0}$ for R > 140 km approximates the decay of low-frequency (1.0 Hz) amplitudes in Northeastern India better than the conventional theoretical bilinear geometrical spreading of $R^{-1.0}$ for R < 100 km and $R^{-0.5}$ otherwise. In the Northwestern Himalaya, the geometrical spreading is found to be $R^{-1.0}$, which is the same as that of a bilinear model at hypocentral distances R < 100 km. In Northeastern India, normalized Fourier spectra corrected for geometrical spreading yields shear-wave quality factor as a function of frequency in the frequency range of 0.9–20 Hz.

D. Seismic Hazard, Vulnerability, Risk in Earthquake inflicted Disaster Mitigation & Management: Prof. Nath made pioneering contributions in Earthquake Disaster Mitigation and Management by performing **Strong Ground Motion Analysis and synthesis** in the near and far field by Stochastic, Analytical, Empirical Green's Function Approaches and Spectral Element Modeling with front ranking achievements in generating a Seismic Scenario in Guwahati and Sikkim Himalaya (e.g., **SRL**, 2009), 3D Spectral Element Simulation of the 1934 Bihar Nepal Earthquake of Mw 8.1 towards understanding the Wave Propagation and Seismic Hazard Scenario in the Sikkim Himalaya, 3D Spectral Element Simulation of the MCE of Mw 8.3 activated from the Sikkim Earthquake of February 14, 2006 at the epicentral location of 27.22 ^{0}N, 88.64^0 E at the focal depth of 19 km towards understanding the wave propagation and Seismic Hazard Scenario in the Sikkim Himalaya for the Maximum Credible Earthquake as the near field source.

His group has also been engaged in predicting Peak Ground Motion in India in the light of the New Generation Attenuation Models with specific contributions to developing Attenuation Models for the Northeast India, Sikkim Himalaya, Shillong region, Garhwal Himalaya, Northwest Frontier Seismic Province, Koyna-Warna Region, Central Indian Peninsular Shield, Gujarat, Western India, Bengal Basin, East-central Himalaya and 42 Cities in India falling in BIS Seismic Zones III, IV and V. Following the assessment criterion of Nath and Thingbaijam (2011), they developed 42 Next Generation Attenuation Models for hazard computation at the standard engineering bedrock conforming to Vs^{30}~760 m/s (defined as boundary site-class BC). He has also made an appraisal of all the available Peak Ground Motion Prediction equations in India for rock sites (e.g., **Journal of Seismology**, 2011) as an attempt towards consorted use in a logic tree framework for Probabilistic Seismic Hazard Assessment of any earthquake prone terrain in India.

Site classification is another very important contribution of Prof. Nath wherein he employed generic subsurface conditions towards seismic response of soil following NEHRP and UBC regulations in both the local and regional scale with specific contributions to the delineation of Spatial Variation of Shear Wave Velocity with High-Frequency Rayleigh Waves in Anchorage, Alaska (e.g., **Earthquake Spectra**, 1997, **Geophysical Journal International**, 2000), Topographic gradient based site characterization in India complemented by strong ground motion spectral attributes (e.g., **Soil Dynamics and Earthquake**

Engineering, 2013) wherein he appraised topographic-gradient approach for site classification that employs correlations between 30 m column averaged shear-wave velocity and topographic gradients. Assessments based on site classifications reported from cities across India indicate that the approach is reasonably viable at regional level. His group has also performed Local Specific Assessment of Seismic Site Conditions in Kolkata, Guwahati and Bangalore City through Geophysical & Geotechnical Investigations (e.g., **PAGEOPH**, 2010; **Soil Dynamics and Earthquake Engineering**, 2017). He has also performed estimation of S-Wave Site Response in and around Delhi Region from Weak Motion Data (e.g., **JESS**, 2003), Site Response Study in the Sikkim Himalaya Using Strong Motion Data (e.g., **JGR**, 2005), Macroseismic-Driven Site Effects in the Southern Territory of West Bengal (e.g., **SRL**, 2010), Correlation Study of Shear wave velocity in near surface geologic formations in Anchorage, Alaska (e.g., **Earthquake Spectra**, 1997), determination of Site Factor in and around Rhine Graben, France in the 1-11Hz Frequency band by Non-reference Network Average Technique, Site Response Study by Shear-wave Spectral analysis using the 1999 Chamoli Earthquake sequence in Garhwal Himalaya (e.g., **BSSA**, 2002), Microtremor survey in Talchir, India to ascertain its basin Characteristics in terms of predominant frequency by Nakamura's ratio technique (e.g., **Engineering Geology**, 2009).

Fundamental studies have been carried out by Prof. Nath and his group to deliver the hazard components that includes seismogenic source zonation and seismicity modeling in the Indian subcontinent, assessment of site conditions across the country, and suitability test for the ground-motion prediction equations in the regional context. These components are integrated to deliver a preliminary model comprising of spatial distributions of Peak Ground Acceleration (PGA), and 5%-damped Pseudo Spectral Acceleration (PSA). He has developed a new generation Probabilistic Seismic Hazard Model of India at engineering bedrock alongwith design response spectra derived through a logic tree framework using a host of new generation attenuation models, smoothening seismicity, layered polygonal seismogenic sources and topography-based site characterization (e.g., **SRL**, 2012). This PSHA Model of India and surroundings [IND]-2012 developed by ***Nath and Thingbaijam (2012, SRL)*** has recently been revised and implemented (2018) into the Open Quake engine and adopted by Global **Earthquake Model ©GEM2018** into Global Seismic Hazard Map: at: https://hazard.openquake.org/gem/images/gem_global_seismic_hazard_map_v2018.1.pdf and https://www.globalquakemodel.org/gem . He and his group also performed Probabilistic Seismic Hazard Assessment of Darjeeling-Sikkim Himalaya (e.g., **IREHM**, 2013), Probabilistic seismic Hazard Assessment of Kolkata City (e.g., **NHESS**, 2014), Probabilistic Seismic Hazard Model of West Bengal (e.g., **Journal of Earthquake Engineering**, 2016), Probabilistic Seismic Assessment of Kashmir Valley (e.g., **Journal of Seismology**, 2016), Probabilistic Seismic Hazard and Damage Modeling in Indo-Gangetic Foredeep region with special emphasis to the City of Patna, Lucknow and Varanasi (**Journal of Seismology**, 2019) Probabilistic Seismic Hazard Assessment for Gujarat Western India, Probabilistic and Deterministic Seismic Hazard Assessment for Koyna-Warna Region, Time Dependent (Brownian Passage Time Recurrence Model) and Time Independent (Poisson Model) Probabilistic Seismic Hazard of Guwahati. Prof. Nath has just accomplished Probabilistic Seismic Hazard Assessment of 40 cities in India at firm rock site condition that fall in Seismic Zones III, IV and V on project mode from the Ministry of Earth Sciences, Govt. of India. The hazard computation is performed on grid-points covering the entire study region (each city) at a spacing of 0.0005^0. Logic tree framework is employed in the computation at each site to incorporate multiple models in source considerations, GMPEs (a total of 42 Next Generation Attenuation Models have been generated for the 11 seismotectonic provinces viz. (i) Bengal Basin, ii) Indo-Gangetic Plain, (iii) Central India, (iv) Kutch Region, (v) Koyna Warna Region, (vi) Western Ghat Region, (vii) Eastern Ghat Region, (viii) Kashmir Himalaya, (ix) West Central Himalaya, (x) Darjeeling-Sikkim Himalaya, and (xi) Northeast India as a part of this study) and the seismicity parameters. The hazard distributions are computed for the source zones at each depth-section separately, and thereafter, integrated. The preliminary model has comprised of spatial distributions of seismic hazard in terms of Peak Ground Acceleration (PGA) and 5%-damped Pseudo-Spectral Acceleration (PSA). Their work plan followed: (a) Mapping of all the faults, both exposed and concealed, in and around all the Cities covering at least 500 km radius and classify those according to their authority and age of movements, (b) Preparation of a seismotectonic map of an area of 500 km radius around each Tectonic Province, listing and plotting of all past-earthquake events with precise magnitude and depth of each event, (c) Interpretation of satellite imagery for lineaments, geological details and geomorphological characteristics, (d) Developing Next Generation Attenuation relationships for eleven tectonic provinces, (e) Smoothened

Seismicity analysis for simulating activation rate on a gridded map on GIS platform for both the areal and line sources, (f) Layered Polygonal Seismogenic Source Framework for hypocentral depth ranges 0-25km, 25-70km,70-180km, >180km, (g) Seismicity Analysis and Maximum Earthquake Prognosis to determine b-value, a-value and Mmax, and (h) Probabilistic Seismic Hazard Assessment at $0.0005^0 \times 0.0005^o$ grid spacing. **The Probabilistic Seismic Hazard Atlas of these 40 Cities** have already been published by the Ministry of Earth Sciences (@MoES, 2017, 500p)

