# CURRICULAM VITAE

DR. MADHAV KRISHNA MURARI

Justus-Liebig-Universität Gießen
Dept. Of Physical Geography,
Senckenbergstr. 1 (Mailing)
Schlossgasse 7(Visiting),
35390 Giessen, Germany

Email:
Madhav.Murari@geogr.uni-giessen.de
madhav.prl@gmail.com
Ph: +49 151 438 15183 (Mob)
+49 641 993 6256 (Off.)

## *Expertise*

Quaternary geochronology and geology. Specifically optically stimulated luminescence (OSL) and terrestrial cosmogenic nuclide (TCN) dating of landforms and sediments in tectonically active settings for paleoenvironmental reconstructions and landscape evolution studies. At present i am exploring infrared radioluminescence as a dating method for sediment dating using feldspar mineral.

## *Academic Positions*

**Since Dec 2015:** Post-Doctoral Researcher, Department of Geography, Justus Liebig University Giessen, Giessen, Germany. *Sponsored by Professor Markus Fuchs*

**Mar-Sep 2015:** Visiting Scientist, Atomic Molecular and Optical Physics, Physical Research Laboratory Ahmedabad, India *Sponsored by Professor Ashok Kumar Singhvi*

**2010-2015:** Post-Doctoral Researcher and Laboratory Manager, Quaternary Geochronology and Geomorphology, Department of Geology, University of Cincinnati, Cincinnati, Ohio, USA. *Sponsored by Professor Lewis A. Owen*

**2008-2010:** Post-Doctoral Researcher Luminescence Laboratory, Planetary and Geoscience Division, Physical Research Laboratory, Ahmedabad, India. *Sponsored by Professor Ashok K. Singhvi*

**2004-2008:** Senior Research Fellow, Luminescence Laboratory, Planetary and Geoscience Division, Physical Research Laboratory, Ahmedabad, India. *Advisor Professor Ashok K. Singhvi*

**2003-2004:** Junior Research Fellow, Luminescence Laboratory, Planetary and Geoscience Division, Physical Research Laboratory, Ahmedabad, India. *Advisor Professor Ashok K. Singhvi*

**2001-2003:** Research Scholar**,** Secondary Ion Mass Spectrometer Laboratory, Planetary and Geoscience Division, Physical Research Laboratory, Ahmedabad, India. *Advisor Professor G. Srinivasan*

## *Academic Education*

### *i) Undergraduate Education*

1993-1996: B.Sc. in Physics, Chemistry and Mathematics
Dr. Bhim Rao Ambedkar University, Agra, India.

### *ii) Master's Education*

1996-1998 M.Sc. in Physics
Dr. Bhim Rao Ambedkar University, Agra, India.

### *iii) Doctoral Research*

2003-2008: Ph.D. in Sciences, focusing on Quaternary geochronology
Physical Research Laboratory Research Institute, Ahmedabad, India.

Thesis title: "Component specific luminescence of natural minerals and their application to the dosimetry of natural radiation environment"

My doctoral research explored the fine features of optically stimulated luminescence (OSL) signals. In brief, I examined the prospects of easily bleached OSL components for determining paleodoses and to help determine accurate ages for sediment samples. For sediments, the zeroing of an age occurs via photo-bleaching by natural daylight during the transport of sediment. A complete resetting of the signal depends on factors such as spectrum and flux of daylight seen by minerals constituting the sediments. In general, barring a few exceptions, grains in a sediment matrix are partially and heterogeneously bleached. The resulting complexity necessitates the modelling of the physical phenomenon of production and resetting of luminescence. The decay pattern of an OSL signal is composed of the sum of three exponentials with different bleaching rate. On the basis of their bleaching rate, these exponentials are known as fast, medium and slow component. These components can be isolated numerically. In my study, the decay of OSL components were examined for dating partially bleached sediment and radiation dosimetry applications. To undertake these studies I wrote programing codes in Matlab to isolate and comprehensive analyze the exponentials from OSL signals. My study is particularly helpful in dating partially bleached samples such as those deposited in fluvial and littoral settings. I specifically applied this technique to assess whether tsunami deposits produced by the 2004 Sumatran tsunami could be dated, and hence whether we could effectively date ancient tsunami deposits. My work shows that these deposits can be dated using the fast component of the OSL.

Advisor: Professors Ashok Kumar Singhvi and K. P. Subramanian

## *Awards and Scholarship*

2015-2018: Post-doctoral fellowship, German Science Foundation, Germany.

2010-2014: US$87,500, University of Cincinnati, post-doctoral research on Quaternary geochronology and landscape evolution.

2001: Joint Entrance Screening Test (JEST). The competition exam jointly conducted by national institutes to award PhD program. It awarded me Junior and Senior Research fellowship towards my Doctoral Research.

2000 and 2001: Graduated Aptitude Test of Engineering (GATE) exam conducted by Indian Instituted of Technology (IIT) for the scholarship towards MTech and Ph.D studies.

## *Since Dec 2015: Employment at Justus-Liebig-University Giessen, Germany*

Here my research is focused to improve and develop infrared radiofluorescence (IR-RF) as a promising sediment dating method using feldspar mineral. However, this dating method is in developing stage and need lot of research and development work. At present I am working on coarse grains feldspar to understand feldspar IR-RF signal behavior and bleaching of signal, dynamic range of signal and origin for IR-RF signal using spectrometer and finding correct function to model signal and dose characteristics. Conducting these studies will be better insight to understand feldspar mineral and would help to improve IR-RF dating.

**IR-RF review and future direction:** The aim of this project to explore the shortcomings of IR-RF and suggest new direction to research towards establishing IR-RF as an alternative luminescence dating method for sediment application. This involves the views and suggestions through rigorous discussion at workshops from researchers from various university and institutes from Europe. This project will result a review paper on IR-RF .

**IR-RF Interlab comparison:** We are conducting interlab comparison among seven labs, six of them are equipped with Lexsyg research and one has Riso with IR-RF attachment. Aim of this study to keep same parameters for all labs and perform comparative study which will reveal if there is any discrepancy in results from machine to machine. To minimize human error sample were prepare at one place and distributed among all labs for measurement. In this study, we are using completely bleached and saturated sample. Saturated sample is prepared in Giessen and bleached sample prepared in Hannover laboratory. This work will be published soon.

