

Curriculum Vitae

1. Full Name : SHASHI PRAKASH SHARMA
2. Designation : PROFESSOR
3. ADDRESS, TELEPHONE, EMAIL, FAX
Prof S.P. Sharma
Department of Geology and Geophysics
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4. EDUCATION AND TRAINING

Degree	Class	Grade	University	Year	Subjects
B.Sc.(Hons)	Ist	66 %	BHU	1985	Physics(Hons.), Maths and Geography
M. Sc. (Tech.)	Ist	73.8 %	BHU	1988	Expl. Geophysics
Ph.D.	-	-	NGRI (BHU)	1994	EM and Electrical Geophysics
Post-Doc	-	-	Oulu University, Finland	March 1996 to June 1999	

UGC-CSIR Joint Entrance Examination for JRF qualified in 1988 in CSIR category

5. PRESENT POSITION

Nov.2011- Present	IIT Kharagpur	Professor	Teaching and Research
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5. PREVIOUS PROFESSIONAL APPOINTMENTS

Duration	Institution	Designation	Nature of Work
Sept.1988-Aug. 1989	BHU	Research Scholar	Research
Sept.1989-Aug. 1991	NGRI	Jr. Research Fellow	Research
Sept.1991-Feb. 1994	NGRI	Sr. Research Fellow	Research
Feb. 1994-Feb. 1996	GWD (Raj.)	T.A.(Geophysicist)	Survey & Research
Mar.1996-June 1999	Oulu Univ.	Post-doc	Research
July 1999-July 2004	IIT Kharagpur	Asstt. Professor	Teaching and Research
Aug.2004- Oct. 2011	IIT Kharagpur	Asso. Professor	Teaching and Research

6. FIELDS OF RESEARCH

- i) Modeling and inversion of 2-D and 3-D subsurface structures considering numerical techniques.
- ii) Integrated interpretation of various geophysical observations for mineral and groundwater exploration.

- iii) Mapping of subsurface contamination by simultaneous applications of electrical and electromagnetic data.
- iv) Global optimization of geophysical data.

7. REPORT OF TEACHING MERITS

Teaching (M.Sc/M.Tech)

a) Theory and lab

- i) Electrical methods of Prospecting
- ii) Electromagnetic methods of Prospecting
- iii) Stationary Fields and Electrical methods
- iv) Time varying fields and Electromagnetic methods
- v) Gravity and magnetic methods of prospecting
- vi) Geophysical Field Theory
- vii) Geophysical Inverse Theory
- viii) Advanced Geophysical Prospecting
- ix) Mineral Exploration
- x) Instrumental Methods in Geosciences
- xi) Groundwater exploration and management
- xii) Groundwater modeling and management

b) Field courses

- i) Electrical and Electromagnetic methods
- ii) Gravity and magnetic methods
- iii) Radiometric methods

8. RESEARCH AWARDS, HONOURS AND MAJOR GRANTS

- a) Post-doctoral fellowship by CIMO, Helsinki (1996-1997)
- b) Research Paper Prize at Oulu University 1998.
- c) Member, National Academy of Sciences, Allahabad, India
- d) Marie Curie Fellowship (Senior Researcher at Eotvos Lorand Geophysical Research Institute, Budapest Hungary (1 June 2008-31 May 2009).
- e) Visiting Professor, University of Hokkaido, Japan (June-Sept. 2015)

9. Projects

a) Major projects

1. Global optimization and joint inversion of geophysical data for solution/reduction of non-uniqueness for reliable subsurface information, DST, Govt. of India.
2. **FIST II:** Deep crustal studies in Eastern Ghats Mobile Belt and adjoining areas using integrated geological and geophysical measurements, DST, Govt. of India.
3. Geophysical survey using gravity and magnetic methods in south Purulia shear zone, BARC, Govt. of India.
4. Geophysical and Geological survey for Chromite deposit in Jajpur, IDCOL, Govt. of Orissa.

5. Geophysical and hydrogeological studies for the development of artificial groundwater recharge scheme for sustainable development in Midnapur, West Bengal, India.
6. Development and Management of Integrated Water Resource in Different Agro-Ecological Regions of India (AEI)

b) Minor Projects (Completed)

1. Groundwater feasibility study for Bankura Municipality (West Bengal) using geophysical surveys.
2. Groundwater exploration for Indian railway for drilling deep tube-well.
3. Integrated geophysical surveys for groundwater exploration for Emami paper Mills, Balasore, Orissa.
4. VLF and Resistivity survey for groundwater exploration for herbal plantation in Birbhum for Emami.
5. Resistivity survey for groundwater exploration for Resistivity Survey for Groundwater Investigation around Amlagora, Garhbetha (W.B.).
6. Integrated geophysical studies for groundwater investigation for Sainik School Purulia, (W.B.)
7. Electrical Resistivity Soundings for feasibility study of groundwater near Kalaikonda, West Bengal for development of Bio-Technology Park.
8. Delineation of limestone formation and groundwater potential assessment around Chaibasa, Jharkhand for Madras Cement.
9. Resistivity Survey for installation for deep tube-well at Kharikamathani PHED, Govt of West Bengal. (PHE WB)
10. Electrical resistivity survey for delineation of Groundwater near Bengunkodar, Purulia, West Bengal (PHE WB)
11. Electrical resistivity survey for delineation of Groundwater near Behragora, Jharkhand. (Indian Oil)
12. Electrical Resistivity Survey for Groundwater exploration Near Sankarial, West Midnapur. (Private firm).
13. Geophysical and Hydrological studies for sustainable water supply for Reliance Industries Ltd,
14. Geophysical and Hydrological studies for delineation of source and preventative measured for underground Chromite mine.
15. Groundwater investigation around Hijli, Indian railway Govt. of India.