Taking a clue from his work on Seismic microzonation of Anchorage, Alaska Prof. Nath was the first to introduce the technology in India through his maiden venture in the earthquake ravaged Himalayan State of Sikkim with the sole objective of updating the existing building codal provisions for enhanced seismic safety. With his initiative and insistence on the Governmental Agencies, the microzonation effort gained momentum in India. Prof. Nath and his group Integrated the Geomorphological and Seismological attributes following an Analytical Hierarchy Process (AHP) or a Fuzzy Logic Protocol for Seismic Microzonation on an urban block-by-block scale for Sikkim Himalaya (e.g., **Natural Hazards**, 2004, **JAES**, 2005, **Natural Hazards**, 2008, **JESS**, 2008), Darjeeling-Sikkim Himalaya, Greater Guwahati City (e.g., **NHESS**, 2009) , National Capital Territory of Delhi (e.g., **Natural Hazards**, 2007), Bangalore Mega-City (e.g., **JAES**, 2010), Chennai, Jabalpur, Jammu, Dehradun, Urban Kolkata (e.g., **NHESS**, 2014, 2015, **Journal of Seismology**, 2018), Kashmir Valley (e.g., **Soil Dynamics and Earthquake Engineering**, 2016; **Journal of Seismology**, 2016) to predict exposure to ground-shaking levels and vulnerability to soil liquefaction. They performed detailed analyses of Liquefaction Susceptibility in all the alluvial terrains of Kolkata, Kashmir Valley, Guwahati Megacity and others and quantified Liquefaction Risk, Probability of Liquefaction, Factor of Safety against Liquefaction and Liquefaction Potential Index of all the Cities they microzoned (e.g., **JAES**, 2010; **Soil Dynamics and Earthquake Engineering**, 2016; **Journal of Seismology**, 2016; **Geomorphology**, 2017; **Soil Dynamics and Earthquake Engineering,** 2017, **Journal of Seismology**, 2017). These hazard maps produced through integrated holistic microzonation endeavor deliver enhanced detailing with a better representation of the local specific seismic hazard variation that is ready for adaptation for updating the existing building codes.

The necessity of evaluating seismic risk in terms of damage potential of structures and socio-economic set-up of built-up regions due to deadly earthquakes has become an important issue in seismic disaster mitigation and management in the Indian context. The number of earthquake impacted fatalities is associated with the vulnerability of local buildings, population density and the intensity of ground shaking. Vulnerability Exposure refers to all man-made facilities namely, the residential, commercial, and industrial buildings, schools, hospitals, roads, bridges, pipelines, power plants, communication systems, and so on. For the safety and sustainability of urban regions, it is, therefore, imperative to implement long-range urban planning and risk assessment tools that rely heavily on accurate and multidisciplinary urban modeling as Prof. Nath and his group achieved for the city of Kolkata (e.g., **NHESS**, 2015; **Soil Dynamics and Earthquake Engineering**, 2017) based on the preparation of inventory database/ seismic vulnerability exposures i.e. demography, building typology, building footprints, building age and landuse/landcover patterns, Accuracy Statistics for validation of Building Height, Building Typology, Building Age and Landuse/Landcover attributes with Field Survey/Ground truthing. His group has also been successful in Seismic Vulnerability & Risk Assessment of Darjeeling-Sikkim Himalaya. Prof. Nath also implemented SELENA & HAZUS based Seismic Damage Scenario and Loss Estimation for both Kolkata and Darjeeling-Sikkim Himalaya. For Kolkata the surface consistent probabilistic seismic hazard model of the City for 475 years of return period have been used for modeling of damage potential of buildings, human casualty and economic loss employing SELENA in a relational analysis protocol considering eleven model building types. The demand spectrum curve of a spectral acceleration through a judicious interaction with the building capacity curve and fragility curve yields the damage state probability of the same in terms of slight, moderate, extensive and complete. Human casualty levels are also computed using SELENA for three different times of the day viz. Night, Day and Commuting time. The economic loss to the tune of ~231 billion of Indian Rupees due to building damage only have been estimated within 300 socioeconomic clusters in the City (**Journal of Rehabilitation in Civil Engineering**, 2017**)**. It is expected that this model will go a long way in safe urbanization process with well-defined disaster mitigation and management guidelines for the city of Kolkata.

Apart from the main stream Geohazard regime Prof. Nath and his group also indulged in Landslide Hazard and Risk Analysis in India at a Regional Scale (e.g., **Disaster Advances**, 2011), Disaster mitigation and management for West Bengal (e.g., **Current Science**, 2008), Slope stability analysis and mitigation measures of Greater Gangtok region using near-surface Geophysics and Geotechnical Investigations. GIS based Landslide Susceptibility Mapping is already performed for Greater Gangtok region and Land Subsidence Modeling is performed for the region using D-InSAR Technique (e.g., **Earth Surface Processes and Landforms**, 2017**).** Earthquake precursory study (e.g., **Current Science**, 2007) using nonlinear dynamical approach has been undertaken by Prof. Nath and his group to identify highly stressed region, an asperity from where the rupture propagation eventually nucleates.

Prof. Nath introduced and sustained a program on "***Man Power Development in Computational Seismology***" through a 24-month M.Tech. Programme at IIT Kharagpur and also helped Tejpur University, Assam in the same effort on mission mode from the Department of Science & Technology, Govt. of India launched in the year 2003 to cater specialized manpower to Earthquake monitoring and seismological research Institutions and Industry. After the 2001 Bhuj Earthquake he coordinated the "***National Programme in Earthquake Engineering Education in India"*** on behest of MHRD and the "***National Programme for Capacity Building of Engineers in Earthquake Risk Management***" initiated by MHA. He is also the institute coordinator of the "***National Earthquake Risk Mitigation Programme***" of the National Disaster Management Authority (NDMA). *As the Nodal Coordinator* of the multi-organizational DST and MoES Projects on "***Seismic Hazard Microzonation and Evaluation of Vulnerability & Risk of Sikkim Himalaya, Guwahati Megacity, Urban Kolkata and Kashmir Valley***" he has been the lead researcher and author of the Seismic Microzonation Atlas of Sikkim and Guwahati published in the years 2006 and 2007 and that for Kolkata in 2016 under the aegis of DST and MoES respectively. He chaired the Seismic microzonation endeavor of Bangalore Megacity and participated in the investigation for NCR Delhi. The results of these consorted site-specific microzonation efforts per UBC/NEHRP/IBC nomenclature are to be adopted in BIS Building Codes for revised urban seismic safety regulations. Under the aegis of MoES he authored two Mega-volumes viz. "**Seismic Microzonation Handbook**" and "**Seismic Microzonation Manual**" encapsulating bench-marked principles and homogeneous protocol for the usage of the seismologists and earthquake engineering community. Both the Handbook and the Manual published under the aegis of the Ministry of Earth Sciences, Govt. of India and released in the year 2011 by the Hon'ble Minister of Science & Technology and Earth Sciences, Govt. of India are widely circulated amongst the urban development institutions in India and abroad. He jointly edited a "**Training Handbook for the Faculty of State Resource Institutions"** under the aegis of the Ministry of Home Affairs for capacity building in earthquake risk management in the country.

Although he has long-term seismological research collaboration with the Bullard Laboratories, University of Cambridge, the Geophysical Institute, University of Alaska Fairbanks and NORSAR, Norway almost all his research work has been carried out in India only. He is a Member of the Seismological Society of America (SSA), American Geophysical Union (AGU) and a Complimentary Member of the European Geosciences Union (EGU). As a member of the National Steering Committee and the Chairman of the Technical Committee formed by the Ministry of Earth Sciences for '***Microzonation of Selected Cities in India***' he plays a pivotal role in the decision making and policy framing for the systematic seismic hazard microzonation, vulnerability and risk assessment of 40 mega cities and urban centers in the country. He has just accomplished the Probabilistic Seismic Hazard Assessment of these cities and encapsulated the results in a 500 page volume "***Probabilistic Seismic Hazard Atlas of 40 Cities in India***" under the aegis of the Ministry of Earth Sciences, Govt. of India.

As an Educationist with 14 PhD supervisions, 01 under submission and 07 more in progress, 02 M.S. by Research, 35 M.Tech. and more than 170+ MSc dissertations to his credit, he has helped revamp course and curricula of Applied and Pure Geophysics, Geophysical Technology and Geological Sciences in several Institutions and Universities in India namely IIT Bombay, IIT Roorkee, ISM Dhanbad, IIT Bhubaneswar, Utkal University etc. He has around 250 technical publications in peer-reviewed high impact factor SCI rated journals and the proceedings of Seminars and Conferences and 12 Books/Atlas with over 2454 citations, h-index:32, i10-index:80 and G-index:64. He is a member of the Editorial Board of both the *International Journal of Earthquake Engineering and Hazard Mitigation* and *ISET Journal of Earthquake Technology*. He has been a reviewer of several archival journals at both the National and International level; Geophysical Journal International, Seismological Research Letters, PAGEOPH,

Journal of Earth System Science, Journal of Seismology, International Journal of Earth Sciences, Natural Hazards and Earth System Sciences, Soil Dynamics & Earthquake Engineering, Engineering Geology, Environmental Geology are to name a few among them.