**IR-RF dose recovery and correction method:** First step towards establishing IR-RF as dating method we first establish the dose recovery for Naturally bleached sample to compare the dose recovery. We found there was sensitivity change from natural to laboratory regenerated IR-RF. Here we proposed two correction methods to correct the sensitivity change of sample. Both method works well and discussed their limitation and advantages. This result a paper in Radiation measurement and will be soon in press.

**IR-RF verification on independent age control:** Conducting experiments on independent age controlled sample to verify the applicability or IR-RF with the correction methods suggested where dose recovery works well. This study will verify the accuracy, precision and limitation of the applicability of IR-RF. This work in progress and will be soon in publication form.

**IR-RF applicability to fine grain:** After applicability verification of IR-RF on coarse grain. We are going to extend its applicability on fine grain. Applicability of IR-RF to fine grain need many verification from other minerals as there is no way to separate K-Feldspar from fine grain sediment. Luckily, major mineral quartz and heavy mineral do not show any IR-RF emission, therefore IR-RF can be applied to date fine grain. But still need a few more verification regarding other feldspar mineral composition interferences. This work in progress.

**IR-RF bleachability or photo transfer:** Often it has been noticed that the bleaching level of IR-RF from K-feldspar never matches to natural bleaching and it need very long hours of bleaching time. This study will focus on changes happened to sample during bleaching and irradiation. It is also noticed that there is quite a large amount of TL signal after bleaching of the sample which is the result of photo transfer. We want to see if photo transfer can explain the unbleachable component of IR-RF and can find some correction and suggest to minimize the effect of photo transfer by means of correction or instrumental modifications. This work involves the spectrometer based study of IR-RF, TL and photo transfer emission. Work in progress

**Exploration of Feldspar defects, purity and IR-RF:** The aim of this work to understand the deeper view of sediment sample using photoluminescence, XRD, SEM-EDX and EPR analysis and finding the correlation to IR-RF. This study can give more confidence in understanding the change in sensitivity of sample due to bleaching or irradiation or both. Work in progress with the collaboration of Dr. Suchinder Sharma at Freiberg Technical University, Freiberg.

**IR-RF as a new low temperature thermochronometer:** There is already a lot of efforts going on for TL thermochronometry to find out really low-temperature thermochronometer as it can give more insight of rock formation but TL is limited due to its low saturation limit and fading issue. Since IR-RF from K-rich feldspar has

high saturation limit than all other luminescence dating method, therefore, IR-RF of K-rich feldspar can be a good choice to search for a low-temperature thermochronometer. This work is in progress with the collaboration of Dr. Rabiul Biswas at the University of Lausanne.

## *(Jan 2010-Mar 2015) Employment at University of Cincinnati, USA*

**2010-Mar 2015:** Post-Doctoral Research Fellow and Laboratory Manager in Quaternary Geochronology and Geomorphology, Department of Geology, University of Cincinnati, Cincinnati, Ohio, USA, *Sponsored by Professor Lewis A. Owen*

### *Responsibilities*

1. **Basic research**: The prime objective of this research is to understand how landscape evolves in tectonically active setting using geomorphic and sedimentological methods, and defined by OSL and TCN dating. This has included collaborative research on projects funded by the US National Science Foundation (NSF), the National Geographic Society (NGS), the US National Earthquake Hazard Reduction Program (NEHRP) and the Southern California Earthquake Center (SCEC). Full details of these projects are outlined in detail later in my cv. *Please note that I was not eligible to apply for my own funding as a post-doctoral researcher at the University of Cincinnati, but was included in grants obtained by my sponsor, Professor Lewis Owen.*

2. **Management of the Luminescence Dating Laboratory:** This including developing and managing a start-of-the-art luminescence dating laboratory at the University of Cincinnati. Here, I modified the protocols for analysis and measurement of samples for OSL dating, specifically refining chemical and physical methods to extract pure quartz from sediments. I installed and calibrated necessary equipment such as an alpha counter, portable gamma counter, finely controlled temperature oven and a Franz magnetic separator. I also designed and produced acid dissolution and heavy liquid separation apparatus. In addition, I developed a methodology to process large core samples in the dark, to help make the laboratory more efficient and productive.

3. **Applied research:** This included projects on paleoseismology and erosion/sedimentation for engineering companies, using OSL and TCN methods. Full details are provided in section. These projects included:

   2011: Optically Stimulated Luminescence Dating and Clay Mineralogy of Sediment from Haiwee Dam Project for URS
   2012: Palioseismology activity using Optically Stimulated Luminescence Dating Panama Samples for URS
   2013: Cosmogenic dating of shorelines at Camp Pendleton, San Deigo for GeoPentech

4. **Training students and visitors:** Trained students and visitors in the preparation and measurement of samples for OSL and TCN dating.
   University of Cincinnati students

   1. Kathryn A. Hedrick
   2. Rebecca Potter
   3. Harrison, Gray
   4. Jeanette Arkle
   5. Jason Cesta
   6. Adam Piestrzeniewicz
   7. Janine M Sparks
   8. Jaun Paul
   9. Todd L. Longbottom
   10. Ron C. Count
   11. Sourav Saha

   Visitors

   1. Kristian J. Bergen (Graduate student from Department of Earth and Planetary science, Harvard

University, Cambridge, MA, USA)
2. R. Jayangondaperumal (Postdoc from Department of Geology, University of Nevada, Reno, USA, and Scientist at Wadia Institute of Himalayan Geology, Dehradun, India)
3. Dr. Abdul Salam Khan (Postdoctoral researcher from Department of Earth and Atmospheric Sciences, University of Houston, Houston, TX, 77204)
4. Suyoung Lee (Graduate Student from Department of Geography, Korea University, Seoul, Korea)
5. London, Anna (Professor from Saint Louis University, St. Louis, MO 63108)
6. Ron Speltz (Professor from Universidad Autónoma de BajaCalifornia Mexico)

**5. Teaching classes**

This included teaching classes to undergraduate and graduate students. These are described in detail below:

*1) GEOL1002C001 - Surface Process (Co-taught with Prof. Lewis Owen and Prof. Barry Mynard) (Winters 2013 and 2014)*

This course was developed for freshman undertaking geology and/or another major. The course focused on examining natural hazards as the interface between humanity and its needs for space and resources and the ongoing geologic processes of Earth. The basic principles of geology, including tectonics, Earth surfaces processes and climate change were explored to help students understand the nature of geologic hazards. Students learned how to interpret geologic data, recognize the risk from geologic hazards and be trained in some basic field methods. This class enrolment was ~30 students.