10. EDITORIAL BOARD MEMBERSHIPS

Board member Journal of Indian Geophysical Union, India
 Edited a Special Volume of 'Physics and Chemistry of the Earth', Elsevier
 Board member Journal of Geophysics, ASEG, India

11. MEMBERSHIPS IN SCIENTIFIC SOCIETIES

Life member of Association of Exploration Geophysicist, India
 Life member of Indian Geophysical Union, India
 Member, National Academy of Sciences, Allahabad, India

12. OTHER ACADEMIC AND PROFESSIONAL MERITS AND ACTIVITIES

Session at Conference: Organized a session on Near Surface Geophysics at AGU 2009 at San Francisco, USA (with Dr S.K. Verma).

Other external academic activities

External examiner, Reviewer of national and international papers.
Examiner of Geophysicist examination conducted by Union Public Service Examination, Govt. of India

13. International collaboration:

Joint Inversion of magnetotelluric and seismic data for study of the earth's crust and upper mantle, DST New Delhi. (International collaboration with Hungary)

My Ph.D. student Mr Vikas Chand Baranwal was a DAAD Fellow from June 2005 to May 2007 at the University of Freiburg, Germany. Collaborative works have been done with Prof. K. Spitzer on the topic 'Integrated Interpretation of VLF Data with other Geophysical Data and Study of Two-Dimensional VLF Modeling and Inversion'.

Attenuation of higher order harmonics in vibroseis data using very fast Simulated Annealing global optimization approach, Collaborative research in Hungary towards Marie Curie advance researcher EU funded ToK Program.

Development of modeling and inversion for time domain electromagnetic data, University of Hokkaido, Japan.

14. Department and Institute activities

- a) Development of curriculum for 5year integrated M.Sc. and 2year M.Sc. programs
- b) Timetable In-charge
- c) Electrical and EM lab In-charge
- d) Gravity and magnetic lab In-charge
- e) Faculty advisor for UG/PG students
- f) Members of various committee in the department
- g) Served as Assistant Warden of hostel
- h) Associated with Joint Entrance Examination (JEE) and Graduate Aptitude Test in Engineering (GATE) examinations.

15. Ph.D. Guidance

i) Completed (6)

1. Suman Dey (2005), Magnetotelluric survey in the northern part of Eastern Ghats Mobile Belt and the southern part of Singhbhum craton across the Archean Proterozoic contact-Eastern India.

2. Vikas Chand Baranwal (2008), Integrated Interpretation of VLF Data with other Geophysical Data and Study of Two-Dimensional VLF Modeling and Inversion.
3. Kailas Sekhar Banerjee (2011), Measurement of source term for environmental radioactivity and study of geologic control of radon release in a uranium mineralized zone, Jharkhand, India (Joint supervision with Prof D. Sengupta)
4. Arkoprovo Biswas (2013), Identification and resolution of ambiguity in interpretation of Self-Potential data: Analysis and integrated study around South Purulia Shear Zone, India.
5. Saurabh Mittal, 2013, Very Low Frequency Electromagnetic and Radiometric studies around South Purulia Shear Zone for the investigation of possible Uranium mineralization. (Joint supervision with Prof D. Sengupta)
6. Animesh mandal, 2013, Integrated Geophysical studies for delineation of subsurface structures and mineral deposits in the Eastern Indian Shield. (Joint supervision with Prof W.K. Mohanty)

ii) On-Going (4)

1. Ujjwal Nandi
2. Anand Singh
3. Saudamini Sahoo
4. K. Pratima Panda
5. Tashmeet kaur
6. Akankhsha Upadhyaya
7. Gaurav Kumar

b) M.Tech guidance

1. Arkho Provo Biswas, 2006, Electrical resistivity survey over the subsurface alluvial aquifers around Barasat in North 24-Pargana (West Bengal): Implication to Arsenic contamination
2. Apporva Kumar Shukla, 2007, Subsurface conductivity Imaging using VLF EM method.
3. K. Pratima Panda, 2014, Smooth inversion of VLF data.
4. Mondeep Kaushik, 2014. Estimation of Hydraulic parameters from resistivity sounding measurement

c) M.Sc Guidance

1. Shantanu Dutta, 2000, Design and development of a virtual digital electronics laboratory
2. Satish Duggana, 2001, Development of optimum length filter for DC resistivity method
3. Shankarsom Mohanta, 2001, Global optimization and joint inversion of DC resistivity data with various Dipole EM data.

4. Chandan Kumar, 2002, Joint Inversion of resistivity and seismic data using global optimization
5. Gunjan Sinha, 2003, Global optimization of seismic travel time data to resolve the ambiguity in geoelectrical model.
6. Tandrima Mukherjee, 2003, Integrated interpretation of geoelectrical and magnetic data for delineation of groundwater bearing zones in Bankura, West Bengal
7. Rituparna Sarker, 2003, Subsurface conductivity Imaging by very low frequency electromagnetic method.
8. Rakesh Kumar, 2004, Interpretation of Geoelectrical data for delineation of groundwater bearing zones in Birbhum, West Bengal.
9. Jyoti Kumar, 2004, Static shift removal and interpretation of magnetotelluric sounding.
10. Subhbrata Chowdhary, 2004, Detection of groundwater bearing fracture zones in a hard rock area using VLF EM data.
11. Subroto Mal, 2004, Detectability and resolution of various Dipole EM systems,
12. Sambit Kumar Ghosal, 2004, Joint inversion of seismic refraction and magnetotelluric data
13. Ashwaini Kumar Jain, 2005, Development of a new filtering technique for interpretation of VLF electromagnetic data.
14. Soumya Roy, 2005, Two-dimensional inversion of magnetotelluric data for delineating smooth variation in subsurface conductivity.
15. Pratik Sangani, 2006, Inversion of seismic reflection and refraction data
16. R. Krishna, 2006, Waveform inversion and global optimization of seismic reflection data using genetic algorithm and artificial neural networks for resolving ambiguities in interpretation.
17. Soumen Dasgupta, 2006, "Very low frequency and resistivity studies for delineation of subsurface structure for development of artificial recharge scheme in Balasore, Orissa"
18. Joyeeta Chattopadhyay, 2006, Modeling and inversion studies of data from Horizontal coplanar loops (Slingram) EM system
19. Tauseef Rouff, 2007, Appriaisal of Tertiary sediments below high velocity Deccan basalt using magnetotelluric modeling and inversion
20. Sachin Bhatnagar, 2007, Groundwater potential assessment using resistivity sounding method near Kalaikunda, West Bengal
21. Bishwarup Das, 2007, Correlation between VLF and radiometric data in hard rock area from Orissa.
22. Manoj Kumar Meena, 2007, Delineation of limestone formation using resistivity method.
23. Sakshi Gopal Saha, 2008, Inversion of magnetotelluric sounding data for 1 D earth models
24. Gaurav Dutta, 2011, Inversion of VLF data for smooth variation in resistivity.
25. Rahul Kumar Pradhan, 2011, Ambiguity in VLF data interpretation from apparent current density.
26. Prabhakar Nayak, 2011, Groundwater investigation around Bahragora using resistivity survey.
27. Nancy Jain, 2012, Resolving ambiguity in self-potential anomaly over 2D inclined sheet ising VFSA global optimization method.
28. Anand Singh, 2012, Least square inversion of seismic refraction travel time data.
29. Tarique Adnan Siddiqui, 2012, Inversion of VLF data for smooth variation in subsurface conductivity.