Prof. Nath is nominated as member of various National Committees under MHRD, MHA, NDMA, MoES, CSIR and a number of Governmental Award Advisory Committees.

In recognition of his outstanding Scientific & Technological contributions, Prof. Nath has been awarded several Awards/ Prizes/ Academy Fellowships/ Laurels and Distinctions, the most iconic amongst those being the "***Shanti Swarup Bhatnagar Prize for Science & Technology***" in *Earth, Atmosphere, Ocean and Planetary Sciences* awarded by the **Council of Scientific and Industrial Research** in the year 2002 for his outstanding and significant contributions to '*Geotomography and its innovative applications'*.

The contributions of Professor Nath are marked by intellectual rigor and personal commitment to high scientific purpose manifestly exhibited in the quality of his scientific publications, the laurels and distinctions achieved by him so far and his involvement in the National and International Programs. The results he has achieved so far through his incessant and painstaking research are all directed towards improving the economy, life-style and security of mankind, in general, and of the society and people in India, in particular. Nevertheless, the benefits from his research will be reaped by the entire humanity for years to come.

I also had the experience of providing leadership to a large number of data processing groups and running seismic camps in remote areas during my tenure in the OIL Industry. I have developed a large number of infrastructures, laboratories and observatories at the Department, Institute and Community level in different capacities, with funds from the sponsored projects, Department and the Institute. As the Head of the Department I provided leadership to a fairly large Department of Geology and Geophysics for a three years' tenure during the year 2003-2006. As a member of various National Committees under MHRD, MHA, NDMA, MoES, CSIR and a number of Government Advisory Committees and International Science & Technology Forum I am aware of the challenges India is facing in the Higher Education Sector.

India's Higher Education System faces Challenges on Three Fronts:

1. Expansion:

· India's GER of16% was much below the world average of 27%, as well as that of other emerging countries such as China (26%) and Brazil (36%) in 2010.

2. Excellence:

· Faculty Shortage: As per a conservative estimate there is 40% and 35% shortage of faculty in State and Central Universities, respectively.

· Accredited Institutions: 62% of Universities and 90% of Colleges were average or below average in 2010, on the basis of their NAAC accreditation.

3· Low Citation Impact: India's relative citation impact is half the world average.

Challenges to drive to Vision-2030: towards a brave new world of Higher Education

1. India will have the largest population in the world, in the higher education age bracket by 2030; increasing urbanization and income levels will drive demand for higher education.

2. India's economy is expected to grow at a faster pace; industry and service sectors will further dominate the economy.

3. Industry and service sectors in India would require a gross incremental workforce of ~250 million by 2030; India could potentially emerge as a global supplier of skilled manpower.

4. Further, India has the opportunity to become a prominent R&D destination:

a. Top Indian companies have reported the largest growth in R&D investment in FY12 (with a 35% y-o-y growth); this compares with China's 28.8%, the EU's 8.9% and the US' 9%.

b. World class R&D facilities are being set up for several industries in India, including chemicals, automobiles, life sciences, electronics, and technology.

c. The Union Ministry of Science and Technology and RIKEN, Japan's largest research organization, has signed a Memorandum of Understanding (MoU) to launch joint research programs

d. Kishore Vaigyanik Protsahan Yojana (KVPY) has been initiated and Innovation in Science pursuit for Inspired research (INSPIRE) Scheme has also been launched to promote research career.

With the above challenges in mind I can transform an Institution into having a Global identity with the culture of research and development, innovations, intellectual property development, entrepreneurship and incubation through the use of modern Educational Technology & ICT, strong Faculty Development Programs and through a collaborative model both Nationally and internationally to turn it into a World Class University having a concentration of talent, abundant resources and favorable governance interconnected with each other.

As a full Professor with about 39 years of professional experience in Industry-Academia of which around 32 years in the IIT System itself with about 10 years in the Higher Administrative Grade (HAG+) out of a 16 years' period as a full Professor with the requisite technological, managerial and leadership skills and dynamism and possessing significant experience in the development and implementation of key strategies in the Institutional, National and International arena, I am confident, I can build positive and productive interpersonal relationships. I command the abilities of an effective leader, with the vision and skills to motivate and manage people, demonstrating an appropriate balance between empowerment, support and assertiveness to maintain a high performance culture. I feel I am courteous, but can be firm when necessary. I am comfortable with the pressures and high level of accountability and associated responsibilities. I am ready to take complete responsibilities of strategic planning and policy development of an Institution/ University of higher magnitude of Global Brand. I can address the essence of quality management, quality research, quality human capital, quality teaching and learning, international linkages, quality infrastructure, and university ranking. With all these qualities I consider myself ready with a clear-cut vision towards achieving Educational Excellence and Research & Development Excellence by taking up the top Academic-Administrative position of Vice-Chancellor/ Director of a top notch University/ Institution.

I have a dream of a brand through the transformational themes like Research Excellence, Faculty Excellence, Visibility, Strong Industrial Collaboration, Financial Self Reliance and Effective Governance that can directly fit itself into cherishing "Vision 2030" and empower the youth of the country.

I hereby, declare that all the statements/particulars made/furnished above are true, complete and correct to the best of my knowledge and belief.

3rd September, 2020, IIT Kharagpur

Prof. (Dr.) Sankar Kumar Nath, *FNAE, FNASc, FAScT, FWAST.*
Ph.D. (IITKGP), Post-Doc (GI, UAF, Alaska, USA)
Shanti Swarup Bhatnagar Laureate (CSIR)
Distinguished Scientist Awardee
Fellow, Indian Geophysical Union (IGU)
Complimentary Member, European Geosciences Union (EGU)
Member Academic Council, Assam Central University, Silchar
Professor [Higher Administrative Grade (HAG- Level 15)]
Former Head
Department of Geology & Geophysics
Indian Institute of Technology Kharagpur
Kharagpur Technology -721302, Midnapore (West), West Bengal, INDIA.
Phone#:+913222 283374, 220042 (O)

283375, 277757 (R)
Cell# : 09434005953, 09734634942
Fax # : +91 3222 220042 / 282268
Email : nath@gg.iitkgp.ernet.in
nathsankarkumar@gmail.com
Website: https://en.wikipedia.org/wiki/Sankar_Kumar_Nath
http://iitkgp.ac.in/department/GG/faculty/gg-nath

MAJOR AWARDS, HONORS, LAURELS & DISTINCTIONS:

COUNCIL OF SCIENTIFIC & INDUSTRIAL RESEARCH, INDIA

SHANTI SWARUP BHATNAGAR PRIZE

FOR

SCIENCE AND TECHNOLOGY

2002

CITATION

Dr Sankar Kumar Nath

The Shanti Swarup Bhatnagar Prize for the year 2002 in Earth, Atmosphere, Ocean and Planetary Sciences has been awarded to Dr Sankar Kumar Nath of the Indian Institute of Technology, Kharagpur. Dr Nath has made outstanding contributions to geotomography and its innovative applications.

(Raghunath Anant Mashelkar)
Director General
Council of Scientific & Industrial Research &
Secretary, Department of Scientific & Industrial Research

(Atal Bihari Vajpayee)
President
Council of Scientific & Industrial Research &
Prime Minister of India

New Delhi
12 July 2003


12 जुलाई 2003

भारत सरकार

खान मंत्रालय

GOVERNMENT OF INDIA
MINISTRY OF MINES

सत्यमेव जयते

राष्ट्रीय खनिज पुरस्कार 1999
National Mineral Awards 1999

डॉ० शंकर कुमार नाथ को उनके द्वारा भूभौतिकी के क्षेत्र में उत्कृष्ट योगदान के लिये मान्यतास्वरुप राष्ट्रीय खनिज पुरस्कार 1999 से सम्मानित किया जाता है।

Dr. Sankar Kumar Nath is conferred the National Mineral Award for 1999 in recognition of his distinguished services in the field of Geophysics.

सुन्दर लाल पटवा
खान मंत्री
भारत सरकार
Sundar Lal Patwa
Minister of Mines
Government of India

दीपक चटर्जी
सचिव, भारत सरकार
खान मंत्रालय
एवं
अध्यक्ष, पुरस्कार निर्णायक प्राधिकरण
Dipak Chatterjee
Secretary, Government of India
Ministry of Mines
and
Chairman, Award Making Authority
on National Mineral Awards

नई दिल्ली, दिनांक: 16 जनवरी, 2001
New Delhi, Date : 16th January, 2001

ज्ञान-विज्ञान विमुक्तये

UNIVERSITY GRANTS COMMISSION

UGC-HARI OM ASHRAM TRUST NATIONAL AWARDS

HOMI J. BHABHA AWARD FOR APPLIED SCIENCES

for the year 2004

to

Dr. SANKAR KUMAR NATH
Department of Geology and Geophysics
Indian Institute of Technology
Kharagpur - 721302, West Bengal.