*2) GEOL6031C001 - Quaternary Geochronology (Winter 2014)*

This was an upper level course that examined the main principles, techniques and applicability of Quaternary geochronology focusing on optically stimulated luminescence dating techniques. It provided training for graduate students and visitors involved in Quaternary geology, neotectonics, paleosesimology, biogeography, pedology, and archaeology who are concerned with defining the timing of events and rates of environmental change. Case studies illuminated the key role of geochronology in Quaternary geology, geomorphology, tectonics and archaeology. A series of assignments were provided to help train students in assessing and evaluating the validity of different dating methods, and the analysis and presentation of data. Students also received field and laboratory instruction in the newly developing techniques of luminescence dating. The course comprised 6 lecture topics with each lecture/lab session about 3 hours long and includes daily labs. This class enrolment was ~15 students.

*3) GEOL1009001 - Natural Hazards (Summer 2014)*

This course was designed for non-geology majors. The course mainly focused on introducing the basic principles of geology, including tectonics, Earth surfaces processes and climate change to understand the nature of geologic hazards. Students learned how to interpret geologic data, to recognize the risk from geologic hazards and were trained in basic field methods. This class enrolment was ~15 students.

## *Summary of Basic Research*

My current research mainly focuses on the Quaternary geology and geomorphology of tectonically active regions. This has involved me in numerous projects aimed at understanding and quantifying the landscape evolution on Quaternary timescales ($10^0$-$10^6$ years). I apply, remote sensing, geomorphology, sedimentology and Quaternary geochronology, which includes optically stimulated luminescence (OSL) dating and terrestrial cosmogenic nuclide ($^{10}$Be, $^{26}$Al and $^{36}$Cl) methods to undertake these studies. These studies would enhance our knowledge and understanding regarding the dynamics and interactions among geomorphic, tectonic, and climatic processes in various tectonically active areas. They are also helping to reveal how the climate change effects the nature and rates Earth surface processes through time.

My main research has focused various projects are enlisted below Involving projects in the Himalaya Argentina, Costa Rica and California.

# 1. Himalayan Research

## *i) Zanskar and Garhwal*

With Lewis A Owen, Amy Townsend-Small (University of Cincinnati, Cincinnati, USA), Jason Dortch, (University of Manchester, Manchester, England), Marc Caffee (Purdue University), Markus Fuchs; (University of Giessen, Giessen, Germany), Saurav Saha and Milap Sharma (Jawaharlal Nehru University, Delhi, India)

This has included two projects in Zanskar and Garhwal in India. These projects aim to understand and develop Himalaya glacial chronologies. Most of work from this project is published and can be read from papers..

*Research Papers:*

1. *Murari, M. K., Owen, L. A., Dortch, J. M., Caffee, M. W., Dietsch, C., Fuchs, M., Townsend-Small, A. (2014). Timing and climatic drivers for glaciation across monsoon-influenced regions of the Himalayan–Tibetan orogen. Quaternary Science Reviews, 88, 159–182.*
2. *Saha, S., Sharma, M.C., Murari, M.K., Owen, L.A., Caffee, M.W., 2016. Geomorphology, sedimentology and minimum exposure ages of streamlined subglacial landforms in the NW Himalaya, India. Boreas 45, 284–303..*
3. *Orr, E.N., Owen, L.A., Murari, M.K., Saha, S., Caffee, M.W., 2017. The timing and extent of Quaternary glaciation of Stok, northern Zanskar Range, Transhimalaya, of northern India. Geomorphology 284, 142-155.*
4. *Orr, E.N., Owen, L.A., Saha, S., Caffee, M.W., Murari, M.K., 2018. Quaternary glaciation of the Lato Massif, Zanskar Range of the NW Himalaya. Quaternary Science Reviews 183, 140-156..*

## *ii) Nanda Devi*

*With Lewis A Owen, Craig Dietsch (University of Cincinnati), Jason Dortch, (University of Manchester)*

This study aims to examine rates of landscape evolution in Nanda Devi. In this project we examined longer term glacial erosion rate, with the help of $^{10}$Be TCN dating of sediment sample from the glacier outwash adjacent to glacier, down valley, glacial stream trunk, and bolder dating from down valley at the end of the most recent moraines and the sample collected from along glacial stream by studying integrates till, moraines. Comparison from other samples collected up valley (both supraglacial boulders and sediment samples) may reveal how glacial erosion rate compares to total for valley (contribution from all major processes). We plan to have this research written up for publication within the next few months.

## *iii) Quantifying soil organic Carbon (SOC) matter in the Himalaya*

*With Todd L. Longbottom, Amy Townsend-Small and Lewis A Owen (University of Cincinnati)*

Soil organic carbon (SOC) affects soil fertility and agricultural production, and SOC storage can also mitigate increasing atmospheric $CO_2$ concentrations on decadal timescales or longer. SOC storage is dependent on climatic conditions, and changes in temperature and precipitation associated with climate change can influence soil processes leading to feedback mechanisms that help control atmospheric $CO_2$ concentrations. Soils in tropical and subtropical mountain systems may be particularly sensitive to climate change, but SOC storage in high tropical and subtropical mountain regions is poorly quantified. To begin to evaluate the importance of C storage in soils in high mountain regions, regional SOC abundance was examined across the Himalaya of northern India. The results show that SOC stocks in the Indian Himalaya are more sensitive to moisture availability than temperature, as average annual precipitation was a greater influence on SOC than altitude. Stable carbon isotope data indicate that C3 vegetation has been consistently dominant in the region for the last ~7000 years. Rates of SOC accumulation and turnover are influenced greatly by variations in climate, vegetation, and topography. We conclude that increased precipitation may lead to increased SOC storage in the region, unless soils are exposed to greater erosion rates during intense storms.

