

Curriculum-Vitae

- A. Name:** DR. Prosanta Kumar Khan
- B. Father's Name:** Late B.N. Khan
- C. Broad Area of Specialization:** Pure and Applied Geophysics
- D. Current Areas of Research:** Seismology, Plate Tectonics, Geodynamics and Geothermics, Gravity
- E. Subjects of Teaching: (PG & M.Tech. Level)** PG Level: Seismology, Geodynamics and Geothermics, Solid Earth Geophysics, Gravity and Magnetic Prospecting
M.Tech. Level: Gravity, Magnetic and Seismic Prospecting
- F. Nationality:** Indian
- G. Religion:** Hindu
- H. Sex:** Male
- I. Date of Birth:** Feb. 02, 1966
- J. Address for Correspondence:** Associate Professor
Department of Applied Geophysics
Indian School of Mines
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- L. SC/ST/OBC/GEN:** General



M. Details of Ph.D. Award:

| Degree | University/Institute | Year of Passing | Subject | Title of the Ph.D. Thesis |
|--------|------------------------|-----------------|-------------------------------|---|
| Ph.D. | Indian School of Mines | 2000 | Seismotectonics & Geodynamics | Evolving Trends of Seismicity in India and its Neighborhood |

N. Educational Qualifications:

| Exam. Passed | University/Institute | Year of Passing | Subject | Class |
|--------------------------------|------------------------|-----------------|---|-----------------------|
| M.Sc. Tech. Applied Geophysics | Indian School of Mines | 1992 | Applied Geophysics | 1 st Class |
| B.Sc. Hons. Physics | University of Calcutta | 1987 | Physics (Hons.), Chem., Maths, English. | 2 nd Class |

O. Details of Project Handled:

| Funding Agency | Tenure/ Status | Working Place | Project Title | Outlay (lakhs) |
|---|---------------------------|---------------------------|--|---------------------------|
| Ministry of Earth Sciences, GOI, New Delhi | 2009 – Contd. | Indian School of Mines | Monitoring and study of local seismicity of the Eastern Indian shield region (PI) | 11.15 |
| Ministry of Earth Sciences, GOI, New Delhi | 2009 – Contd. | Indian School of Mines | Finite element stress modeling of the subducting Indian lithosphere and the overlying structures in northeast part of India (PI) | 16.19 |
| Minor Research Project, MHRD, GOI | 2007 – Contd. | Indian School of Mines | Mapping of seismic b-value and its correlation with Bouguer gravity anomaly over the northeast India (PI) | 0.40 |
| Council of Scientific and Industrial Research, GOI, New Delhi | 2004 - 2007 | Indian School of Mines | Poly-phase Tertiary Development of the Himalayas and Surrounding Regions Implications for the Recent Trends of Seismicity in India (PI) | ~8.00 |
| Deptt. of Science and Technology, GOI, New Delhi | 2001 - 2004 | Indian School of Mines | Evolving seismicity in India and its adjoining regions in the 20 th century (PI) | 9.12 |
| Deptt. of Science and Technology, GOI, New Delhi | 1997 - 2000 | IIT Roorkee | Digital Telemetered Seismic Network in the Kumaun Himalaya (Scientist) | ~120.00 |
| Deptt. of Science and Technology, GOI, New Delhi | 1997 -2000 | IIT Roorkee | Modelling of Earthquake Source and Earth Structure in the Garhwal Kumaun Himalaya Region using Broadband Seismic Data (Scientist) | ~20.00 |
| University Grant Commission, GOI, New Delhi | 1992 –1997 | Indian School of Mines | Seismotectonic modeling of India (JRF & SRF) | ~2.00 |

P. Research/Teaching Experience:**Research Experience:** ~18 years**Post-doc Experience:** ~11 years**Teaching Experience:** ~8 years**Q. Research Interest:**

- Earthquake source kinematics and dynamics
- Seismotectonic modeling
- Deformation of Lithosphere