Citation

Prof. Sankar Kumar Nath emerged as one of the leading and prolific Geophysicist of the country having made outstanding scholarly contributions towards developing techniques of geophysical exploration and for strategies better mitigation of disaster in mines as well as earthquake hazards. Front ranking new contributions made by him in Earth Science include: (i) Finite element simulation of seismic wave propagation through kinematic condensation of the nodal degrees of freedom, (ii) Pattern recognition in exploration and earthquake seismology using Hilbert, Hough and Wavelet transforms, Fractal analysis and genetic alrorithm, (iii) Development of seismic-geoelectric sequential inversion algorithm and a GIS integration tool for groundwater potential modeling, (iv) A new forward-modeling algorithm in cross-hole-VSP tomographic inversion, pattern recognition by algebraic reconstruction, forward-only counter propagation neural network, and simulated evolution techniques, (v) Seismic hazard assessment & microzonation of the Sikkim Himalaya and Guwahati Region, Seismic hazard scenario of the Garhwal Himalaya, (vi) Precursory study of large earthquakes through fractal correlation dimension and fuzzy logic approaches, (vii) Receiver function, surface wave and teleseismic tomographic imaging of the crust and mantle to understand the uplift and support of the Himalaya Mountains and Tibet

New Delhi
July 20, 2006

Prof. Sukhadeo Thorat
Chairman
University Grants Commission

THE NATIONAL ACADEMY OF SCIENCES, INDIA

SANKAR KUMAR NATH

has been elected
FELLOW
of
The National Academy of Sciences, India
in **2003**
for his/her contributions in the field of

GEOPHYSICAL TOMOGRAPHY/SEISMOLOGY, SEISMIC PROSPECTING & MICROZONATION/PATTERN RECOGNITION IN GEOPHYSICS.

GENERAL SECRETARIES

PRESIDENT


Indian National Academy of Engineering
INDIAN NATIONAL ACADEMY OF ENGINEERING
ESTD-1987
Elects
Sankar Kumar Nath
as
Fellow
of
The Academy
on the 18th day of September 2006
Witness our hand and seal at New Delhi
This 1st day of January 2007
Executive Secretary
President
Member

WEST BENGAL ACADEMY OF SCIENCE AND TECHNOLOGY

WEST BENGAL ACADEMY OF SCIENCE AND TECHNOLOGY

Prof. Sankar Kumar Nath

has been elected Fellow of the
West Bengal Academy of Science and Technology
in the year 2016
for his notable contributions
in the field of

EARTHQUAKE AND ENGINEERING SEISMOLOGY

(Section V : Earth & Planetary Sciences)

Rajendra N. Basu
Secretary

Dhrubajyoti Chattopadhyay
President

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE
ROORKEE

A.S. ARYA-IITR DISASTER PREVENTION AWARD – 2009

Prof. Sankar Kumar Nath, Geology and Geophysics Department, Indian Institute of Technology Kharagpur is honoured with A.S. Arya - IITR Disaster Prevention Award of Rs. 50,000/- and a Citation for his Outstanding Contribution in the area of Disaster Prevention/ Mitigation.

ROORKEE
November 14, 2009

S.C. Saxena
Director

INDIAN INSTITUTE OF TECHNOLOGY ROORKEE

AS-ARYA DISASTER PREVENTION AWARD-2009

CITATION

Prof. Sankar Kumar Nath

Prof. Sankar Kumar Nath, IIT Kharagpur, has worked extensively on various facets of the application of quasi-linear Physical/Geophysical concepts, Intrinsic & Transient Signal Processing and *Computational* Geophysical techniques including pattern recognition, Pattern classification, finite fault dynamic rupture propagation, Stochastic modeling, F-K simulation, Kinematic Condensation based Finite Element modeling in Seismic and random vibration methodologies in the branch of Engineering Seismology, Seismic Hazard & Microzonation and Geophysical Tomography.

Prof. Nath's work on seismic hazard is distinguished by data acquisition, nonlinear signal analysis, delineation of near-surface structures, source, site and ground response characterizations, seismic waveform modeling and eventually integrating the seismological attributes with geological, geomorphological and geotechnical hazard attributing signatures in a holistic hierarchical/fuzzy framework for Seismic Microzonation of the Sikkim Himalaya and Greater Guwahati City. He played an active role in the seismic microzonation of the capital city of Delhi and the megacity of Bangalore as well.

His innovative research endeavors resulted in the development of more efficient techniques of Earthquake Seismological data analysis. The results that he has achieved so far through his incessant research are all directed towards improving the economy, life-style and security of mankind, in general, and of the society and people of India, in particular. Prof. Nath is the recipient of numerous distinctions, the most prestigious amongst which are the Shanti Swarup Bhatnagar Prize in Earth, Atmosphere, Ocean and Planetary Sciences, **National Mineral Award in Geophysics**, **UGC National Hari Om Ashram Trust Award, Homi J. Bhabha Award for Applied Sciences, Dr. J. Coggin Brown Memorial (Gold) Medal for Geological Sciences, D. N. Thakur Award *for Earth Sciences and* SGAT Award of Excellence. He is** Fellow of the National Academy of Sciences, India (FNASc) and the Indian National Academy of Engineering (FNAE).

It is a matter of great pleasure for IIT Roorkee to honour Prof. Sankar Kumar Nath with A S Arya-IITR Disaster Prevention Award of Rs.50,000/- and a citation for his outstanding contributions in the area of Disaster Prevention/Mitigation.

Roorkee
November 14, 2009

(S.C.Saxena)
Director


ANNUAL

INDIAN GEOPHYSICAL UNION

Head Office: National Geophysical Research Institute Campus,
Uppal Road, Hyderabad – 500 007, India.

It is hereby certified that

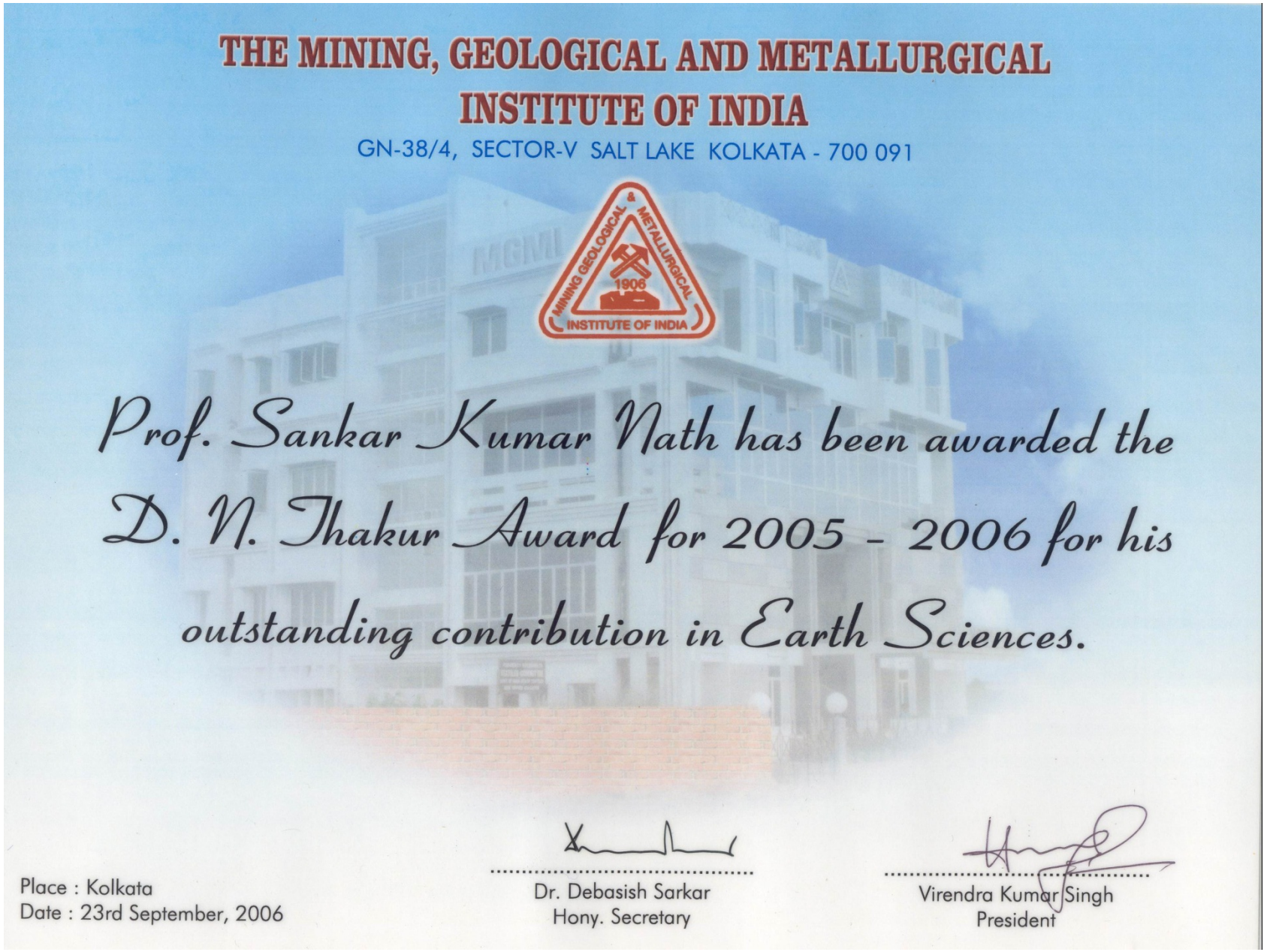
Prof. Sankar Kumar Nath
Professor, IIT, Kharagpur

is admitted to the Life ~~Membership~~ / Fellowship / ~~Foreign~~ ~~Fellowship~~ of the Union and shall be entitled to all the privileges outlined in the constitution.