30. Subhajit Poddar, 2012, A new approach for detection of groundwater bearing fractures in hard rock area through measurement of normalized current flow in Dc resistivity survey.
31. Sasi Kumar Reddy K, 2012, Optimal survey design for resistivity survey based on sensitivity analysis.
32. Chirag Tibrawal, 2013, Design of optimum length resistivity filters.
33. Sumeet Kumar Mavani, 2013, Self-potential anomalies around South Purulia Shear zone.
34. Aparajita Nath, 2014, Modeling and inversion of VLF data.
35. PVS Sai, 2014, Interpretation of Self-potential data over thick structures.
36. Nitesh Kumar, 2014, Groundwater investigation around Hijli, Kharagpur.
37. Abhay Kumar, 2015, 2-D modeling of electrical resistivity for resolving vertical structure.
38. Adesh Pandey, 2015, Numerical modeling of resistivity data.
39. Manu Mathew, 2015, Modeling of marine resistivity data.
40. C. M. Jyotsana, 2015, Interpretation of resistivity sounding data.
41. Sharad Shashank, 2015, Interpretation of seismic data for resolving thin structures.
42. Viresh Kumar Jadav, 2016, Development of interpretation approach for VLF data.
43. M. Praneeth, 2016, Inversion of 2-D resistivity data.
44. Dileep Kumar Meena, 2016, Development of interpretation techniques for SP data.
45. Afjal Haque, 2016, Interpretation of VLF and VLF-R data
46. Sachin Kumar Daiya, 2016, Modeling of resistivity data.
47. Shivendra Bharati, 2016, Interpretation of resistivity sounding data.

Popular Article

1. **S. P. Sharma**, 2004, Geophysics: Exploring Earth's Interior and its Natural Resources, Dissari, Article for School Children, DAV Model School, IIT Kharagpur.

Invited lectures

Recent advancement in VLF data interpretation Techniques, NGRI Hyderabad (December 2000).

Inversion of Geophysical data, Sopron, Hungarian Academy of Sciences, (December 2004).

Very low frequency Electromagnetic method, Sopron, Hungarian Academy of Sciences, (December 2004)

VLF Electromagnetic method in the investigation of concealed radioactive deposits, Uranium Corporation of India (UCIL), Jaduguda. Jharkhand (December 2005)

Equivalence and Suppression problems in DC. Resistivity data interpretation at Central groundwater Board, Patna, India (December 2006)

VLF electromagnetic methods in groundwater investigation at Central groundwater Board, Patna (December 2006).

Electrical Prospecting-Theory and applications, International Summer School at University of Hokkaido, Japan, 2015

Electromagnetic prospecting- Theory and applications: International Summer School at University of Hokkaido, Japan, 2015

Global Optimization of Geophysical data, University of Hokkaido, Japan, 2015.

SOFTWARE (DEVELOPED/MODIFIED)

NAME

DESCRIPTION

- 1. LOOPS.FOR** This program computes the forward response over the layered earth for various EM dipole systems using digital linear filtering approach.
 - 2. CEMRES.FOR** This program performs the individual as well as joint inversion of the data from various EM systems and DC resistivity arrays.
 - 3. CCST.FOR** The program stands for controlled comprehensive search technique. It can be used for the optimization in multidimensional space.
 - 4. SARES.FOR** Inversion of DC resistivity data by Simulated Annealing.
 - 5. SAEM.FOR** Inversion of dipole EM data by Simulated Annealing.
 - 6. GENRES.FOR** Inversion of DC resistivity data by Genetic Algorithm
 - 7. GENEM.FOR** Inversion of Dipole EM data by Genetic Algorithm
 - 8. MESH.FOR** Automatic mesh and code generator for elements in 2-D finite element modeling.
 - 9. SAVLF.FOR** Simulated annealing inversion of VLF EM data considering 2-D structure using finite element modeling.
 - 10. JTEMPLT.FOR** Joint inversion of multi channel and multi profile time domain EM data.
 - 11. EM3D.FOR** Three-dimensional MT forward modeling Software obtained from R. Mackie modified and implemented at university of Oulu and is in process to be used in inversion.
 - 12. INV3D.FOR** Inversion of Three-dimensional VLF and MT data using stable iterative inversion method.
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- 13. Mainnt.m** Matlab software to harmonic noise attenuation from multitrace vibroseis seismic reflection data
- 14. VFSARES.f** Inversion of resistivity data from various electrode arrays
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List of publications