*Research Paper:*
*T. L. Longbottom, A. Townsend-Small, L. A. Owen, and M. K. Murari, "Climatic and topographic controls on soil organic matter storage and dynamics in the Indian Himalaya: Potential carbon cycle–climate change feedbacks," CATENA, vol. 119, pp. 125–135, Aug. (2014).*

# 2. Statistical analysis of TCN ages

*With Jason Dortch (University of Manchester)*

This project involved development of Matlab codes to isolate Gaussian peaks from scattered TCN data. The Matlab code identifies and isolates all the peaks available in data and thereby helps us to interpret the data more robustly. This code was able to isolate true age using probability distribution function from the mixing of exhumed (young age) and inherited (too old ages). We are now verifying and comparing with existing TCN age data. This code has been used in two manuscripts, and we are preparing a paper on extending this methodology. We are planning to submit it to *Quaternary Geochronology*.

## *3. Mexican marine terraces*

*With Lewis A Owen (University of Cincinnati) and Thomas K. Rockwell (San Diego State University)*

This project is to understand architecture of an oblique rift margin, set within the Big Bend domain of the San Andreas Fault system. We explored past tectonic activities with the help of OSL and cosmogenic dating. In this area surface ruptures from the 2010 El Mayor-Cucapah and 1892 Laguna Salada earthquakes, along with their interactions, to see spectacular field relations that show how fault systems work together to accommodate oblique extension. All Samples were measured for OSL and cosmogenic $Be^{10}$ chronology. Currently we are finalizing results and discussing result to prepare manuscript. Last Glacial Maximum to the present with mosaics present during the Late Pleistocene. This project is under process

## *4. Geoarcheology*

### *i) Big Bone Lick*

*with Lewis A. Owen, Ken Tankersley and Crowley, B.E (University of Cincinnati)*

Big Bone Lick is a critical geologic site in the historical development of North American vertebrate paleonotology and Quaternary science. Yet, the relationship between the Quaternary chronostratigraphy and stable isotope paleoecology of this site has not been considered. To address this lack of study, the Quaternary chronostratigraphy and stable isotope paleoecology of Big Bone Lick, Kentucky is examined using data obtained solid-sediment cores, stream profile excavations, vertebrate paleontology, archaeology, stable isotope accelerator mass spectrometry (AMS) radiocarbon and optically stimulated luminescence (OSL) dating. A manuscript resulting from this work has been submitted to Quaternary Research.

*Research paper:*

*Tankersley, K.B., Murari, M.K., Crowley, B.E., Owen, L.A., Storrs, G.W., Mortensen, L., 2015. Quaternary chronostratigraphy and stable isotope paleoecology of Big Bone Lick, Kentucky, USA. Quaternary Research 83, 479–487.*

### *ii) Shreridan and Great Saltpeter Cave (Written)*

*with Lewis A. Owen and Ken Tankersley (University of Cincinnati)*

This project was undertaken to examine and compare cave fills within Great Saltpeter Cave and Indian Trails Cave System. In particular we wanted to determine, how old is the age of the cave using OSL and cosmogenic burial age methods. Our work showed OSL has its saturation level and shows sediment is older than 200ka. We are working on manuscript, it will be submitted to Quaternary Research.

*Research paper:*

*Murari, M. K., & Tankersley, K. B. (2017). Age estimate of the Indian Trails Cave System, Wyandott County, Ohio. Quaternary Research. (To be resubmitted)*

## *5. Lower Ohio River valley in the tri-state region of Kentucky, Illinois, and Indiana*

*With Lewis A. Owen, Ronald Count (University of Cincinnati) and Shanon Mahan (USGS)*

In this project, we undertook paleoenvironmental reconstructions along the lower Ohio River valley to understand landscape evolution dominated by climatic and a lesser degree tectonic influences. We ultilized OSL methods to date the sediment. The lower Ohio River valley is a terraced fluvial landscape that has been profoundly influenced by Quaternary climate change and glaciation. A modern Quaternary chronostratigraphic framework was developed for the lower Ohio River valley using optically stimulated luminescence (OSL) dating and allostratigraphic mapping to gain insights into the nature of fluvial responses to glacial–interglacial/stadial-interstadial transitions and Holocene climate change. The chronostratigraphic framework and reconstructed history developed here suggest that the lower Ohio River is highly sensitive to glacial-interglacial transitions and abrupt Holocene climate change and responds rapidly to these allogeneic forcing. This manuscript was submitted after revision for publication to Quaternary Science Reviews.

*Research Paper:*

*Counts, R.C., Murari, M.K., Owen, L.A., Mahan, S.A., Greenan, M., 2015. Late Quaternary chronostratigraphic framework of terraces and alluvium along the lower Ohio River, southwestern Indiana and western Kentucky, USA. Quaternary Science Reviews 110, 72–91.*

## *6. Paleoseismology along the Pre-Corderilla, Argentina*

*With Lewis A Owen (University of Cincinnati) and Thomas K. Rockwell (San Diego State University)*

This research is defining the timing of past and recurrence of earthquakes with the help of OSL chronology in one of the most tectonically active regions of the Pre-Corderilla of Argentina. We are utilizing cosmogenic and OSL dating to determining ages of deformed sediments in fault trenches and displaced landforms. We are currently working on writing a manuscript from this work.