SECRETARY

PRESIDENT

Date : 10-01-2014



THE MINING, GEOLOGICAL AND METALLURGICAL INSTITUTE OF INDIA

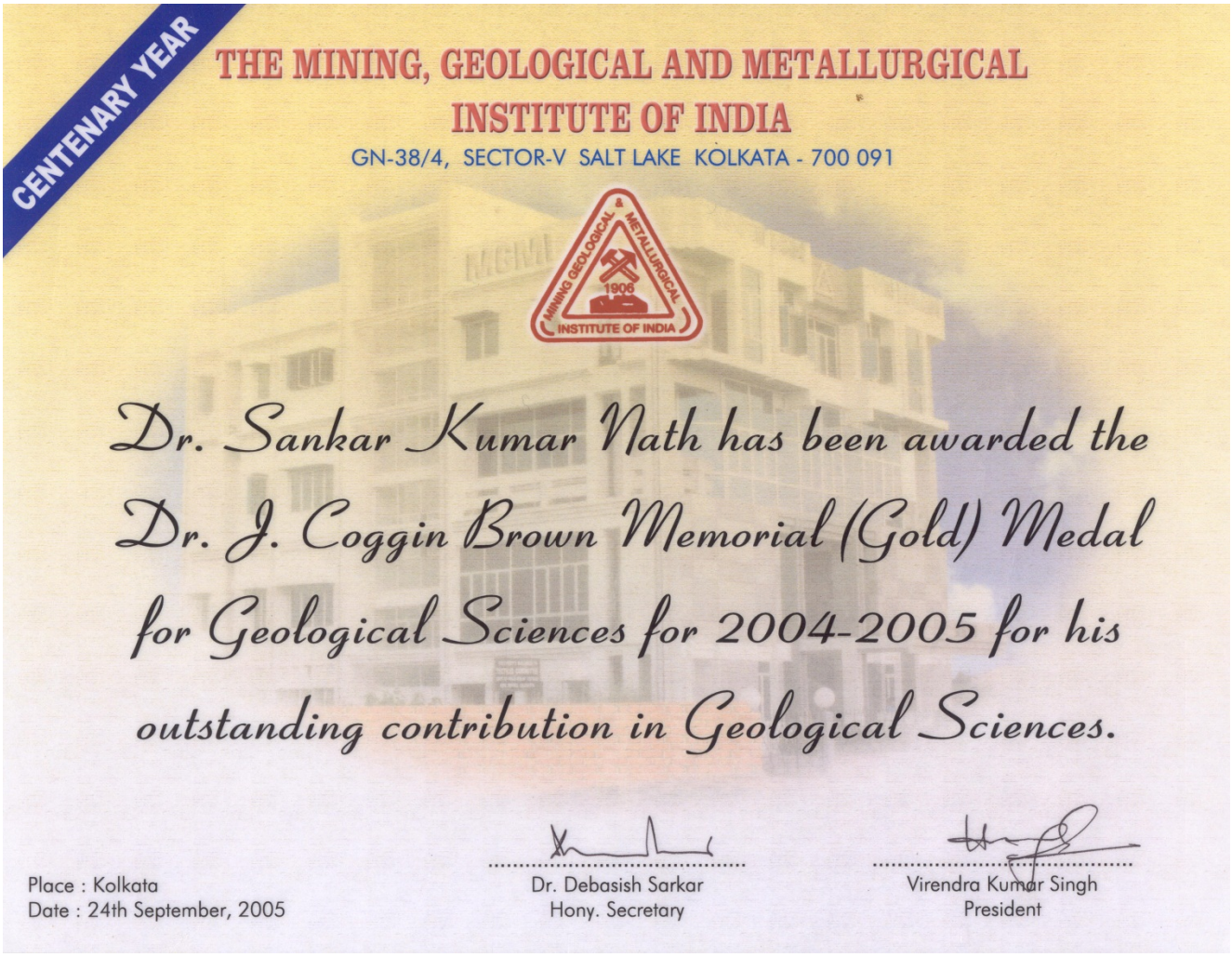
GN-38/4, SECTOR-V SALT LAKE KOLKATA - 700 091

Prof. Sankar Kumar Nath has been awarded the D. N. Thakur Award for 2005 - 2006 for his outstanding contribution in Earth Sciences.

Place : Kolkata
Date : 23rd September, 2006

Dr. Debasish Sarkar
Hony. Secretary

Virendra Kumar Singh
President


CENTENARY YEAR
THE MINING, GEOLOGICAL AND METALLURGICAL
INSTITUTE OF INDIA
GN-38/4, SECTOR-V SALT LAKE KOLKATA - 700 091
MINING GEOLOGICAL METALLURGICAL
1906
INSTITUTE OF INDIA
Dr. Sankar Kumar Nath has been awarded the
Dr. J. Coggin Brown Memorial (Gold) Medal
for Geological Sciences for 2004-2005 for his
outstanding contribution in Geological Sciences.
Place : Kolkata
Date : 24th September, 2005
Dr. Debasish Sarkar
Hony. Secretary
Virendra Kumar Singh
President

52nd ANNUAL CONVENTION

Citation

INDIAN GEOPHYSICAL UNION

The 52nd Annual Convention on

"Near Surface Earth System Sciences"

November 3-5, 2015, ESSO-National Centre for Antarctic and Ocean Research, Goa

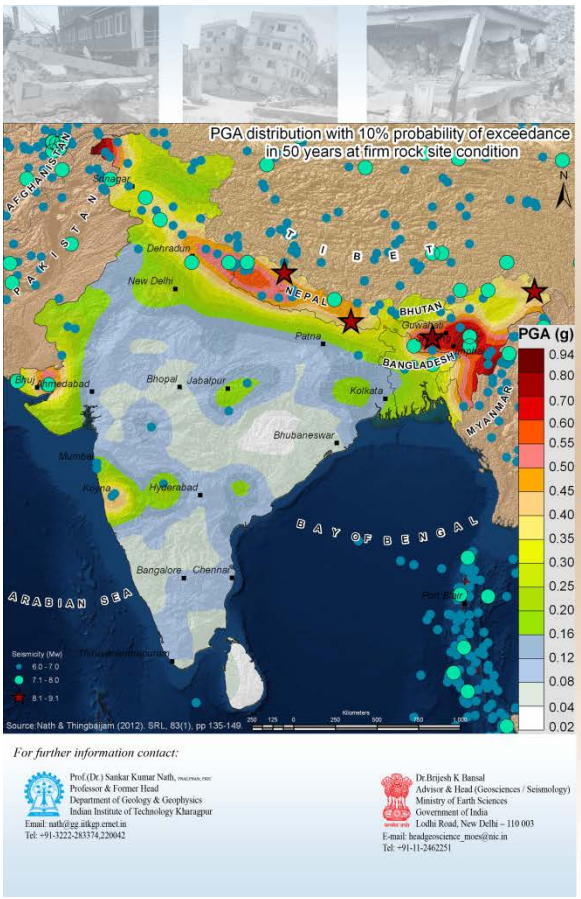
Prof. Sankar Kumar Nath, a Senior Professor in the Higher Administrative Grade at IIT-Kharagpur, has been successful in blending of Exploration & Solid-Earth Geophysics and Earthquake Hazard Science & Engineering, and contributed significantly for delineation of near-surface structures; characterization of source, site and ground response; assessment of seismic risk and vulnerability; and seismic microzonation at different parts of India. He has developed algorithms and codes in Seismic Prospecting & Pattern Recognition, Geophysical Tomography, Groundwater Geophysics and Earthquake Seismology. He has published more than 200 research articles in peer-reviewed journals and proceeding volumes and supervised 8 Ph.D. students. In view of his diversifying research interests and outstanding contribution to methodological and conceptual developments to address geophysical and geo-environmental problems, Prof. Sankar Kumar Nath has been unanimously chosen for the Decennial Award of IGU for the year 2015.

