

DR SANTOSH KUMAR RAI (SCIENTIST-E)



Google Scholar Page: [*Total Citation-322*]

<https://scholar.google.co.in/citations?user=YodDvrwAAAAJ&hl=en>

RESEARCH GROUP: IGNEOUS PETROLOGY & GEOCHEMISTRY

FIELD OF SPECIALIZATION: GEOCHEMISTRY, GEOCHRONOLOGY, MASS SPECTROMETRY, HYDROLOGY, WEATHERING & EROSION OF HIMALAYAN FLUVIAL SYSTEMS.

EDUCATION: (DETAILS OF EDUCATIONAL QUALIFICATIONS STARTING FROM THE MOST RECENT ONES.)

Examination / Degree	Subject/ Specialization	Year	Division	% Marks	University / Board	Distinctions/ Scholarships
PhD	Geochemical and isotopic studies of ancient and modern Sediments	2009	-	-	MSU Baroda /PRL Ahmedabad	With Prof. S. Krishnaswami PRL, Ahmedabad
M.Sc.	Applied Geology	1999	I	70.2	University of Allahabad	1 st Rank in M.Sc. merit
B.Sc.	Physics, Chemistry and Mathematics	1996	II	50.7	University of Allahabad	-
High School (X)	Hindi, English, Science-2, Maths-2, Social Science, Biology	1990	I	66.7	U P Board	-
Intermediate (X+2)	Hindi, English, Maths, Physics, Chemistry,	1992	I	64.0	U P Board	-
NET (LS)	Earth Ocean & Atmospheric Sciences	2001	National Eligibility Test for Lectureship (College/ University)			
GATE	Geology & Geophysics	1999	Graduate Aptitude Test in Engineering: 46 th AIR (MHRD)			

PROFESSIONAL EXPERIENCE: DETAILS OF PROFESSIONAL EXPERIENCE STARTING FROM THE MOST RECENT POSITION.

Sl.No	Name of Organization	Post held	From	To	Nature of duties
1	Wadia Institute of Himalayan Geology, 33 GMS Road, Dehradun- (Uttarakhand) 248001	Scientist-E Scientist-D Scientist-C Scientist-B	06.09.2019 28.07.2015 17.06.2013 28.09.2007	Continue 05.09.2019 27.07.2015 16.06.2013	(A) Academic & Research: Development of (i) Research class Laboratories (ii) Mass Spectrometry Methods and improvements (iii) Research on Environmental Sciences, Climatic science (iv) Weathering and Erosion in the Himalayan Rivers, Aqueous Geochemistry. (v) Acting as a member of Library committee for its smooth functioning (vi) Taking part in conference/Workshop/ Training organization at the Institute (v) Acted as a reviewer on the Journal of Himalayan Geology.
2.	Physical Research Laboratory, Navrangpura, Ahmedabad Gujarat -380009	Junior Research Fellow (JRF)	01.11.2001	31.10.2003	Research work on the Weathering and Erosion in the Himalayan Rivers, Aqueous Geochemistry.
3.	Do	Senior Research Fellow (SRF)	01.11.2003	26.06.2007	Do
4.	Do	Project Associate	20.08.1999	31.10.2001	Do

VISITING POSITIONS: NIL

SERVICES:

- (1) Discharged the responsibility of OIC/Co-OIC for the major laboratories at WIHG which include the Stable Isotope Lab, LA-MC-ICPMS and Clean Lab (class-10000).
- (2) Member Library Committee, Screening Committees for JRF and employees and Academic committee.
- (3) Member of the committee for the Technical evaluation of different instruments/items at WIHG and institutes outside (i.e. NCAOR Goa and Center for Aromatic Plants, Dehradun).

- (4) Represented Institute as a nominated member of the Uttarakhand State Ganga Committee constituted by the Govt. of Uttarakhand.
- (5) Represented Institute as a Technical expert member of the Committee under Haryana Saraswati Heritage Development Board (HSHDB) constituted by the Governor of Haryana.
- (6) Acted as member in the Academic Program Committee (APC) for the evaluation of research Scholars at WIHG.
- (7) Acted as member in the Library committee at WIHG.
- (8) Acted as member in the Store and Purchase committee at WIHG.
- (9) Acting as the assistant Central Public Information Officer (ACPIO) at WIHG.
- (10) Acted as an expert member for the committee constituted for preparing the technical specification of MC-ICPMS at national Center of Antarctic and Ocean Research (NCAOR) Goa (26-27 August, 2015).
- (11) Represented WIHG and contributed in the inter institutional meeting on water related issues at the Irrigation Research Institute (08.01.2016)
- (12) Represented WIHG and contributed in the meeting regarding discussion on “revival of springs in Himalayan Region” (9-11-2016).
- (13) Represented WIHG and contributed in the inter-institutional meeting on Water and welfare: An Uttarakhand Initiative (05.05.2017).
- (14) Represented WIHG and contributed in the meeting on the “Quality infrastructure for surface Water monitoring in the River Ganga” (17.08.2017).
- (15) Represented WIHG and contributed in the meeting regarding discussion on “Revision of the National Water Mission Document” (06-06-2019).