a) Journals

1. S. K. Verma and **S. P. Sharma, 1993**; Resolution of thin layers using joint-inversion of electromagnetic and direct current resistivity sounding data, *Jour. of Electromagnetic Waves and Applications*, Vol. 7, No. 3, pp. 443-479.
2. **S. P. Sharma, 1993**; Comments on Versatility of digital linear filters used in computing resistivity and EM sounding curves, *Jour. of Appl. Geop.*, Vol. 30, No. 4, pp. 317.
3. **S. P. Sharma** and S. K. Verma, **1994**; Imaging of subsurface contamination using dipole EM systems, *Geophysical Research Letters*, Vol. 21, No. 7, 513-516.
4. S. K. Verma and **S. P. Sharma, 1994**; Effect of T-R Separation on the Resolution of subsurface Layer by Various Dipole EM system, *Jour. AEG*, V. 15, No. 3, 129-138.
5. S. K. Verma and **S. P. Sharma, 1995**; Focused resolution of thin conducting layer by various dipole EM systems, *Geophysics*, V. 60, No. 2, 381-389.
6. P. Kaikkonen and **S. P. Sharma, 1997**; Delineation of 2-D near surface structures using VLF and VLF-R data- An insight from the joint inversion results, *The Leading Edge*, November issue, 1683-1686.
7. **S. P. Sharma** and P. Kaikkonen, **1998**; Joint inversion using simulated annealing in 2-D: I - VLF-R mode, *Jour. of Physics and Chemistry of the Earth*, V. 23, No.9-10, 895-900.
8. P. Kaikkonen and **S. P. Sharma, 1998**; Joint inversion using simulated annealing in 2-D: II - VLF model and comparison with VLF-R mode, *Jour. of Physics and Chemistry of the Earth*, V. 23, No.9-10, 901-908.
9. **S. P. Sharma** and P. Kaikkonen, **1998**; Two-dimensional nonlinear inversion of VLF-R data using simulated annealing, *Geophysical Journal International*. V. 133, 649-668.
10. P. Kaikkonen and **S. P. Sharma, 1998**; 2-D non-linear joint inversion of VLF and VLF-R data using simulated annealing, *Jour. of Appl. Geophysics*, V. 39, No. 3, 155-176.
11. **S. P. Sharma** and P. Kaikkonen, **1998**; An automatic finite element mesh generation and element coding in 2-D electromagnetic inversion, *Geophysica*, V. 34, No. 3, 93-114
12. **S. P. Sharma** and P. Kaikkonen, **1999**; Appraisal of equivalence and suppression problems in 1-D EM and DC measurements using global optimization and joint inversion, *Geophysical Prospecting*, V. 47, No. 2, 219-249.
13. **S. P. Sharma** and P. Kaikkonen **1999**; Global optimization of time domain electromagnetic data using very fast simulated annealing, *Pure and applied Geophysics*, V 155,149-168.
14. **S. P. Sharma** and P. Kaikkonen, **2000**; Global nonlinear inversion of transient EM data from conducting surroundings using a free-space plate model, *Geophysics*, v. 65, no. 3, p 783-790.
15. P. Kaikkonen and **S. P. Sharma, 2001**; A comparison of performances of linearized and global nonlinear 2-D inversions of VLF and VLF-R electromagnetic data, *Geophysics*, v 66, no 2, p. 462-475.

16. N. Kundu, M. K. Panigrahi, **S. P. Sharma** and S. Tripathi, **2002**, delineation of fluoride contaminated groundwater around a hot spring in Nayagarh, Orissa using geochemical and resistivity studies, *Environmental Geology*, V. 43, 228-235.
17. **S. P. Sharma**, **2003**, Modeling and inversion of Very Low Frequency (VLF) data over 3-D structures, *GEOS*, V. 14, 91-100.
18. **S.P. Sharma** and V.C. Baranwal, **2005**, Delineation of groundwater bearing fracture zones in hard rock areas using integrated study of Very Low Frequency Electromagnetic and Resistivity data' *Journal of Applied Geophysics*, 57, 155-166.
19. **S.P. Sharma**, E. Prascer, K.K. Roy, **2005**, Joint inversion of seismic refraction and magnetotelluric data for resolving deeper subsurface structures, *Acta Geod. Geoph. Hungarica*, 241-258.
20. V.C. Baranwal and **S.P. Sharma**, **2006**, Integrated Geophysical Studies in the East-Indian Geothermal Province, *Pure and Applied Geophysics*, 206-227
21. V.C. Baranwal, **S.P. Sharma**, D. Sengupta, M.K. Sandilya, B.K. Bhaumik, R. Guin, and S.K. Saha, **2006**, A new high background radiation area in Geothermal region of Eastern Ghats Mobile Belt (EGMB) of Orissa, India, '*Radiation measurements*' 202-210.
22. A. Mandal, D. Sengupta and **S.P. Sharma**, **2007**, Mapping of groundwater contamination in and around Ash disposal site of Kolaghat thermal power plan, West Bengal, India, using DC resistivity studies, *Journal of Geological Society of India*, 69, 373-380.
23. **S.P. Sharma**, K. Anbarasu, S. Gupta, A. Sengupta, **2010**, Integrated Very Low Frequency EM, electrical resistivity and Geological studies on the Lanta Khola landslide, North Sikkim, India, *Landslides*, V. 7, No. 1, 43-53.
24. K. Anbarasu, A. Sengupta, S. Gupta and **S.P. Sharma**, **2010**, Mechanism of activation of the Lanta Khola Landslide in Sikkim Himalayas, *Landslide*, 7, 135-14
25. **S. P. Sharma** and S. K. Verma, **2011**, Solutions of the inherent problem of the equivalence in direct current resistivity and electromagnetic methods through global optimization and joint inversion by successive refinement of model space, *Geophysical Prospecting*, 59(4), 760-776.
26. **S.P. Sharma** and A. Biswas, **2011**, Global nonlinear optimization for the estimation of static shift and interpretation of magnetotelluric sounding data, *Annals of Geophysics*, 54 (3), 249-264.
27. **S.P. Sharma** and V.C. Baranwal, **2011**, Focusing frequency and significance of multi-frequency Very Low Frequency electromagnetic measurement in delineating near surface conducting structures, *Near Surface Geophysics*, 9, 435-447.
27. W. K. Mohanty, A. Mandal, **S. P. Sharma**, S. Gupta and S. Misra, **2011**, Integrated Geological and Geophysical studies for delineation of chromite deposits: A case study from Tangarparha, Orissa, India, *Geophysics*, 76, NO. 5 (SEPTEMBER-OCTOBER 2011); P. B173–B185, (DOI: 10.1190/GEO2010-0255.1)
29. K. S. Banerjee, **S. P. Sharma**, A. K. Sarangi and D. Sengupta, **2011**, Delineation of subsurface structures around an Indian U-tailings pond, Jharkhand, India using an integrated Resistivity, VLF and radiometric survey and its hydrogeological implication, *Jour. of Physics and Chemistry of the Earth*, 36 (16),1345-1352. doi:10.1016/j.pce.2011.03.008
30. **S.P. Sharma**, **2012**, VFSARES—a very fast simulated annealing FORTRAN program for interpretation of 1-D DC resistivity sounding data from various electrode arrays, *Computers and Geosciences*, 42, 177-188