PRESIDENT - IGU

HON. SECRETARY - IGU

DECENNIAL AWARD-2015


भारतीय भूभौतिकी संघ



For further information contact:

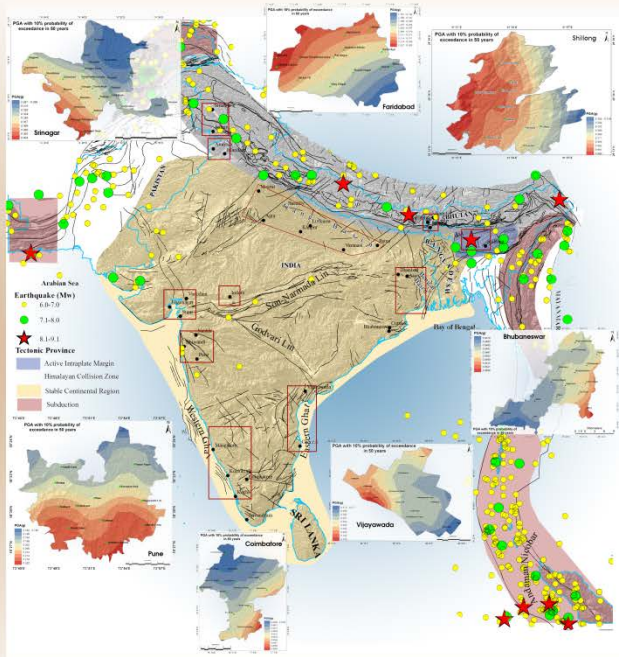
Prof.(Dr.) Sankar Kumar Nath,
Professor & Former Head
Department of Geology & Geophysics
Indian Institute of Technology Kharagpur
Email: nath@gg.iitkgp.ernet.in
Tel: +91-3222-283374,220042

Dr.Brijesh K Bansal
Advisor & Head (Geosciences / Seismology)
Ministry of Earth Sciences
Government of India
Lodhi Road, New Delhi – 110 003
E-mail: headgeoscience_moes@nic.in
Tel: +91-11-2462251

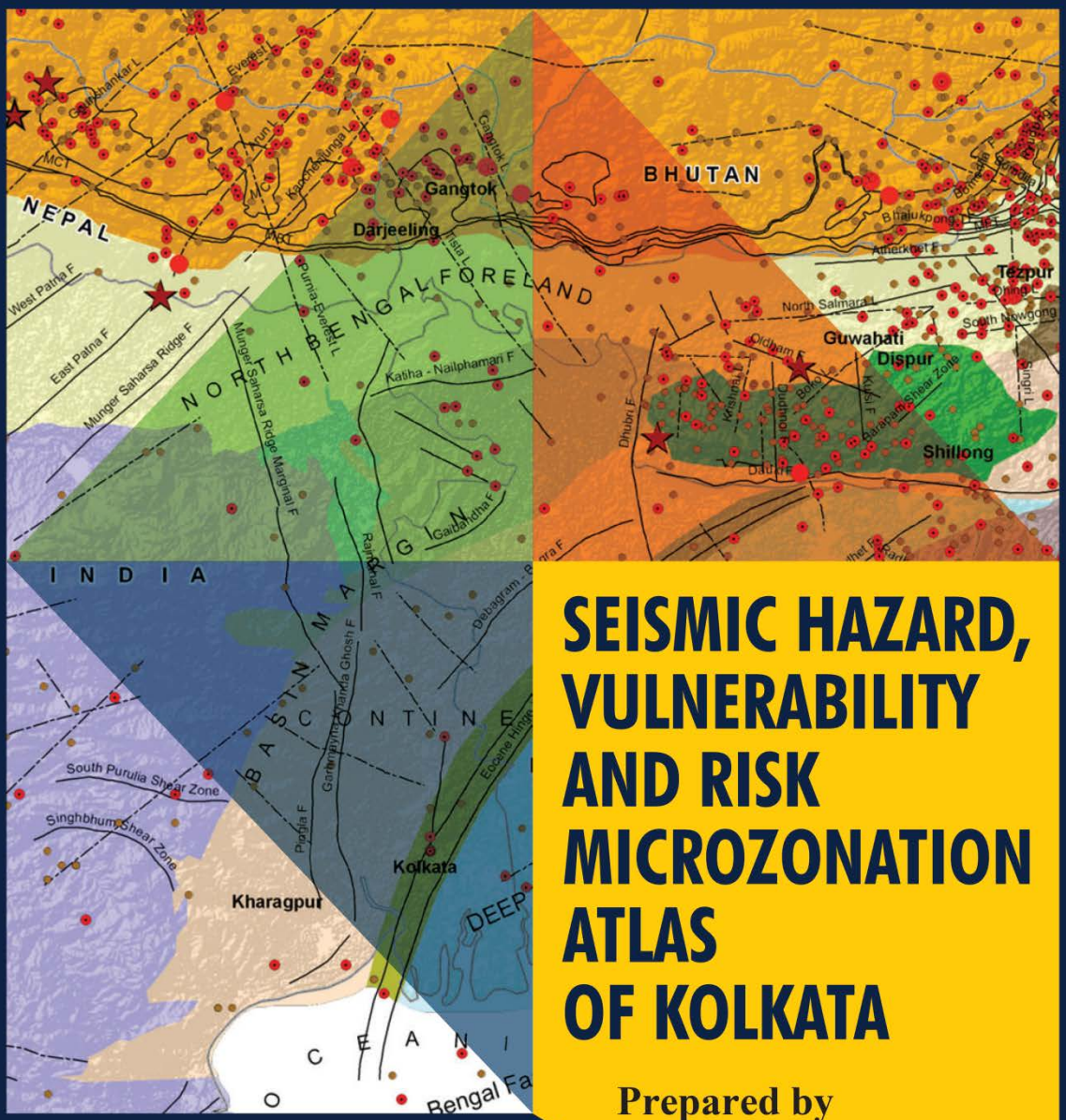
Probabilistic Seismic Hazard Atlas of 40 Cities in India

2017

Probabilistic Seismic Hazard Atlas of 40 Cities in India



Geoscience Division, Ministry of Earth Sciences
Government of India, New Delhi
2017