## *7. New York Oneida Lake*

*With Lewis A Owen (University of Cincinnati) Eugene W. Domack (Hamilton College)*

The region east of modern day Oneida Lake contains a unique set of aeolian features (dunes) that developed on a variety of substrates including: deltas, spits, and paleo-shorelines of Glacial Lake Iroquois. Yet, these landforms have not been dated, which is unfortunate, as the timing of their development is critical in evaluating various hypotheses dealing with recession of Ontario Lobe of the Cordilleran Ice Sheet and consequent drainage of Glacial Lake Iroquois, via the St Lawrence and Champlain Lowlands. To address this issue, we undertook the first numerical dating to define the timing for dune formation from two systems including the Rome Sand Plains and barrier beach dunes, both of which were associated with late stage Glacial Lake Iroquois. The age of formation is defined by utilizing OSL ages from within the dune features themselves and radiocarbon and OSL ages from the substrates, upon which the dunes formed. We are presently preparing a paper on this work, this paper is submitted to *Quaternary Research.*

# *Applied Research*

1. 2011: Optically Stimulated Luminescence Dating and Clay Mineralogy of Sediment from Haiwee Dam Project for URS. This project involved OSL dating sediments from formations being examined for the construction of a new dam at Haiwee in Owens Valley as part of the California Aqueduct that supplies water to the Los Angeles Basin.

2. 2012: Palioseismology activity using Optically Stimulated Luminescence Dating Panama Samples for URS. These projects involved dating clay-rich sediments from fault trenches as part of a project to help determine seismic hazard for the construction of new locks across the Panama Canal.

3. 2013: Cosmogenic dating of shorelines at Camp Pendleton, San Deigo for GeoPentech, This project aimed to date marine terraces using $^{10}Be/^{26}Al$ burial age dating as a part of a seismic assessment at Camp Pendleton.

## *(2001-2010): Employment at Physical Research Laboratory, India*

**2008-2010** Post-Doctoral Researcher at Physical Research Laboratory, Ahmedabad, India
*Advisor Professor Ashok K. Singhvi*

**Duties included:**

**1. Basic Research**

i) **Examining the resetting of OSL and TL signals during the process of sand injecting into sand dikes**. This included modeling the process of dike injection, to assess heating temperature experienced by the sediment. Matlab code was developed for the thermal modeling of this process. The prime objective was to understand whether the viscous heating of the sediment was sufficient to cause resetting of the luminescence signal. This study shows that during this process heating temperature could rise from 300 to 500 $^{o}$C. This research show that we can extend the applicability OSL and TL to such kind of sediment.

ii) **Examining the resetting of OSL signal in fault gouge samples.** Here, the fault gouge production was numerically modeled to examine the temperatures produced in the gouge during an earthquake event. The objective was to ascertain whether the temperatures produced were enough to reset OSL signal. It was found that temperature could rise high enough to reset OSL signal. Further, the modeling showed that the temperature rise is closely related to the physical parameters like magnitude of earthquake, slip during earthquake and depth of earthquakes. This model helped us to decide what condition would be the best to collect sample and apply OSL dating. Further it is carried on by Anil Tyagi for his doctoral work.

iii) **Developing single grain OSL methodologies.** The present protocol for single grained OSL dating is limited to only the brightest grains that provide signals much above the noise level. The recent advances in this technique made it possible to identify and minimize partially bleaching of sediment. However, OSL dating techniques are still limited to brightest grains that yields high OSL signal. I explored the wavelet method to denoise the OSL signal and use the processed signal for age estimation. I used this method to study the OSL signal from the samples from different provinces. This method showed promising results in terms of the accuracy of age for samples with poor single grain OSL signal.

**2. Training students:**

Trained Ph.D. students to use the MATLAB codes that I developed to isolate the OSL components to increase OSL dating accuracy. This resulted in several joint publication and abstracts at international meetings.

**2004-2008 Senior Research Fellow**
Physical Research Laboratory, Ahmedabad, India
*Advisor Professor Ashok K. Singhvi*

This fellowship provide me with the opportunity to work towards my doctorate research focusing on the following areas of research:

i) **Examining the Components of OSL signal for multigrain:** OSL signal is modeled using sum of three exponentials. These different exponentials are then further examined to see the applicability to partially bleached sediment setting. Which includes writing a Matlab code for isolating exponentials from OSL and develop a protocol to detect easily bleached component. I applied this technique to date recent tsunami deposits. This study has greatly help us to apply OSL dating to determine the age of past tsunami deposits.

ii) **Finding instrumental cross-talk effect on dating sediments.** The measurement protocol involves repeated irradiation and illumination of the individual aliquots. In the process, it is possible that the adjacent aliquot may get affect either by irradiation or illumination. This study enabled us to avoid any type overestimation due to irradiation and underestimation due to illumination. To avoid cross talk effect, we suggested for certain models of OSL readers required to leave one blank position between two measurement aliquots to avoid cross talk effect.

iii) **Denoising of signal for Single grain OSL:** In luminescence dating, the single grain OSL has emerged as a promising technique for several methodological reasons. However, the present protocol is limited to only the brightest grains that provide signals much above the noise level. The recent advances in these machine techniques made it possible to identify and minimize partially bleaching of sediment. However, the OSL dating technique is still limited to brightest grain, which yields high OSL signal. I explored the wavelet method to denoise the OSL signal and use the processed signal for age estimation. I used this method to study the OSL signal from the samples from different provinces. This method results better estimate of ages for poor signal samples.

**2003-2004**: **Junior Research Fellow**
Physical Research Laboratory, Ahmedabad, India
*Advisor Professor Ashok K. Singhvi*

This fellowship provided me with the opportunity to work towards my doctorate research and to get trained in OSL laboratory methods. I explored the applicability of OSL methods to date terrestrial and exposure ages of meteorites. Earlier work on terrestrial ages of meteorite was undertaken using thermoluminescence (TL). While this method was successful to explain terrestrial age, but it failed to provide exposure age of meteorite and showed a huge underestimation. I examined the applicability of OSL in this scenario. My objective was to study whether OSL has any improvement over TL in context of exposure age of meteorites determined using feldspar dating.

**2001-2003: Research Scholar**
Physical Research Laboratory, Ahmedabad, India
*Advisor Prof. G. Srinivasan*

I worked with Prof. G. Srinivasan and learned how to use secondary ion mass spectrometer (SIMS). Due to high sensitivity of this instrument means that samples with low concentration levels (down to ppb levels) can be analyzed. As a result, the SIMS is used to determine trace element abundances in meteorites, interplanetary dust. It also allows for depth profiling of elemental and molecular abundances as well as isotopic ratios. In situ analysis eliminates the need for complex sample preparation in most cases, i.e., minerals may be analyzed directly either as grain mounts or in thin sections. I learned how to identifying and measure short-lived radionuclides in meteorites using SIMS.