31. P. Kaikkonen, **S. P. Sharma** and S. Mittal, 2012, 3D modeling and inversion of VLF and VLF-R electromagnetic data, *Geophysics*, 77 (4), WB219–WB231.
32. Biswas, A, Jana A. and **Sharma S. P.**, 2012, Delineation of Groundwater Potential Zones using Satellite Remote Sensing and Geographic Information System Techniques: A Case study from Ganjam district, Orissa, India, *Research Journal of Recent Sciences*, Vol. 1(9), 59-66.
33. **S. P. Sharma** and A. Biswas, 2013, Interpretation of Self-potential anomaly over a 2D inclined structure using very fast simulated-annealing global optimization — An insight about ambiguity, *Geophysics*, Vol. 78, NO. 3, P. WB3–WB15.
34. **S. P. Sharma** and A. Biswas, 2013, A practical solution in delineating thin conducting structures and suppression problem in direct current resistivity sounding, *J. Earth Syst. Sci.* **122**, No. 4, pp. 1065–1080.
35. S. Mittal, R. Guin, **S.P. Sharma** and D. Sengupta, 2013, Estimation of ^{238}U , ^{232}Th and ^{40}K concentrations in rock and soil samples around South Purulia Shear Zone, India, *Int. J. Low Radiation*, Vol. 9, No. 2, 110-118.
36. A Mandal, W.K. Mohanty, **S.P. Sharma**, 2013, Gravity-magnetic studies over Manbazar-Kutni area of South Purulia Shear Zone by *GSTF International Journal of Geosciences*, 1(1), 83-87.
37. A. Mandal, A. Biswas, S. Mittal, W K Mohanty, S P Sharma, DSengupta, J. Sen, A.K. Bhatt, 2013, Geophysical anomalies associated with uranium mineralization from Beldih mine, South Purulia Shear Zone, India, *Journal of the Geological Society of India*, 82 (6), 601-606.
38. A. Biswas, A. Mandal, **S.P. Sharma** W.K. Mohanty, 2014, Integrating Apparent Conductance in Resistivity Sounding to Constrain 2D Gravity Modeling for Subsurface Structure Associated with Uranium Mineralization across South Purulia Shear Zone, West Bengal, India, *International Journal of Geophysics*, **2014, ID 691521**.
39. S. Mittal, **S.P. Sharma**, A. Biswas and D. Sengupta, 2014, Correlation of VLF-EM Data with Radiometric Measurements: Implications for Uranium Exploration around Beldih, South Purulia Shear Zone, India, *International Journal of Geophysics*, **2014, ID 969462**.
40. A. Biswas, A. Mandal, **S.P. Sharma** W.K. Mohanty, 2014 Delineation of subsurface structures using self-potential, gravity, and resistivity surveys from South Purulia Shear Zone, India: Implication to uranium mineralization, *Interpretation*, 2(2), **T103-T110**.
41. A. Biswas and **S.P. Sharma**, 2014, Optimization of self-potential interpretation of 2-D inclined sheet-type structures based on very fast simulated annealing and analysis of ambiguity, *Journal of Applied Geophysics*, 105, 235-247.
42. S.P. Sharma, A. Biswas, V.C. Baranwal, 2014, Very low frequency electromagnetic method – A shallow subsurface investigation technique for geophysical applications, edited book *Recent Trends in Modelling of Environmental Contaminants*, 119-141; Springer, ISBN: 978-81-322-1783-1
43. S.P. Sharma, A. Biswas and S. Mittal, 2014, Delineation of Extension of Uranium Mineralization Zone using Resistivity and Very Low Frequency Electromagnetic Surveys around South Purulia Shear Zone, India, *Jour Geological Society of India*, **84, 645-656**.
44. A. Biswas, A. Mandal, S. P. Sharma, and W. K. Mohanty, 2014, Delineation of subsurface structures using self-potential, gravity, and resistivity surveys from South Purulia Shear Zone, India: Implication to uranium mineralization, *Interpretation*, **2, T103-T110**.
45. A. Biswas and S.P. Sharma, 2014, Resolution of multiple sheet-type structures in self-potential measurement by *Jour. of Earth System Science*, **123, 809-825**.