C. TEACHING EXPERIENCE: ISOTOPE HYDROLOGY FOR PHD STUDENTS (UPES, DEHRADUN)

d. Membership:

- Life member (No.578) of **Indian Society for Mass Spectrometry** (ISMAS), Fuel chemistry division, Bhabha atomic research Center Mumbai 400 085, INDIA.
- Professional Member of **the Geochemical Society**, (#168259) America.
- Life member, **Himalayan Geology Society**, INDIA
- Life member, **Indian Geological Congress**, Roorkee, INDIA

e. Editorial Board: NIL

f. International/National Seminars/Workshop:

g. External Research Fund received & Project Handled: NIL

h. Member of important Committees:

- (1) Member in the Uttarakhand State Ganga committee (under the National Mission on Clean Ganga), at Dehradun.
- (2) Expert member Represented Institute as a Technical expert member of the Committee under Haryana Saraswati Heritage Development Board (HSHDB) constituted by the Governor of Haryana.

AWARDS/FELLOWSHIPS/HONORS/MEMORIAL LECTURES:

a. Awards/Medals/Prizes:

- a) Received U.P State Integrated Scholarship from 1989-1990.
- b) Stood **First in the order of merit in the M.Sc. (Applied Geology)** final exam. 1999 of the University of Allahabad.

- c) Received the **Best presentation award** in research student category for the paper " ¹⁸⁷Re-¹⁸⁷Os systematics of Black Shale from the Vindhyan: Implication to their chronology" in ISMAS conference -2001 (Indian Society of Mass Spectrometry) held at Puri, Orissa, India.
- d) *DST young scientist prize (second)* at the **3rd Meeting of the PAC-ES) at VIT University, Vellore (Tamil Nadu) between 17th-19th January, 2008.**

b. Fellowships:

c. Memorial Lectures: NIL

d. Recognition/Honors:

- (i) *Best research paper award* of the Wadia Institute of Himalayan Geology, Dehradun for the paper Stable isotopes ($\delta^{13}\text{C}_{\text{DIC}}$, δD , $\delta^{18}\text{O}$) and geochemical characteristics of geothermal springs of Ladakh and Himachal (India): Evidence for CO₂ discharge in northwest Himalaya; (2016) *Geothermics* 64, 314–330 by Sameer K. Tiwari, **Santosh K. Rai**, Sukesh K. Bartarya, Anil K. Gupta, Manju Negi (*IF*=3.47).

COUNTRIES VISITED:

Country Visited	Purpose of Visit	Date
Germany	To present research paper in GV International conference, Potsdam	26-29 October. 2006
France	To deliver a lecture at CRPG- Nancy; Hosted by Prof. Christian France Lanord	30 Oct.-01 Nov. 2006
Czech Republic	To Attend 21 st Goldschmidt International Conference (Geochemistry) at Prague	14-19 August, 2011
Thailand	One week Training on Ion Chromatography	19 -22 June, 2012
Germany	Two week Training on Isotope Ratio Mass Spectrometry (IRMS) at Thermo Fisher Bremen	27 th Oct -12 th Nov, 2013
Germany	Two week Training on Neptune Plus (LA-MC-ICPMS) at Thermo Fisher Bremen	19 th Oct -30 th Oct, 2015

NATIONAL/INTERNATIONAL COLLABORATION (Outside WIHG):

Inside WIHG Collaborator: NIL

PATENT: NIL

SCHOLARSHIPS AWARDED, GATE

1. Doctoral Research Fellowship of Physical Research Laboratory (Deptt of Space, Govt. of India) in the field of Isotope Geochemistry.
2. Qualified **GATE-99** (Graduate Aptitude Test for Engineers: conducted by Indian Institute of Technology) **All India Rank 46th** in Geology & Geophysics subject.
3. **CSIR-NET exam Dec.-2001** for the National eligibility Test of Lectureship.