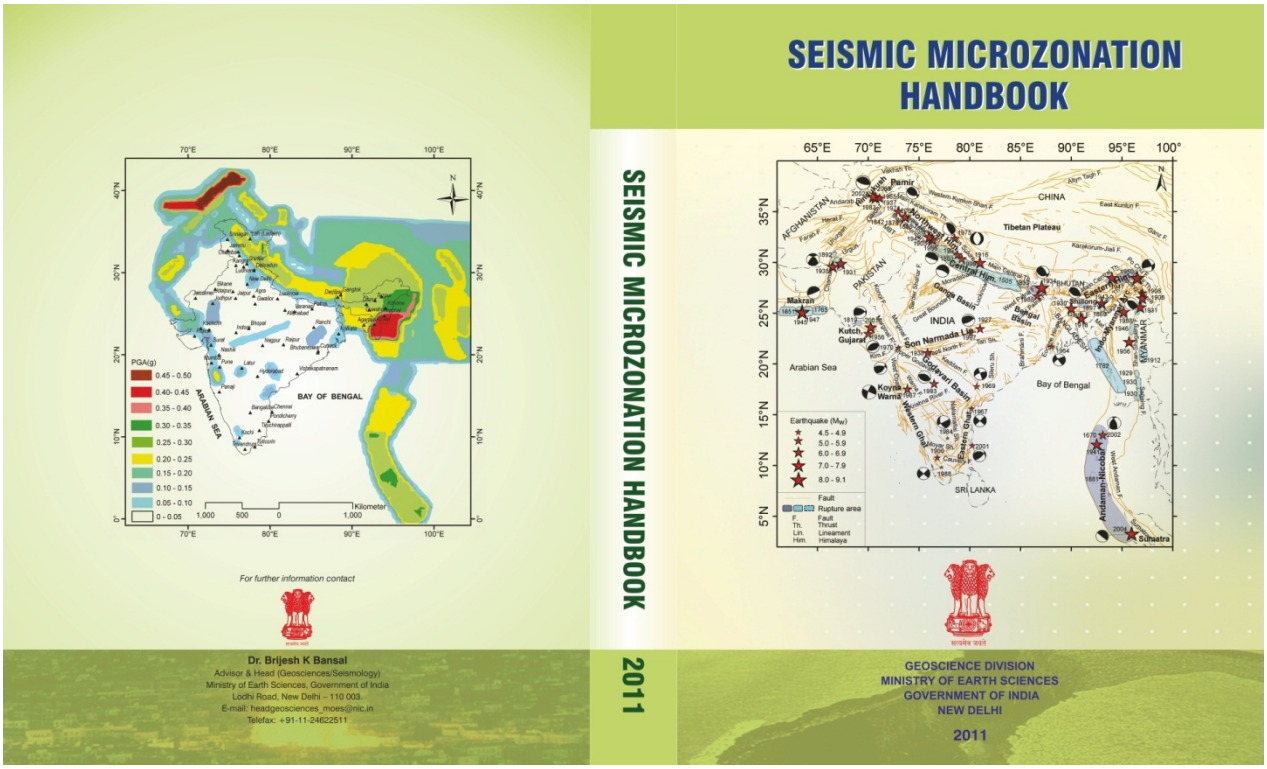


SEISMIC HAZARD, VULNERABILITY AND RISK MICROZONATION ATLAS OF KOLKATA

Prepared by
Sankar Kumar Nath

सत्यमेव जयते

Geoscience Division
Ministry of Earth Sciences
Government of India
New Delhi


SEISMIC MICROZONATION HANDBOOK
SEISMIC MICROZONATION HANDBOOK
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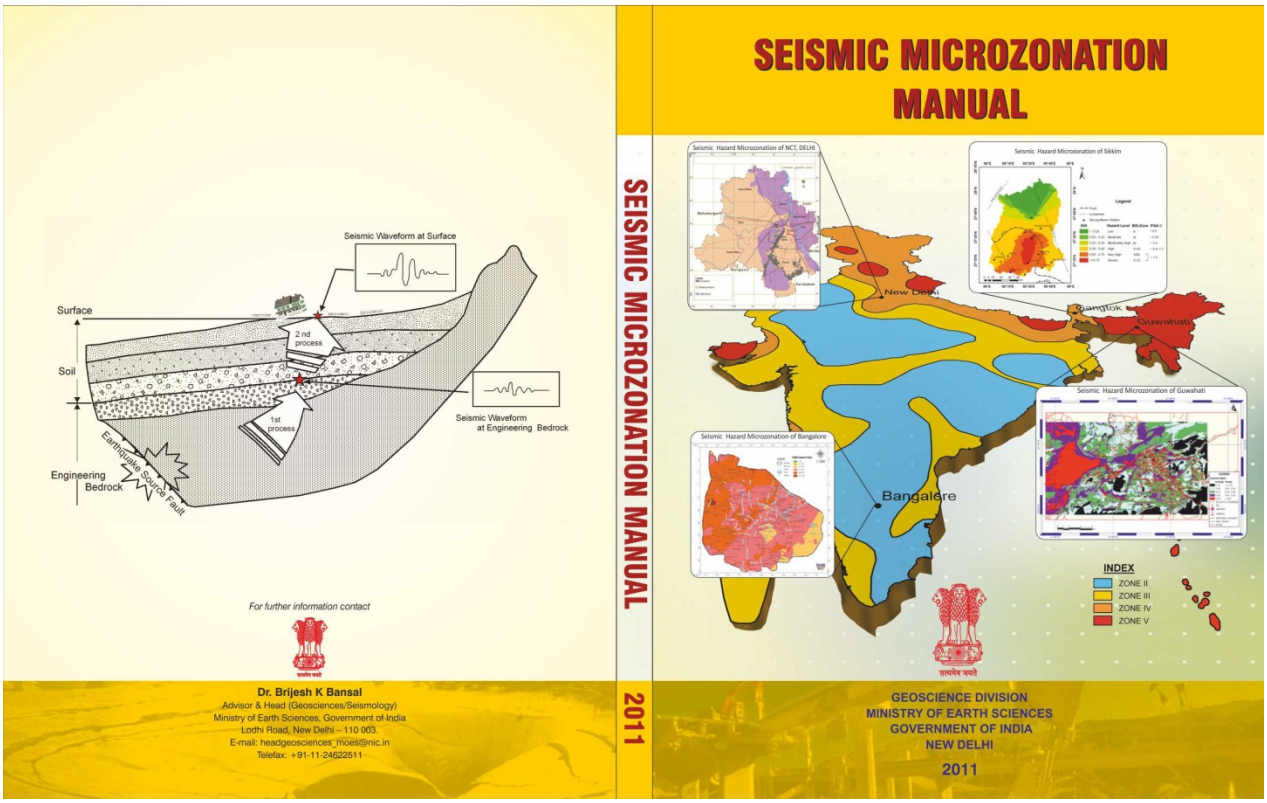
0.30 - 0.35
0.25 - 0.30
0.20 - 0.25
0.15 - 0.20
0.10 - 0.15
0.05 - 0.10
0 - 0.05
BAY OF BENGAL
ARABIAN SEA
Kilometer
For further information contact
Dr. Brijesh K Bansal
Advisor & Head (Geosciences/Seismology)
Ministry of Earth Sciences, Government of India
Lodhi Road, New Delhi – 110 003.
E-mail: headgeosciences_moes@nic.in
Telefax: +91-11-24622511
Earthquake (Mw)
4.5 - 4.9
5.0 - 5.9
6.0 - 6.9
7.0 - 7.9
8.0 - 9.1
Fault
Rupture area
Fault
Thrust
Lineament
Himalaya
CHINA
Tibetan Plateau
INDIA
Arabian Sea
Bay of Bengal
SRI LANKA
Sumatra
GEOSCIENCE DIVISION
MINISTRY OF EARTH SCIENCES
GOVERNMENT OF INDIA
NEW DELHI
2011


SEISMIC MICROZONATION MANUAL
SEISMIC MICROZONATION MANUAL
2011
Seismic Waveform at Surface
Surface
Soil
2nd process
1st process
Seismic Waveform at Engineering Bedrock
Engineering Bedrock
Earthquake Source Fault
For further information contact
Dr. Brijesh K Bansal
Advisor & Head (Geosciences/Seismology)
Ministry of Earth Sciences, Government of India
Lodhi Road, New Delhi – 110 003.
E-mail: headgeosciences_moes@nic.in
Telefax: +91-11-24622511
Seismic Hazard Microzonation of NCT, DELHI
Seismic Hazard Microzonation of Sikkim
Seismic Hazard Microzonation of Guwahati
Seismic Hazard Microzonation of Bangalore
New Delhi
Guwahati
Bangalore
INDEX
ZONE II
ZONE III
ZONE IV
ZONE V
GEOSCIENCE DIVISION
MINISTRY OF EARTH SCIENCES
GOVERNMENT OF INDIA
NEW DELHI
2011

सत्यमेव जयते
डॉ. शैलेश नायक
DR. SHAILESH NAYAK

सचिव
भारत सरकार
पृथ्वी विज्ञान मंत्रालय
महासागर भवन, ब्लाक–12, सी.जी.ओ. कॉम्पलैक्स,
लोदी रोड़, नई दिल्ली–110 003
SECRETARY
GOVERNMENT OF INDIA
MINISTRY OF EARTH SCIENCES
'MAHASAGAR BHAVAN' BLOCK-12, C.G.O. COMPLEX,
LODHI ROAD, NEW DELHI-110 003

FOREWORD

The seismic vulnerability in urban areas is rapidly increasing due to uncontrolled growth, destabilization of environment and social framework. According to a conservative estimate, more than 15 million lives have been lost and damage worth hundred billion dollars has been inflicted in the recorded history due to earthquakes.

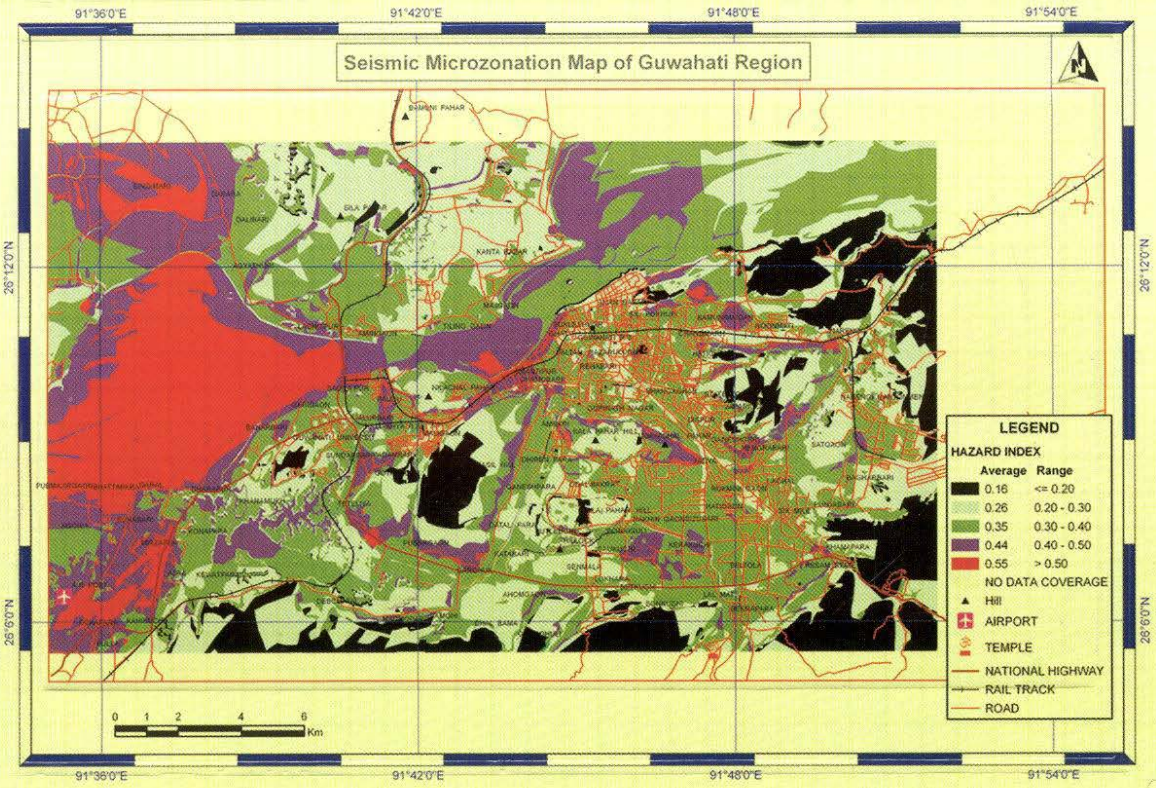
Urban Safety has gained importance in recent years with rapid increase in construction activities and growth in urban population all over the world. It poses a challenge to planners, administrators, engineers and architects alike due to its multi-dimensional nature, which cover areas from structural design, maintenance and rehabilitation to disaster mitigation.