46. A Mandal, WK Mohanty, SP Sharma, A Biswas, J Sen, AK Bhatt, 2015, Geophysical signatures of uranium mineralization and its subsurface validation at Beldih, Purulia District, West Bengal, India: a case study. *Geophysical Prospecting*, 63 (3), 713-726, DOI: **10.1111/1365-24**.
47. A Mandal, W. K. Mohanty, SP Sharma, 2015, Integrated Gravity-Magnetic Study for Delineation of Structural Guided Uranium Mineralization Zones at Kutni, Purulia, West Bengal, *Jour Geological Society of India*, **85 (3), 299-304**.
48. A. Biswas and S.P. Sharma, 2015, Interpretation of self-potential anomaly over idealized bodies and analysis of ambiguity using very fast simulated annealing global optimization technique by *Near Surface Geophysics*, **13, 179–195**.
49. A. Singh and S.P. Sharma, Fast imaging of subsurface conductors using very low-frequency electromagnetic data by *Geophysical Prospecting*, **63, 1355-1370**.
50. A. Mandal, W.K. Mohanty, S.P. Sharma, S.Gupta, 2015, Laterite covered mafic-ultramafic rocks: Potential target for chromite exploration-A case study from southern part of Tangarparha, Odisha by *Journal of Geological Society of India*, **86, 519-529**.
51. A. Biswas and S.P. Sharma, 2015, Can very low frequency electromagnetic survey detect graphite deposits in the subsurface? Initial results from Daltanganj, Jharkhand, *Journal of Geological Society of India*, **86, 530-534**.
52. Kajori Parial, Arkoprovo Biswas, Sudha Agrahari, S.P. Sharma and D. Sengupta, 2015, Identification of contaminated zones using direct current resistivity surveys around ash ponds near Kolghat Thermal Power plant, West Bengal, India by *International Journal of Geology and Earth Sciences*, **V.1 (No.2)**.
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1. S. K. Verma and **S. P. Sharma, 1995**; EM Mapping of Pollution Plumes, SAGEEP, EEGS P.809-827
2. S. K. Verma and **S. P. Sharma, 1996**; Performance of sequential and joint inversion in electrical and electromagnetic methods. Presented in EAEG seminar in Amsterdam, The Netherlands, May 6-10.
3. S. K. Verma and **S. P. Sharma, 1996**; Performance of local and global methods in the optimization of EM sounding data. Presented at the 13th workshop on EM induction in the Earth, Onuma, Hokkaido, Japan - July 13-20.
4. **S. P. Sharma** and P. Kaikkonen, **1997**; An automated finite element mesh generation for 2-D EM inversion, Proceeding of the XXII Convention of Radio science (Ed. K. Kalliomäki and E. Savolainen), 133-134.
5. P. Kaikkonen and **S. P. Sharma, 1997**; A comparison of local and global optimization of 2-D very low frequency electromagnetic data, Proceeding of the XXII Convention of Radio science (Ed. K. Kalliomäki and E. Savolainen), 135-138.
6. **S. P. Sharma** and P. Kaikkonen, **1997**; Nonlinear inversion using simulated annealing in 2-D: I VLF-R mode, presented at 22nd EGS meeting in Vienna, Austria, April 21-25.

7. P. Kaikkonen and **S. P. Sharma, 1997**; Nonlinear inversion using simulated annealing in 2-D: II VLF mode, presented at 22nd EGS meeting in Vienna, Austria, April 21-25.
8. **S. P. Sharma** and P. Kaikkonen, **1997**; Global optimization and joint inversion in 1-D: Appraisal of equivalence and suppression problems in EM and DC measurements, Presented at Applied geophysicist XI meeting, 22-23 October, University of Oulu, Finland.
9. P. Kaikkonen and **S. P. Sharma, 1997**; Linear and nonlinear 2-D inversion of electromagnetic VLF and VLF -R data: A comparison of performances. Presented at Applied geophysicist XI meeting, 22-23 October, University of Oulu, Finland.
10. P. Kaikkonen and **S. P. Sharma, 1997**; Delineation of 2-D near surface structures using global optimization in joint inversion of VLF and VLF-R data Presented at Applied geophysicist XI meeting, 22-23 October, University of Oulu, Finland.
11. **S. P. Sharma** and P. Kaikkonen, **1997**; An automated finite element mesh generation for 2-D EM inversion, Poster presented at XXII convention on Radio Science at 20-21 NOV., University of Oulu, Finland.
12. P. Kaikkonen and **S. P. Sharma, 1997**; A comparison of local and global optimization of 2-D very low frequency electromagnetic data, Poster presented at XXII convention on Radio Science at 20-21 NOV., University of Oulu, Finland.
13. **S. P. Sharma**, P. Kaikkonen and S. K. Verma, 1997; Inversion of transient EM data using very fast simulated annealing, Presented at *Inversion Days* symposium held on 11-12 December at the Department of mathematics, Helsinki University of Technology, Espoo, Finland.
14. **S. P. Sharma** and P. Kaikkonen and S. K. Verma, **1998**; Global optimization of time domain electromagnetic data using very fast simulated annealing., presented at 14th Workshop on Electromagnetic Induction in the Earth held in Sinaia, Romania August 14-22.
15. **S. P. Sharma** and P. Kaikkonen, **1998**; Global optimization of transient EM data in conducting surroundings using free space model, presented at 14th Workshop on Electromagnetic Induction in the Earth held in Sinaia, Romania August 14-22.
16. M. Pirttijärvi, P. Kaikkonen, **S. P. Sharma** and S.-E. Hjelt, **1998**; Two dimensional inversion of VLF data, presented at 14th Workshop on Electromagnetic Induction in the Earth held in Sinaia, Romania August 14-22.
17. M. Pirttijärvi, P. Kaikkonen, **S. P. Sharma**, and S.-E. Hjelt, 1998. Two dimensional inversion of VLF data in geophysical exploration. 8th National Electromagnetics Meeting, Helsinki, Finland, August 27.
18. P. Kaikkonen and **S. P. Sharma, 1999**; Three-dimensional inversion of VLF data, Poster presented at 61st EAGE Conference and Technical Exhibition, June 1.-11., Helsinki, Finland, June 7-11.
19. S. K. Verma, S.E. Hjelt, **S. P. Sharma** and M. Pirttijarvi, **1999**, Strengths and weaknesses of global, local, and joint- inversion approaches in the optimisation of electrical and EM data. IUGG99 (IAGA) Birmingham, England, July 19.-30.
20. S.-E. Hjelt, L. Päivärinta, P. Kaikkonen, M. Orispää and M. Pirttijärvi, **S.P. Sharma** and S.K. Verma, 1999, Studies of Non-linear EM Inversion - Experiences from the NOIGEM Project, Presented at 2nd symposium on 3D-EM modeling , Utah, USA, October 19-21.
21. **S. P. Sharma**, 2000, Joint inversion using global optimization of DC resistivity and MT data for resolving thin resistive and conducting layers, Presentation at 15th EM Induction Workshop held in Cabo Frio, Brazil, August 19-26.