- Plate driving mechanisms
- Origin and evolution of the lithospheric stress field
- Subduction dynamics vis-à-vis back-arc tectonics
- Seismic b-value vis-à-vis lithospheric stress
- Earthquake Hazard Assessment and Mitigation
- Earthquake prediction

R. Major Achievements in Research:

- Role of plate driving forces behind the occurrence of subduction zone mega-earthquake.
- A hypothesis on mega-earthquake along subduction margin around the world was uncovered through an evolutionary strain-hardening model.
- Long-awaited problem of opening of Andaman Sea was successfully explained through two-phase modeling of the region between Sumatra and Andaman along the eastern subduction margin of India.
- Episodic late Tertiary episodic development of Myanmar region was successfully explained through dip-angle variation of descending Indian lithosphere. Both these study pertain to the understanding the dynamics of the Earth's interior and their surface expression including the origin and evolution of the lithospheric stress field.
- Installation of Duplex Telemetry Seismic Network in the Kumaun Himalaya under the Himalayan Seismicity Programme of Department of Science & Technology, Govt. of India, New Delhi.
- A seismotectonic model for widening the Himalayan orogeny towards western part in Pakistan was established.
- The origin of the deeper part of the subducting lithospheres below Hindukush and Pamir were delineated.
- A causal relationship between Bouguer gravity anomaly and b-value was established for the Shillong Plateau area. In the same study, the configuration of the descending Indian lithosphere below the Myanmar and Himalaya in northeast India was delineated.
- A long-awaited model involving tectonic elements orthogonal to trench was proposed.

S. Prizes/Awards/Honours:

- **"Pool Scientist, 2004"**, Council of Scientific and Industrial Research, HRD Group, Govt. of India, New Delhi
- **"Young Earth Scientist, 2000"**, Science and Engineering Research Council, Department of Science and Technology, Govt. of India, New Delhi.
- **Awards:** Adjudged one of the best four participants in DST sponsored 2nd SERC School (SEP-II) during April 14 to May 4, 1994 held at Banaras Hindu University, Varanasi.
- **Awards:** Adjudged one of the best four participants in DST sponsored 3rd SERC School (SEP-III) during Sept. 23 to Oct. 12, 1996 held at Indian School of Mines, Dhanbad.

- **Fellow**, Earth Sciences, Birbal Sahani Institute, Lucknow
- **Incharge**: Broadband Seismological Observatory, Indian School of Mines, Dhanbad.

T. Membership:

- Life member: Journal of Himalayan Geology, Dehradun
- Life member: Journal of the Indian Geophysical Union, Hyderabad
- Life member: Indian Geological Congress, Roorkee
- Life member: Journal of the Indian Society of Earthquake Technology, Roorkee
- Life member: Journal of Earth Science India, Lucknow

U. Employment Record:

| Sl. No. | Name and Addresses of Employer | Post Held | Ad-hoc/ Regular/ Temp./ Permnt. | Period | | Nature of Duties |
|---------|--|---------------------|--|---------------|----------------|------------------------------------|
| | | | | From | To | |
| i) | Indian School of Mines, Dhanbad, Jharkhand | Associate Professor | Permnt. | Feb. 15, 2010 | Contd... | Research, Teaching and Development |
| ii) | Indian School of Mines, Dhanbad, Jharkhand | Assistant Professor | Permnt. | Feb. 15, 2007 | Feb. 14, 20010 | Research, Teaching and Development |
| iii) | Council of Scientific and Industrial Research, New Delhi | Scientist | Temp. | Feb. 17, 2004 | Feb. 16, 2007 | Research and Teaching |
| iv) | Deptt. of Science and Technology, New Delhi | Scientist | Temp. | Jan. 23, 2001 | Jan. 22, 2004 | Research and Teaching |
| v) | Deptt. of Science and Technology, New Delhi | Fellow 'A' | Temp. | Nov. 06, 1997 | Sept. 30, 2000 | Research |

V. List of Publications:

In Referred Journal

1. **Khan, P. K.**, Ghosh, M., Chakraborty, P.P. and Mukherjee, D., 2010, Seismic b-value and the assessment of ambient stress in Northeast India, Pure and Applied Geophysics, DOI: 10.1007/s00024-010-0194-x (in press).