Twenty seven cities in India have a population of one million or more. Urban population in India is growing very fast. Most urban centres fall under Seismic Zones V, IV and III. In this context, development of seismic microzonation maps of major urban centers has, therefore, been recognized as a priority area of seismic mitigation programme in India. To this effect, Ministry of Earth Sciences (MoES), Govt. of India constituted a National Steering Committee in March 2008 to provide overall guidance to undertake microzonation studies for the identified cities on priority, to be decided upon their locations and population density. Though a limited work has already been done for a few selected cities in India, the quantum of work is huge. Also, at present there are no detailed guidelines available for adopting appropriate investigations. I hope that the present *"**Seismic Microzonation Manual**"*, an MoES initiative that encapsulates bench-marked principles and protocol of accomplishing seismic microzonation studies, will prove useful to the geoscientific and earthquake engineering community of the country.

Shailesh Nayak

Tel. : 00-91-11-24360874, 24362548 ❑ E-mail : secretary@moes.gov.in ❑ Fax No. : 00-91-11-24362644/24360336

SEISMIC MICROZONATION ATLAS OF GUWAHATI REGION

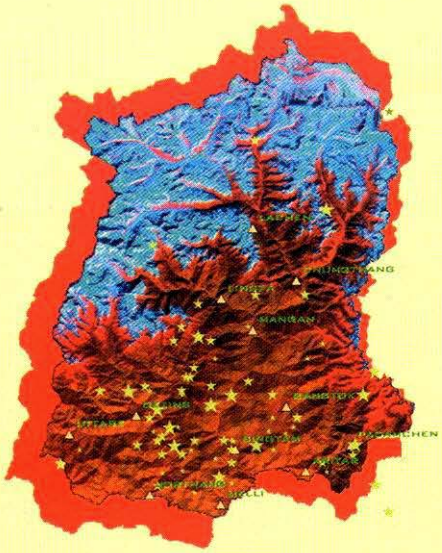


सत्यमेव जयते

Department of Science & Technology
Government of India
New Delhi - 110 016

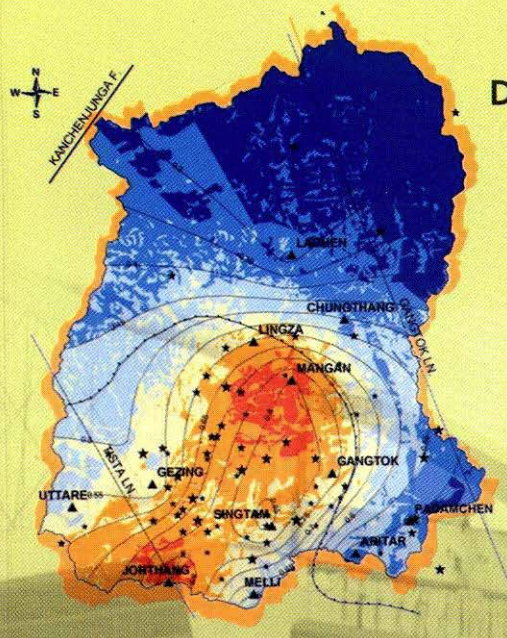
2007

SEISMIC HAZARD AND MICROZONATION ATLAS OF THE SIKKIM HIMALAYA



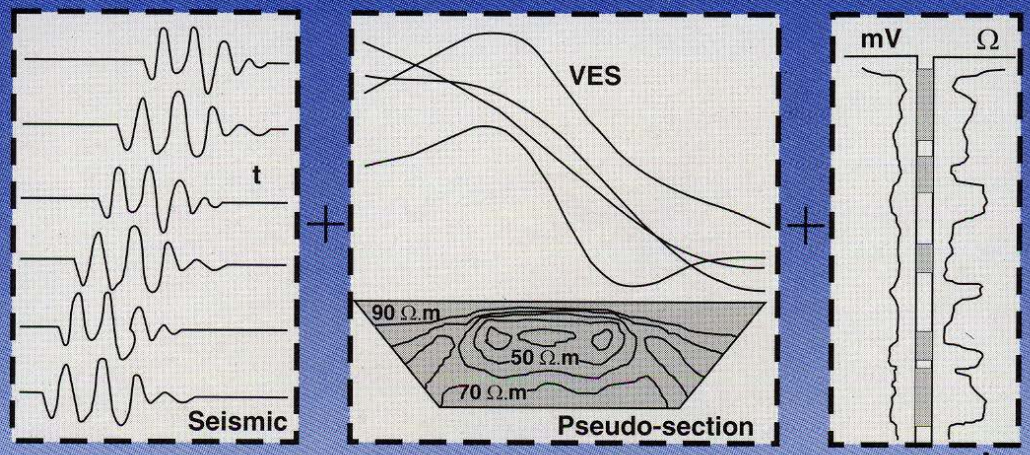
Prepared by
Sankar Kumar Nath

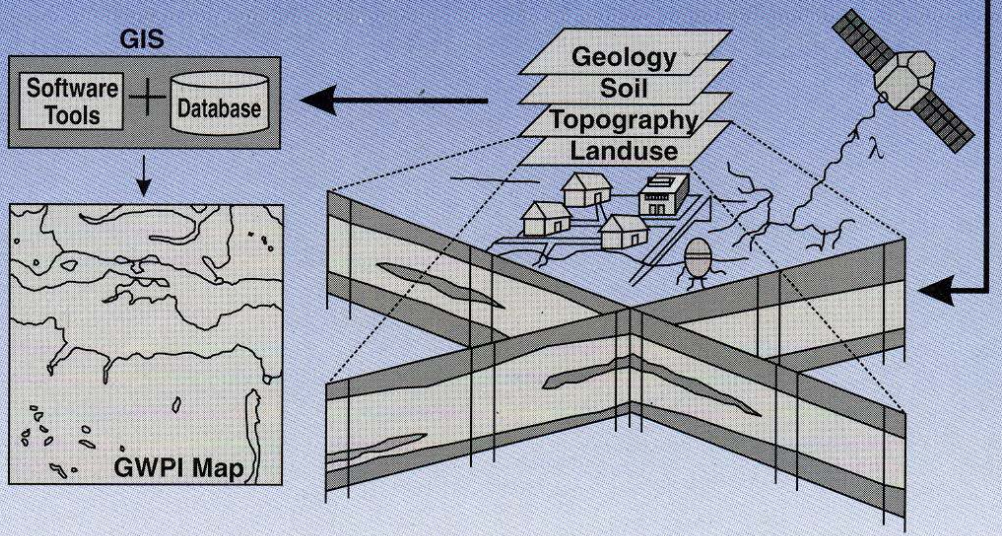
सत्यमेव जयते



Seismology Division
Department of Science and Technology
Government of India
New Delhi -110 016

Geophysical Prospecting for Groundwater





Sankar Kumar Nath • Hari Pada Patra
Shamsuddin Shahid

Geophysical Prospecting for Groundwater

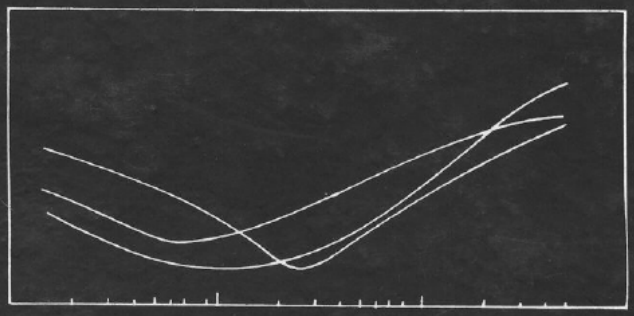
Sankar Kumar Nath, Hari Pada Patra and Shamsuddin Shahid

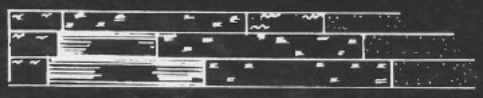
Department of Geology and Geophysics
Indian Institute of Technology
Kharagpur - 721302
West Bengal, India

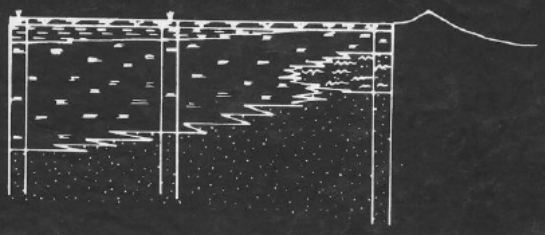
OXFORD & IBH PUBLISHING CO. PVT. LTD.
New Delhi Calcutta

SCHLUMBERGER GEOELECTRIC SOUNDING IN GROUND WATER

Principles, Interpretation and Application







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(Principles, Interpretation and Application)

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