## *Skills and Instrumental Expertise*

**Lexsyg Research OSL Readers:** An advance OSL reader having the capability of modification according to research needs. Currently, this reader is equipped with Andor Newton DU 920P BU and has back illuminated CCD camera. This CCD can be cooled down up to – 80°C to eliminate any observable dark current noise. The readout noise for CCD camera is about 4 e- per pixel. The spectrograph is equipped with a 300/500 grating, with a groove density of 300 l/mm and a blaze wavelength of 500 nm. These setting are best for making measurements between about 250 nm and about 1000 nm which is ideal for IR-RF measurements for feldspar.

**Risoe OSL Readers:** Risoe TL-DA12, Risoe TL-DA15, Risoe TL-DA 15 with single grain attachment, Risoe TL-DA 20 with Radioflurescence attachement and Risoe TL-DA 20 with RED TL measurement capabilities.

**Daybreak OSL Readers:** Daybreak 1100 basic model and advance version Daybreak 2200.

**Dose rate measurement:** Hyper pure germanium crystal detector, gamma spectrometers (well type thallium activated sodium iodide crystal), and Alpha counter.

**Other instruments used for my research:** Secondary ion mass spectrometer (SIMS) I used it for measurement of short-lived radionuclides in meteorites, scanning electron microscope (SEM) to identify mineral in meteorite sample thin section for Secondary ion mass spectrometer analysis. Magnetic separator used to separate magnetic minerals and making clean quartz,

## *Wet Chemistry: Terrestrial Cosmogenic Dating*

During my stay at University of Cincinnati I have gained extensive experience in laboratory chemistry techniques while undertaking Quaternary geologic projects to prepare samples for TCN dating. In order to determine correct isotopic age it is very important to isolate it from other interfering metals. It involved intense amount of chemical treatments. Wet chemistry includes all methods to isolate beryllium, aluminum and chlorine.

## *Computational Expertise*

- Scientific Software: Matlab, Comsol, Mathematica, Origin and Sigma-Plot
- Programming Languages: FORTRAN, C, Matlab
- Mapping and drawing software: ENVI, ArcGIS, Adobe Illustrator and Coral Draw

Numerical methods included:

- Using ordinary differential equation methods including the use of Range Kutta to model OSL phenomena.
- Developing a Matlab program using non-linear optimization methods including the Levenberg-Marquardt, Dog-Leg, and Pade-Laplace methods to isolate exponential from OSL data. Also, developed a Matlab program based on genetic algorithm was developed to isolate OSL exponentials as it offers advantages over other nonlinear minimization methods.
- Transient thermal modeling of faulting event using Comsol and MATLAB
- Developing graphical user interface in Matlab to make programs related to isolation of OSL components user friendly.

## *Published Papers*

[21] ***Murari, M.K.***, Kreutzer, S., Fuchs, M., 2018. Further Investigations on IR-RF: Dose Recovery and Correction. Radiation Measurements *(Under review, will be available soon).*

[20] Orr, E.N., Owen, L.A., Saha, S., Caffee, M.W., ***Murari, M.K.***, 2018. Quaternary glaciation of the Lato Massif, Zanskar Range of the NW Himalaya. Quaternary Science Reviews 183, 140-156.

[19] Kreutzer, S., ***Murari, M.K.***, Frouin, M., Fuchs, M., Mercier, N., 2017. Always remain suspicious: a case study on tracking down a technical artefact while measuring IR-RF. Ancient TL 35, 20-30.

[18] Bergen, K.J., Shaw, J.H., Leon, L.A., Dolan, J.F., Pratt, T.L., Ponti, D.J., Morrow, E., Barrera, W., Rhodes, E.J., ***Murari, M.K.,*** Owen, L.A., 2017. Accelerating slip rates on the puente hills blind thrust fault system beneath metropolitan Los Angeles, California, USA. Geology 45, 227-230.

[17] Orr, E.N., Owen, L.A., ***Murari, M.K.,*** Saha, S., Caffee, M.W., 2017. The timing and extent of Quaternary glaciation of Stok, northern Zanskar Range, Transhimalaya, of northern India. Geomorphology 284, 142-155.

[16] Bhatt, N., ***Murari, M.K.,*** Ukey, V., Prizomwala, S.P. and Singhvi, A.K. 2016 Geological evidences of extreme waves along the Gujarat coast of western India. Natural Hazards, 1-20. Doi: 10.1007/s11069-016-2507-6

[15] Saha, S., Sharma, M.C., ***Murari, M.K.***, Owen, L.A., Caffee, M.W., 2016. Geomorphology, sedimentology and minimum exposure ages of streamlined subglacial landforms in the NW Himalaya, India. Boreas 45, 284–303.

[14] Counts, R.C., ***Murari, M.K.***, Owen, L.A., Mahan, S.A., Greenan, M., 2015. Late Quaternary chronostratigraphic framework of terraces and alluvium along the lower Ohio River, southwestern Indiana and western Kentucky, USA. Quaternary Science Reviews 110, 72–91.

[13] Kadlec, J., Kocurek, G., Mohrig, D., Shinde, D.P., ***Murari, M.K.***, Varma, V., Stehlík, F., Beneš, V., Singhvi, A.K., 2015. Response of fluvial, aeolian, and lacustrine systems to late Pleistocene to Holocene climate change, Lower Moravian Basin, Czech Republic. Geomorphology 232, 193–208.

[12] Tankersley, K.B., ***Murari, M.K.***, Crowley, B.E., Owen, L.A., Storrs, G.W., Mortensen, L., 2015. Quaternary chronostratigraphy and stable isotope paleoecology of Big Bone Lick, Kentucky, USA. Quaternary Research 83, 479–487.

[11] Murari, M.K, Owen L A, Dortch J.M., Caffee M.W., Dietsch, C., Fuchs, M., Haneberg, W.C., Sharma, M.C. and Townsend-Small, A., 2014. Timing and climatic drivers for glaciation across monsoon-influenced regions of the Himalayan–Tibetan orogen. Quaternary Science Reviews, 88, 159–182.