22. N. Kumar and **S. P. Sharma**, 2002, Global optimization and joint inversion of electromagnetic and direct current resistivity sounding data, Poster presented EM induction workshop held in Santa Fe, USA, June 18-26.
23. **S. P. Sharma** and S. K. Verma, 2003, Solutions of the inherent problem of the equivalence in direct current resistivity and electromagnetic methods through global optimization and joint inversion by successive refinement of model space, presented in 23rd General Assembly of the IUGG 2003, Sapporo, Japan (30 June-11 July).
24. **S. P. Sharma**, 2003, Three-dimensional inversion of very low frequency (VLF) electromagnetic data, presented in 23rd General Assembly of the IUGG 2003, Sapporo, Japan (30 June-11 July).
25. **S. P. Sharma**, 2003, Characterization of geothermal reservoir around a hot spring through integrated geophysical and geochemical studies, Poster presentation in 23rd General Assembly of the IUGG 2003, Sapporo, Japan (30 June-11 July).
26. S. Dey, **S. P. Sharma**, K. K. Roy, and S. Srivastava, 2003, Some properties of the magnetotelluric rotation invariant tensors, Poster presentation in 23rd General Assembly of the IUGG 2003, Sapporo, Japan (30 June-11 July).
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28. Baranwal V.C., Franke A., Boerner R.-U., Spitzer K., **Sharma S.P.**, 2006. Unstructured grid based 2D inversion of plane wave EM data for models including topography, Extended Abstracts, S3-12, 18th International Workshop on Electromagnetic Induction in the Earth, El Vendrell, Spain.
29. **S. P. Sharma** and Marta Kis, 2007, Global optimization for the interpretation of magnetotelluric sounding data using polynomial approximation and estimation of static shift, Paper presented at IUGG 2007, Perugia, Italy 1-12 July.
30. K.M. Bhatt, S.K. Verma and **S. P. Sharma**, 2007, 3-D inversion of Electromagnetic data over kimberlite pipe, AP. India, IUGG 2007, Paper presented at IUGG 2007, Perugia, Italy 1-12 July.
31. **S. P. Sharma**, K. Anbarasu, S. Gupta and A. Sengupta, 2007, Very low frequency electromagnetic observations in the high altitude region of north sikkim, India, Paper presented at IUGG 2007, Perugia, Italy 1-12 July.
32. Baranwal V.C., Franke A., Boerner R.-U., Spitzer K., **Sharma S. P.**, 2007, Development of an unstructured grid based 2D code to invert plane wave EM data for models including topography, 67th Annual Convention of the German Geophysical Society, Aachen, Germany, 25, German Geophysical Society.
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34. **S.P. Sharma**, Peter Tildy , Kambiz Iranpour, Peter Scholtz, 2009, Attenuation of harmonic noise in vibroseis data using Simulated Annealing , Presented EGU09 meeting at Vienna 19-24 May, 2009.

35. **S.P. Sharma**, K. Anbarasu, S. Gupta, A. Sengupta, 2009, Integrated Very Low Frequency EM, electrical resistivity and Geological studies on the Lanta Khola landslide, North Sikkim, India, Presented at AGU2009 Fall meeting held in San Francisco, USA, Dec 14-18.
36. [Animesh Mandal](#), [W.K. Mohanty](#), **S.P. Sharma** , 2013, 3D compact inverse modeling of gravity data for chromite exploration – A case study from Tangarparha, Odisha, India, Society of Exploration Geophysicists (SEG) International Exposition and Eighty-Third Annual Meeting, Houston, Texas, USA.
37. [Animesh Mandal](#), **S.P. Sharma**, [W.K. Mohanty](#), 2014, Simultaneous inversion of gravity and very low frequency electromagnetic real anomaly – a compact inversion approach, SEG International Exposition and 84th Annual Meeting, Denver, Colorado, USA.
38. A. Singh and S.P. Sharma, 2015, Appraisal of current density in very low frequency measurement using preconditioned conjugate gradient approach, AGU, San Fransisco, USA, December 15-20.
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1. **S. P. Sharma, 1990**; Ground water exploration in parts of Varanasi district, U. P., INDIA, Presented at the National Seminar on Role of Geophysics in National Development at Banaras Hindu University, Varanasi, U. P., August, 29 - 31.
2. **S. P. Sharma** and S. K. Verma, **1990**; Performance of various resistivity sounding arrays in resolving thin layers by joint-inversion of EM data, Presented at 16th Annual Convention of AEG and Seminar on Exploration Geophysics at Dehradun, U. P., December, 5-7.
3. S. K. Verma and **S. P. Sharma. 1991**; Relative resolution of thin layers by joint-inversion of data from various EM systems and DC arrays, Presented at the First International Seminar and Exhibition on `Exploration Geophysics in Nineteen Nineties', Hyderabad, November, 25-30.
4. **S. P. Sharma** and S. K. Verma, **1992**; Detectability and resolvability of thin layers by electromagnetic loop-loop systems, Presented at the Seminar on `Modeling of Geosignatures for the Detection of Oil and Natural Gas', B.H.U., Varanasi, February 27-29.
5. S. K. Verma and **S. P. Sharma, 1993**; Focused resolution of thin conducting layer by various dipole EM systems, presented at the 18th Annual Convention of AEG and Seminar on Exploration Geophysics, Jaipur April 6-8.
6. S. K. Verma and **S. P. Sharma, 1993**; A new phenomenon of focusing observed for various EM systems, Proceeding of the 30th IGU seminar held at NGRI, Hyderabad, Dec. 21-23, p. 56-67.
7. S. K. Verma and **S. P. Sharma, 1994**; EM mapping of Pollution plumes (AEG Seminar paper).