PH.D. ADVISOR:

a. Supervision/Guidance to Ph.D. Students: (2 awarded, 1 Submitted & 3 In Progress)

(1) Dr. Sameer Kumar Tiwari (PhD Thesis-Dec-2014, Awarded; Reg.No. 500020777) " Isotopic and Geochemical studies of Geothermal Springs of Northwest Himalaya, India: Implication for source and degassing of Metamorphic CO₂" at University of Petroleum and Energy Studies, Dehradun [with Co-Guide Dr. S.K. Bartarya, WIHG]

(2) **Dr. Manju Negi** (*PhD Thesis-October-2019* PhD Registration No. 500033386) " Petrographic and Isotopic Studies of the Precambrian Lesser Himalayan Clastic Sediments: Implication for their Provenances" at University of Petroleum and Energy Studies, Dehradun [Co-Guide Dr. Udai Bhan, UPES]

(3) **Mr. Somenath Ganguly** (*PhD Registration No. 500041347; Submitted, February, 2020*) "Estimation of absolute ground water temperature by Oxygen-18 fractionation". [Co-Guide Dr. Udai Bhan, UPES and Dr. Saurabh Mittal, UPES]

(4) **Mr. Satyabrata Das** (PhD Registration No. 16DP000079' Thesis-in progress) "Geochemical and isotopic studies of Fluvial sediment core from Teesta River Basin: Climatic variations in the Himalayan region over last 50Ky. [Co-Guide Dr. Sushanta Sarangi, Indian Institute of Technology (ISM) Dhanbad].

(5) **Miss Sakshi Maurya** (PhD Registration No. 16DP000080; Thesis-in progress) "Isotope stratigraphy of Lesser Himalayan carbonate rocks from India: Geological correlation and paleoclimatic reconstruction" [Co-Guide Dr. Sushanta Sarangi, Indian Institute of Technology (ISM) Dhanbad].

(6) **Deepak Singh Maurya** (PhD Registration No. 500028070; Thesis-in progress) "Biostratigraphy and Geochemical Studies of Sirbu Shale Upper Vindhyan Basin India Implication to Province and Hydrocarbon Characteristics" [Co-Guide Dr. Udai Bhan & Dr. D. K. Gupta, at University of Petroleum and Energy Studies]

b. Training [M.Sc./M.Tech Thesis Guidance: 2 completed]

(1) **Miss Sakshi Maurya** [M.Sc. (Geology)-June-2015] "Geochemical characteristics of Gypsum deposits from Sahastradhara-Chamsari section of Lesser Himalaya at D.B.S. College (HNB Garhwal Central university, Srinagar)

(2) **Mr. P. Ilavalgan** [M.Tech (Petroleum exploration)-April-2016, Registration No. 770214010] "Mass Spectrometry and its application in Geology" at University of Petroleum and Energy Studies, Dehradun [Co-Guide Dr. Udai Bhan, UPES]

LIST OF PUBLICATIONS:

(a) SCI Papers (List of Publications (Refereed journals))

1. P Saravanan, AK Gupta, H Zheng, MK Panigrahi, S Tiwari, **Santosh K Rai**, M. Prakasam (2020) Response of shallow-sea benthic foraminifera to environmental changes off the coast of Goa, eastern Arabian Sea during the last ~6,100 cal yr BP; Geological Magazine, 157,3, 497-505
2. S Maurya, **Santosh K Rai** (2020) Geochemical and Isotopic Composition of Gypsum Deposits from Sahastradhara Region of Lesser Himalaya, India; JOURNAL GEOLOGICAL SOCIETY OF INDIA 95, 00
3. **Santosh K Rai** (2020) Geochemical constituents in hot spring waters in the Third Pole; Water Quality in the Third Pole (Elsevier ISBN: 9780128164891), 211-235
4. M Negi, SK Rai, SK Ghosh, U Bhan, S Singhal (2020) Characterization of the detrital zircon from the Lesser Himalayan Proterozoic siliciclastics; Himalayan Geology 41 (1), 126-138