2. **Khan, P. K.**, 2010, Role of unbalanced slab resistive force in the 2004 off Sumatra mega-earthquake ($M_w > 9.0$) event, *International Journal of Earth Sciences*, DOI: 10.1007/s00531-010-0576-4 (in press).
3. **Khan, P.K.**, Mukherjee, G. and Chakraborty, P.P., 2010, Seismotectonic overview of the Burma-Andaman-Sumatra subduction margin preceding the 2004 off Sumatra mega-event, *Memoir, Journal of the Geological Society of India*, 81-95.
4. **Khan, P.K.**, Mohanty, S. and Mohanty, M., 2010, Geodynamic implications for the 8 October 2005 North Pakistan earthquake, *Surveys in Geophysics*, DOI 10.1007/s10712-009-9083-1.
5. **Khan, P. K.**, Ghosh, M. and Srivastava, V. K., 2009, Seismic a-value and the spatial stress-level variation in Northeast India, *Journal of Indian Geophysical Union*, 13, 49-62.
6. Kayal, J.R., Srivastava, V.K., Bhattacharya, S.N., **Khan, P.K.** and Chatterjee, R., 2009, Source parameters and focal mechanisms of local earthquakes: single broadband observatory at ISM Dhanbad, *Journal of the Geological Society of India*, 74, 413-419.
7. **Khan, P. K.**, Chakraborty, S., Srivastava, V. K. and Prasad, R., 2009, Seismicity, source parameters and scaling relationships for the eastern part of Eastern Indian Shield region, *Indian Minerals*, 61, 65-74.
8. Chakraborty, P. P., and **Khan, P. K.**, 2009, Cenozoic geodynamic evolution of the Andaman-Sumatra subduction margin: a current understanding, *Island Arc*, 18, 184-200, DOI: 10.1111/j.1440-1738.2008.00641.x.
9. **Khan, P. K.**, and Chakraborty, P. P., 2009, Plate geometry, plate rheology, and their relation to shallow-focus mega-thrust seismicity with special reference to 26 December 2004 Sumatra event, *Journal of Asian Earth Sciences*, 34, 480-491.
10. **Khan, P. K.**, and Chakraborty, P. P., 2007, The seismic b value and its correlation with Bouguer gravity anomaly over the Shillong plateau area: a new insight for tectonic implication, *Journal of Asian Earth Sciences*, 29, 136-147.
11. **Khan, P. K.**, 2007, Lithospheric deformation under pre- and post-seismic stress fields along the Nicobar-Sumatra subduction margin during 2004 Sumatra mega-event and its tectonic implications, *Gondwana Research*, 12, 468-475.
12. **Khan, P. K.** and Chakraborty, P. P., 2005, Two-phase opening of Andaman Sea: A new seismotectonic insight, *Earth and Planetary Science Letters*, 229, 259-271.
13. **Khan, P. K.**, 2005, Variation in dip-angle of the Indian plate subducting beneath the Burma plate and its tectonic implications, *International Geosciences Journal*, 9, 227-234.
14. **Khan, P. K.**, 2005, Mapping of b-value beneath the Shillong plateau, *Gondwana Research*, 8, 271-276.
15. **Khan, P. K.**, 2004, Recent seismicity trend in India and adjoining regions, *Journal of the Indian Society of Earthquake Technology*, 10 – 14.