[10] Longbottom, T.L., Townsend-Small, A., Owen L.A. and ***Murari, M.K.***, 2014. Climatic and topographic controls on soil organic matter storage and dynamics in the Indian Himalaya: Potential carbon cycle–climate change feedbacks. Catena, 119, 125–135.

[09] Lee, S.Y., Seong, Y.B., Owen, L.A., ***Murari, M.K.***, Lim, H.S., Yoon, H. Il, Yoo, K.-C., 2014. Late Quaternary glaciation in the Nun-Kun massif, northwestern India Boreas 43, 67–89

[08] Jayangondaperumal, R., ***Murari, M.K.***, Sivasubramanian, P., Chandrasekar, N., Singhvi, A.K., 2012. Luminescence dating of fluvial and coastal red sediments in the SE coast, India, and implications for paleoenvironmental changes and dune reddening Quaternary Research 77, 468–881

[07] Kananen, B.E., Brant, A.T., Buchanan, D.A., ***Murari, M.K.***, McClory, J.W., 2012. Analysis of neutron induced defects in silver doped lithium tetraborate IEEE Nuclear Science Symposium Conference, 427–430

[06] Wesnousky, S.G., Aranguren, R., Rengifo, M., Owen, L.A., Caffee, M.W., ***Murari, M.K.***, Pérez, O.J., 2012. Toward quantifying geomorphic rates of crustal displacement, landscape development, and the age of glaciation in the Venezuelan Andes Geomorphology 141-142, 99–113

[05] Brant, A.T., Kananan, B.E., ***Murari, M.K.***, McClory, J.W., Petrosky, J.C., Adamiv, V.T., Burak, Y. V, Dowben, P.A., Halliburton, L.E., 2011. Electron and hole traps in Ag-doped lithium tetraborate (Li2B4O7) crystals Journal of Applied Physics 110, 0937191–197

[04] Nair, R.R., ***Murari, M.K.***, Vijaya Lakshmi, C.S., Buynevich, I., Goble, R.J., Srinivasan, P., Murthy, S.G.N., Trivedi, D., Kandpal, S.C., Hussain, S.M., Sengupta, D., Singhvi, A.K., 2011. Subsurface signatures and timing of extreme wave events along the southeast Indian coast Journal of Earth System Science 120, 873–883

[03] Biswas, R.H., ***Murari, M.K.***, Singhvi, A.K., 2009.Dose-dependent change in the optically stimulated luminescence decay of Al2O3:C Radiation Measurements 44, 543–547

[02] ***Murari, M.K.***, Achyuthan, H., Singhvi, A.K., 2007. Luminescence studies on the sediments laid down by the December 2004 tsunami event: Prospects for the dating of palaeo tsunamis and for the estimation of sediment fluxes Current Science 92, 367–371

[01] Mayya, Y.S., Morthekai, P., ***Murari, M.K.***, Singhvi, A.K., 2006.Towards quantifying beta microdosimetric effects in single-grain quartz dose distribution Radiation Measurements 41, 1032–1039

***Paper to be Submitted***

[01] ***Murari, M.K.***, Kreutzer, S., Frouin, M., Friedrich, J., King, G., Klasen, N., Lauer, T., Mercier, N., Richter, D., Schmidt, C., Tsukamoto, S. and Fuchs, M.. Infrared radiofluorescence and understanding towards its applicability to sediment dating. Quatenary Geochronology (to be submitted)

[02] ***Murari, M.K.***, Kreutzer, S., Friedrich, J., Frouin, M., Tsukamoto, S., Schmidt, C., Lauer, T., Klasen, N., Richter, D., Mercier, N., Fuchs, M., 2018. An interlab comparison of Infrared Radiofluorescence (IR-RF). Geochronometria (to be submitted).

[03] ***Murari, M.K.***, Fuchs, M., 2018. Exploration towards IR-RF daiting method applicability to polymineral fine grain: A comparison with independent age control. Quaternary Geochronology (to be submitted).

[04] ***Murari, M.K.***, Domack, E. and Owen, L.A. Landforms and Surface Geology of Eastern Oneida Lake and Oneida County, New York: New Insights from Matching Bathymetry with LIDAR Topography. to Quarternary Research ( to be resubmitted)

[05] ***Murari, M.K.,*** Tankersley, K., Owen, L.A., Caffee, M.W. 2018. Terrain, Defining the timing and nature of cave fill deposits within a glaciated. Quaternary Research, (to be submitted).

[06] ***Murari, M.K.,*** Singh, R.N. and Singhvi, A.K. Flash heating of faults and resetting of TL clocks in shallow earthquakes. Tectonophysics (to be resubmitted)

[07] Singh, R.N., ***Murari, M.K.*** and Singhvi, A.K. Flash heating in sand dykes: A possible Zeroing mechanism for OSL dating. Tectonophysics. (, To be submitted)

***Under Preparation***

[01] ***Murari, M.K.,*** Fuchs, M., 2018. Shallow traps interference to IR-RF: Correction hypothesis. Radiation Measurements (*Under preparation*).

[02] ***Murari, M.K.***, Biswas, R.H., Fuchs, M., 2018. Phototransfer and bleachability of IR-RF: A correction method. Radiation Measurements (*Under preparation*).

[03] ***Murari, M.K.,*** Biswas, R.H., Fuchs, M., 2018. IR-RF as a new low temperature thermochronometer: a comparison with TL theromochronometry. Quaternary Geochronology (*Under preparation*).

[04] ***Murari, M.K.,*** Sharma, S.K., Fuchs, M., 2018. Photoluminescence, EPR and IR-RF correlation of K-feldspar (*Under preparation*).

[05] Counts, R., Van Arsdale, R., Woolery, E., ***Murari, M.K***, Ruttledge, F. and Whitt, J., Quaternary deformation within the Wabash Valley Fault System. (*Under Preparation*)

## *Abstracts in International Conferences*

[28] ***Murari, M.K***., Kreutzer, S., Fuchs, M., 2017. Progress made towards Infrared Radiofluorescence (IR-RF) dating method. German LED Meeting, Bayreuth, Germany, (Oct, 27-29).