5. S Ganguly, U Bhan, **Santosh K Rai**, S Mittal, RS Ahluwalia, A Verma (2019) An experimental approach to estimate groundwater temperature from ^{18}O fractionation; Groundwater for Sustainable Development 9 (100257), 1-9
6. S Ganguly, **Santosh K Rai**, S Mittal, U Bhan, RS Ahluwalia (2019) Estimation of ground water temperature from ^{18}O fractionation-A deterministic analytical model; Groundwater for Sustainable Development 9 (100234), 1-8
7. MS Goyat, V Jaglan, V Tomar, G Louchaert, A Kumar, K Kumar, Maneesh Singla, Rajeev Gupta, Uday Bhan, **Santosh K. Rai**, Sudesh Sharma (2019) Superior thermomechanical and wetting properties of ultrasonic dual mode mixing assisted epoxy-CNT Nano composites; High Performance Polymers 31 (1), 32-42
8. S Samanta, TK Dalai, SK Tiwari, **Santosh K Rai** (2018) Quantification of source contributions to the water budgets of the Ganga (Hooghly) River estuary, India ;Marine Chemistry 207, 42-54
9. PK Mukherjee, S Singhal, V Adlakha, **Santosh K Rai**, S Dutt, A Kharya, AK Gupta (2017) In situ U-Pb zircon micro-geochronology of MCT zone rocks in the Lesser Himalaya using LA-MC-ICPMS technique. Current Science (00113891) 112 (4)
10. A Kharya, HK Sachan, SK Tiwari, S Singhal, PC Singh, **Santosh K. Rai**, S Kumar, Manish Mehta, PKR Gautam (2016) New occurrence of albitite from Nubra valley, Ladakh: characterization from mineralogy and whole rock geochemistry; Current Science, 1531-1535
11. SK Tiwari, **Santosh K Rai**, SK Bartarya, AK Gupta, M Negi (2016) Stable isotopes ($\delta^{13}\text{C}_{\text{DIC}}$, δD , $\delta^{18}\text{O}$) and geochemical characteristics of geothermal springs of Ladakh and Himachal (India): Evidence for CO_2 discharge in northwest Himalaya Geothermics 64, 314-330
12. SK Tiwari, SK Bartarya, **Santosh K Rai**, AK Gupta, AKL Asthana (2016) Isotopic and geochemical studies of groundwater from the Ramganga basin and the middle Ganga Plains: implication for pollution and metal contamination; Environmental Earth Sciences 75 (16), 1170
13. HK Sachan, M Santosh, D Prakash, A Kharya, PC Singh, **Santosh K Rai** (2016) Metamorphic P–T conditions and CO_2 influx history of medium-grade metapelites from Karakorum, Trans-Himalaya, India; Journal of Asian Earth Sciences 124, 126-138
14. C Groppo, F Rolfo, HK Sachan, **Santosh K Rai** (2016) Petrology of blueschist from the Western Himalaya (Ladakh, NW India): exploring the complex behavior of a lawsonite-bearing system in a paleo-accretionary setting ; Lithos 252, 41-56
15. S Agrawal, P Srivastava, NK Meena, **Santosh K Rai**, R Bhushan, DK Misra, AK Gupta (2015) Stable ($\delta^{13}\text{C}$ and $\delta^{15}\text{N}$) isotopes and magnetic susceptibility record of late Holocene climate change from a lake profile of the northeast Himalaya; Journal of the Geological