16. **Khan, P. K.**, 2003, Stress state, seismicity and subduction geometry of the descending lithosphere below the Hindukush and Pamir, *Gondwana Research*, 6, 867-877.
17. Wason, H. R., Sharma, M. L., **Khan, P. K.**, Kapoor, K., Nandini, D. and Kara, V., 2002, Analysis of aftershocks of the Chamoli Earthquake of March 29, 1999 using broadband seismic data, *Journal of Himalayan Geology*, 23, 7-18.
18. Wason, H. R., Goel, O. P., Tripathi, H. B., **Khan, P. K.**, Paul, A., and Kapoor, K., 2002, Analysis of Aftershock Events of the Chamoli Earthquake Recorded by Kumaun Digital Telemetry Seismic Network, *Journal of Himalayan Geology*, 23, 19-23.
19. **Khan, P. K.**, 2002, Compiled tectonic map of India and its adjoining regions, *Newsletter, Indian Geological Congress*, 8, 50-51.
20. Wason, H. R. and **Khan, P. K.**, 2001, Seismotectonics of the Garhwal-Kumaun Himalaya region based on local observations and teleseismic data, *in* O. P. Verma (ed.), *Seismicity*, Spl. Pub., DST, New Delhi, 2, 75-84.
21. Chouhan, R. K. S. and **Khan, P. K.**, 1999, Focal mechanism solution and stress pattern in Hindukush region, *in* A. K. Jain and R. M. Manickavasagam (eds.), *Geodynamics of the NW Himalaya*, *Memoir, Gondwana Research*, 6, 361-367.

In Symposia/Workshop/Seminar Volume

22. **Khan, P. K.**, Chakraborty, P. P. and Prabhat Kumar, 2010, Long-term concentrated deformation of the subducting oceanic lithosphere in Sumatra margin: tectonic implications, *Seminar on Earthquake Engineering (14SEE)*, organized by the Department of Earthquake Engineering, IIT Roorkee, Roorkee, Uttarakhand (accepted).
23. **Khan, P. K.**, Mohanty, M. and Kumar, S., 2010, Present seismotectonic status of the Central Himalaya, *Seminar on Earthquake Engineering (14SEE)*, organized by the Department of Earthquake Engineering, IIT Roorkee, Roorkee, Uttarakhand (accepted).
24. **Khan, P. K.**, 2009, 2004, Off Sumatra mega-thrust earthquake ($M_w > 9.0$) along Burma-Andaman-Sumatra subduction margin: tectonic implications, *in* *Proceeding volume on Climate change and role of geo-scientific community to counter its impacts*, organized by Indian Geological Congress, National Geophysical Research Institute, Hyderabad, p. 63.
25. **Khan, P. K.**, Mukherjee, G., Chakraborty, P. P. and Srivastava, V. K., 2008, 2004 Off Sumatra mega-event in the backdrop of preseismic stress field variation along the Burma-Andaman-Sumatra subduction margin, *in* *Seminar on Indo-Myanmar Ranges in the tectonic framework of the Himalaya and Southeast Asia*, organized by the Department of Earth Sciences, Manipur University, Canchipur, Imphal, p. 25.