8. **S. P. Sharma, 1995**; Ambiguities in ground water exploration by geoelectrical method in hard rock areas of Rajasthan, Presented in AEG seminar on Earth resources, Industrial development and Environmental issue, March 20-22, 1995 at Jaipur.
9. S. K. Verma and **S. P. Sharma, 1996**; Evaluation of local and global methods in the resolution of fine structures employing electrical and EM data. Presented at the 2nd international seminar and exhibition **Geophysics beyond 2000**, Hyderabad - Nov. 15-20.
10. **S. P. Sharma** and P. Kaikkonen, **1999**; Three-dimensional modeling and inversion of Very Low Frequency (VLF) measurements, presented at 25th AEG seminar on Exploration Geophysics held in Chandigarh from November 18-20.
11. **S. P. Sharma** and V. C. Baranwal, 2003, "Integrated geophysical study for groundwater bearing fracture zones in hard rock region of Purulia, West Bengal", Paper presented in National symposium held at Dept. of Geophysics, BHU during 6th to 8th Nov. 2003 .
12. V. C. Baranwal and **S. P. Sharma, 2004**, Integrated Geophysical Studies in the East-Indian Geothermal Province, Presented at EM Induction workshop held in Hyderabad, India, Oct 2004.
13. **S. P. Sharma** and Jyoti Kumar, 2004, Interpretation of magnetotelluric sounding data and simultaneous optimization of static shift, Presented at EM Induction workshop held in Hyderabad, India, Oct 2004.
14. **S. P. Sharma** and V. C. Baranwal, 2004, Interpretation of multifrequency VLF data, Presented at EM Induction workshop held in Hyderabad, India, Oct 2004.
15. Guin R., Baranwal V.C., **Sharma S. P.**, Sengupta D., Saha S.K., 2006. Natural radioactivity in a new high background area in Orissa, India, International Conference on Application of Radiotracers in Chemical, Environmental and Biological Sciences, Kolkata (ENV 34).
16. **S.P. Sharma, 2008**, Interpretation of magnetotelluric sounding data and simultaneous optimization of static shift, Presented at 1st Indo-German workshop on EM induction at Lonawala, Mumbai, India March 14-18.
17. **S.P. Sharma, 2008**, Very low frequency electromagnetic observations in the high altitude region of North Sikkim, India, Presented at 1st Indo-German workshop on EM induction at Lonawala, Mumbai, India March 14-18.
18. Arkoprovo Biswas, **S. P. Sharma**, Saikat Sengupta, Anindya Sarkar, **2011**, Schlumberger Resistivity Survey over the Subsurface Alluvium Aquifer of Barasat (West Bengal), Implication to Arsenic Contamination. Proceedings of International Seminar on Recent Advances in Geoscience, ISBN 9789380813035, 1, 270-275
19. Mandal, A., Mohanty, W. K., **Sharma, S. P.**, and Gupta, S., 2011, Integrated gravity and magnetic studies for delineation of chromite deposit at Tangarparha, Orissa *by, Proceedings of International Seminar on Recent Advances in Geoscience (RAG 11)* 1, 290-294, (ISBN 9789380813035
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22. **S.P. Sharma** and Arkoprovo Biswas, 2011, Delineation of subsurface structures associated with uranium mineralization using resistivity and VLF surveys around South Purulia Shear

Zone, Presented at [International Workshop on "Recent Advances in Ground and Airborne Electromagnetic Methods - Innovations in processing and inversion techniques", held in Hyderabad on September 27-28,](#)

23. Arkoprovo Biswas and S.P. Sharma, 2012, Application of Very Low Frequency Electromagnetic and Self Potential survey to identify the source for subsurface mine seepage at Bangur Chromite mine, Orissa, Presented (oral) 49th IGU held at Gandinagar 29-31 October 2012.
24. S.P. Sharma and Arkoprovo Biswas, 2012, Uncertainty in the interpretation of Self potential anomaly over a 2D inclined sheet type structure using very fast simulated annealing global optimization technique, Presented (oral) 49th IGU held at Gandinagar 29-31 October 2012.
25. Animesh Mandal, Arkoprovo Biswas, Saurabh Mittal, S. P. Sharma, W. K. Mohanty and D. Sengupta, 2012, Integrated exploration strategy for uranium mineralization from Beldih mine, Purulia, West Bengal, India, Presented (Poster) 49th IGU held at Gandinagar 29-31 October 2012. **(Awarded Best poster prize of the conference)**
26. Saurabh Mittal, Arkoprovo Biswas, S.P. Sharma and D. Sengupta, 2012, VLF-EM and Radiometric studies around Beldih mine in South Purulia Shear Zone, India, Presented 49th IGU held at Gandinagar 29-32 October. Presented (Poster) 49th IGU held at Gandinagar 29-31 October 2012.
27. Anand Singh, Arkoprovo Biswas and S.P. Sharma, 2012, Global optimization of self-potential data for the resolution of closely spaced multiple structures, Presented 49th IGU held at Gandinagar 29-32 October. Presented (Poster) 49th IGU held at Gandinagar, 29-31 October 2012
28. S.P. Sharma and Arkoprovo Biswas, 2013, Detection of groundwater bearing fractures in hard rock areas through measurement of normalized current flow in direct current resistivity survey, Conference on Near Surface Geophysics, NGRI, Hyderabad, 27-29 January.
29. Arkoprovo Biswas and S. P. Sharma, 2013, Delineation of source for subsurface mine leakage at Bangur Chromite mine, Odisha using Very Low Frequency Electromagnetic and Self Potential survey, Conference on Near Surface Geophysics, NGRI, Hyderabad, 27-29 January.

(d) Scientific monographs

1. S.P. Sharma, 2012, VFSARES, A software for the interpretation of Resistivity sounding data from various arrays, User manual and software at Computers and Geosciences.
2. S. P. Sharma, Arkoprovo Biswas and V. C. Baranwal, 2014, Very Low-Frequency Electromagnetic Method: A Shallow Subsurface Investigation Technique for Geophysical Applications, Recent trend in modeling environmental contaminants Edited by D. Sengupta, Springer.
3. S.K. Verma and S.P. Sharma, 2011, Urban Geophysics, Special issue of Physics and Chemistry of the Earth.

(e) Other original publications, e.g., articles in scientific journals and conference proceedings with no peer-review process, and in university or department publications;

1. **S. P. Sharma, 1994;** Resolution of fine 1-D structures employing individual and joint inversion of electrical and electromagnetic data, Ph.D. Thesis.
2. **S. P. Sharma** and P. Kaikkonen, **1997;** Developments in very low frequency electromagnetic data interpretations, *Report submitted to CIMO, Helsinki, FINLAND*
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5. S.P. Sharma, 2015, Developments on Modeling and inversion of time domain electromagnetic data, University of Hokkaido, Japan.