Society of India 86 (6), 696-705

16. S Samanta, TK Dalai, JK Pattanaik, **Santosh K Rai**, A Mazumdar (2015) Dissolved inorganic carbon (DIC) and its $\delta^{13}\text{C}$ in the Ganga (Hooghly) River estuary, India: Evidence of DIC generation via organic carbon degradation and carbonate dissolution *Geochimica et Cosmochimica Acta* 165, 226-248
17. **Santosh K Rai**, SK Tiwari, A Kharya, M Negi, AK Gupta(2015) A Laser Based Fluorination (BrF_5) System for the Extraction of Oxygen (O_2) from Silicate Rocks of Himalaya and $\delta^{18}\text{O}$ Measurements: Method Establishment and implications; *Mapan* 30 (3), 221-230
18. AKL Asthana, AK Gupta, K Luirei, SK Bartarya, **Santosh K Rai**, SK Tiwari (2015) A quantitative analysis of the ramganga drainage basin and structural control on drainage pattern in the fault zones, Uttarakhand; *Journal of the Geological Society of India* 86 (1), 9-22
19. **Santosh K Rai**, SK Tiwari, SK Bartarya, AK Gupta (2015) Geothermal systems in the Northwest Himalaya *Current Science*, 1597-1599
20. SK Tiwari, R SINGH, J Singh, AK Gupta, SK Bartarya, **Santosh K Rai (2015)** Impact of limestone mining activities on major ion geochemistry of Krem Markhyrdop water, Meghalaya, India; *HIMALAYAN GEOLOGY* 36 (1), 74-80
21. S Ganguly, S Tiwari, U Bhan, S Mittal, S Rai, EF Osta (2015) Melting of Sea Ice Inexplicable for Recent Global Eustatic Sea Level Rise; *Journal of Earth Science & Climatic Change* 6 (1), 1
22. HK Sachan, A Saxena, P Verma, **Santosh K Rai**, A Kharya (2013) Fluid inclusion study of the Higher Himalayan quartzitic pelites, Garhwal Himalaya, India: Implications for recrystallization history of metasediments; *Journal of the Geological Society of India* 82 (5), 509-518
23. **Santosh K Rai**, SK Singh, S Krishnaswami (2010) Chemical weathering in the plain and peninsular sub-basins of the Ganga: impact on major ion chemistry and elemental fluxes *Geochimica et Cosmochimica Acta* 74 (8), 2340-2355
24. SK Singh, **Santosh K Rai**, S Krishnaswami (2008) Sr and Nd isotopes in river sediments from the Ganga Basin: sediment provenance and spatial variability in physical erosion; *Journal of Geophysical Research: Earth Surface* 113 (F3)
25. S Vyshnavi, R Islam, **Santosh K Rai** (2008) Weathering of Granitic rocks on an eroding landform: An example from Lesser Garhwal Himalaya *HIMALAYAN GEOLOGY* 29 (3), 132-133
26. **Santosh K Rai**, SK Singh (2008) Tracing Erosion in the Himalaya through chemical and isotopic composition of the Ganga Sediments; *HIMALAYAN GEOLOGY* 29 (3), 80-81

27. **Santosh K Rai (2008)** Isotopic and geochemical studies of ancient and modern sediments
Ph. D. Thesis MS University, Vadodara (195 pp.)
28. **Santosh K Rai**, SK Singh (2007) Temporal variation in Sr and $^{87}\text{Sr}/^{86}\text{Sr}$ of the Brahmaputra: Implications for annual fluxes and tracking flash floods through chemical and isotope composition *Geochemistry, Geophysics, Geosystems* 8 (8)

(b) **Non-SCI Articles: NIL**

(c) **Chapter in Books: One**

1. **Santosh K Rai** (2020) Geochemical constituents in hot spring waters in the Third Pole; Water Quality in the Third Pole (Elsevier ISBN: 9780128164891), 211-235

(d) **Books-authored/ Edited volume: NIL**

(e) **Abstract volume: NIL**

(f) **Reports/Other Documents: NIL**

(g) **Articles in Proceeding Volumes:**

1. **Santosh K Rai**, SK Tiwari, SK Bartarya, AK Gupta, AKL Asthana (2015) Nature of silicate weathering in the Indus River System, Ladakh, India;30 Himalaya-Karakoram-Tibet Workshop - 2015, WIHG, Dehradun, India, 162-64
2. F Rolfo, CT Groppo, HK Sachan, **Santosh K Rai** (2015) Petrology of lawsonite-blueschist facies metasediments infers cold subduction processes in the western Himalaya (Ladakh, NW India).
3. 30th Himalaya-Karakoram-Tibet Workshop, 10-11
4. F Rolfo, CT Groppo, HK Sachan, **Santosh K Rai** (2015) Lawsonite-blueschist from the western Himalaya (Ladakh, NW India): petrologic witness of cold subduction processes. XI International Eclogite Conference, 89-89
5. SK Singh, SK Rai(2006) Temporal variation in $^{87}\text{Sr}/^{86}\text{Sr}$ and Sr content of the Ganga–Brahmaputra river system; *Geochimica et Cosmochimica Acta* 18 (70), A593
6. SK Singh, **Santosh K Rai** (2005) Sediment tracing in the Ganga River System *Geochimica et Cosmochimica Acta Supplement* 69, A697
7. SK Singh, **Santosh K Rai** (2004) Sr isotope budget of the Ganga headwaters, Eleventh ISMAS workshop on mass spectrometry
8. SK Singh, **Santosh K Rai**, JR Trivedi (2002) ^{187}Re - ^{187}Os Systematics of the Black Shales from the Vindhyaans: Implications to Their Geochronology; 10th ISMAS-WS Puri, 242-244