26. **Khan, P. K.**, Ghosh, M. and Srivastava, V. K., 2008, Seismic a-value and the spatial stress-level variation in Northeast India, in IGU Seminar on Seismic hazard and crustal earthquakes: Indian scenario, organized jointly by Department of Geophysics, Banaras Hindu University, Varanasi and National Geophysical Research Institute, Hyderabad, p. 27.
27. **Khan, P. K.** 2008, Strength of the oceanic lithosphere and the generation of mega-thrust earthquake $M_w > 9.0$, in Indo-UK Frontiers of Science Symposium, organized by Indian National Science Academy, New Delhi and The Royal Society, London, Hyderabad, India (abstract no. 6).
28. Chatterjee, R., Srivastava, V. K. and **Khan, P. K.**, 2007, Finite element stress modeling of rock block: a preliminary approach, in Proceedings, 2nd Indian Mineral Congress, Singh, S.K. and Sinha, A. (eds.), **Symposium on Sustainable development to meet socio-economic expectation**, ISM, Dhanbad, 184-196.
29. **Khan, P. K.**, 2007, The 26 December 2004, $M_w > 9.0$ off Sumatra mega-thrust earthquake: A new seismo-kinetic insight, in National Seminar on Modern Trends in Geophysical Sciences and Techniques, Department of Applied Geophysics, Indian School of Mines, Dhanbad, 78-81.
30. **Khan, P. K.**, 2005, The 26th December' 2004 off Sumatra mega-thrust event: state of static and dynamic stress fields, and its tectonic implications, in Volume I, H.R. Wason and D. Shankar (eds.), **Symposium on Seismic Hazard Analysis and Microzonation**, IIT Roorkee, India, 443-465.
31. **Khan, P.K.**, 2005, A note on Sumatra earthquake of December 26, 2004 and its aftershocks: clues from geodynamics aspects, in National Seminar on Recent Advances in Theoretical and Applied Seismology, Department of Mathematics, Indian School of Mines, Dhanbad, p. 25.
32. **Khan, P.K.** and Chakraborty, P.P., 2005, How far interplate coupling is responsible for large thrust earthquakes along subduction margin? in National Seminar on East Crust, Department of Applied Geophysics, Indian School of Mines, Dhanbad, p. 25.
33. **Khan, P. K.**, 2003, Study of the occurrence of two recent damaging earthquakes and their aftershocks in the Central Himalaya, in National Symposium on Developments in Geophysical Sciences in India, BHU, Varanasi, 114-116.
34. **Khan, P. K.**, 2003, Episodic development of the Andaman-Nicobar and downgoing Indian plate: Implications for coupling inhomogeneity along this margin, in SAP (UGC) Seminar on Advances in Theoretical and Applied Seismology, ISM, Dhanbad, 16-17.
35. **Khan, P. K.**, Chouhan, R. K. S. and Bhattacharya, S. N., 2001, Generalised stress pattern and neotectonic activity in Myanmar-Andaman-Nicobar region, in International Conference on Seismic Hazard with particular reference to Bhuj Earthquake of January 26, 2001, IMD, New Delhi, 370-376.
36. Wason, H. R., Sharma, M. L., **Khan, P. K.**, Kapoor, K., Nandini, D. and Kara, V., 2000, Broadband Seismic Recording of the Chamoli Earthquake of March 29, 1999 and its Aftershock sequence, in A Report

on Chamoli Earthquake of March 29, 1999, Department of Earthquake Engineering, University of Roorkee, India, 45-61.

37. Chouhan, R. K. S. and **Khan, P. K.**, 1997, Seismotectonic study of Killari-an intraplate earthquake, GARC Bull., 5, 1-17.
38. **Khan, P. K.** and Chouhan, R. K. S., 1994, Latur earthquake – a probable cause, *in* National Symposium on Mantle dynamics and its relation to earthquake and volcanism, S.N. Bose National Centre for Basic Sciences, Calcutta, p. 41.

W. Proposed Research Undertaken:

1. Establishment of permanent GPS network in the Eastern Indian Shield Region for the studies of plate deformation, earthquake prediction, monsoon in the lower gangetic plain, etc..
2. Study of local seismic deformation of the Eastern Indian shield region.
3. Finite element stress modeling of the subducting Indian lithosphere and the overlying structures in northeast part of India.
4. Mapping of seismic b-value and its correlation with Bouguer gravity anomaly over the northeast India.
5. 3-D elastic/viscoelastic/viscous finite element stress modeling for the subducting Indian plate and its overriding Asian plate along this margin.
6. 4-D geodynamical modeling of the subducting Indian plate and overriding Asian plate along the Burma-Andaman-Sumatra margin.
7. Stress field evaluation based on stress inversion.
8. Establishing a broadband seismic network in the Eastern Indian Shield Region.