[27] ***Murari, M.K.,*** Kreutzer, S., Fuchs, M., 2017. Recent developments and progress towards establishing Infrared Radiofluorescence (IR-RF) as a dating method. 15th International Conference on Luminescence and Electron Spin Reasonance Dating, Cape Town, South Africa, (Sep 11-15).

[26] Kreutzer, S., Frouin, M., ***Murari, M.K.,*** Fuchs, M., Mercier, N., 2017. IR-RF dating on K-feldspar: tracing environmental changes in the Middle Pleistocene. European Geosciences Union (EGU).

[25] ***Murari, M.K.,*** Fuchs, M., 2016. Further steps to establish Infrared Radiofluorescence (IR-RF) as routine dating method. German LED, Emmendingen, Freiburg, Germany (Nov, 04-06)

[24] ***Murari, M.K.***, Frouin, M., Friedrich, J., Kreutzer, S., King, G., Klasen, N., Lauer, T., Mercier, N., Richter, D., Schmidt, C., Tsukamoto, S. and Fuchs, M. 2016. Further steps to establish Infrared radiofluorescence (IR-RF) as a dating method. UK Luminescence and ESR Meeting (UKLUM 2016)

[23] ***Murari, M.K.***, Kumar, V. and Singhvi, A.K. 2015. Comparison of Component specific palaeodose with those from SAR protocol:. *4th Asia Pacefic Luminescence and Electron Spin Resonance Dating (APLED 2015) Conf., Adelaid,* Australia

[22] Kumar, V., ***Murari, M.K.*** and Singhvi., A.K. 2015. A GUI package for the deconvolution OSL components. *4th Asia Pacefic Luminescence and Electron Spin Resonance Dating (APLED 2015) Conf., Adelaid,* Australia

[21] Tyagi, A.K., ***Murari, M.K.,*** Kumar, D., Singh, R.N. and Singhvi1, A.K., 2014. Resetting of Luminescence in Sand Dykes Due to Viscous Heating: Theoretical Considerations and Experimental Evidences, in: *14th International Conference on Luminescence and Electron Spin Resonance Dating. Montréal, Québec*, Canada, pp. 212-213

[20] Bergen, K.J., Shaw, J.H., Leon, L.A., Dolan, J.F., Pratt, T.L., Ponti, D.J., Barrera, W., Rhodes, E.J., ***Murari, M.K.*** and Owen, L.A., 2014. Continuity of slip rates over various time scales on the Puente Hills Blind-thrust Fault, Los Angeles, California, in: *EGU General Assembly. Geophysical Research Abstracts* 16, EGU -13126.

[19] Dortch, J.M., Hughesa, P., Owen, L.A. and ***Murari, M.K.,*** Marc W. Caffee, 2013. Orogen, Patterns of glaciation and topographic hypsometry across semi-arid western Himalayan-Tibetan. *AGU Fall Meeting Abstracts* 1:03

[18] ***Murari, M.K.,*** Count, R. and Owen, L.A., 2012. Defining the timing and rates of floodplain deposition controlled by climate and tectonics along the central Ohio River, in: *8th New World Luminescence Dating Workshop, University of California, Los Angeles,* USA

[17] Longbottom, T.L., Townsend-Small, A., Owen, L.A. and ***Murari, M.K.,*** 2012. Climatic and topographic controls on soil organic carbon storage and dynamics in the Indian Himalaya: Potential carbon cycle and climate change feedbacks, *AGU Fall Meeting Abstracts,* l. GC51D-1221, p. 1221.

[16] Counts, R.C., ***Murari, M.K.*** and Owen, L.A., 2012. Optically stimulated luminescence chronology of terraces of the lower Ohio River valley: implications for quaternary climate change and neotectonic deformation. *Geological Society of America, Charlotte, North Carolina* 44: 186, USA.

[15] Barrera, W.A., Rhodes, E.J., ***Murari, M.K.,*** Owen, L.A., Lawson, M.J., Bergen, K.J., Dolan, J.F. and Shaw, J.H., 2012. Luminescence dating inter-comparison for sediments associated with the Puente Hills Blind-Thrust System recovered from cores, in: *8th New World Luminescence Dating Workshop, University of California, Los Angeles*, USA.

[14] Longbottom, T.L., Owen, L., Caffe, M.W., Lafayette, W. and ***Murari, M.K.,*** 2011. Quaternary History of Glacier Morphology and Landform Development in Garhwal And Lahul Himaalaya, in: The Geological Society of America, Minneapolis, The Geological Society of America, Minneapolis, USA.

[13] Domack, E.W., Hess, D.P., Owen, L.A., ***Murari, M.K.*** and Rayne, T., 2011. Landforms and surface geology of eastern Oneida lake and oneida county, New York: New insights from matching bathymetry with lidar topography, in: *GSA Northeastern/North-Central Section Meeting, Pittsburgh, Pennsylvania*, USA.

[12] ***Murari, M.K.,*** Domack, E.W., Hess, D.P. and Owen, L.A., 2011. Timing of Esker and Dune Formation at the Eastern end of Oneida Lake, New York State, defined by Optically stimulated Luminescence Dating . in *GSA Northeastern/North-Central Section Meeting, edited, Pittsburgh, Pennsylvania*, USA.

[11] Jayangondaperumal, R., ***Murari, M.K.,*** Sivasubramaniam, P., Singhvi, A.K. and Chandrasekar, N., 2009. Luminescence dating of Teri Red Sand Dune in the SE coast, India: Implications of early-mid Holocene environmental changes and dune reddening, in*: 2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad,* India.

[10] Shinde, D.P., ***Murari, M.K***., Kadlec, J., Kocurek, G., Svetlik, I. and Singhvi, A.K., 2009 Dating of floodplain deposits in Straznicke Pomoravi area (Czech Republic), in: *2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad*, India.

[09] ***Murari, M.K.***, Singh, R.N. and Singhvi, A.K., 2009.. Flash heating of faults and resetting of TL clocks in shallow earthquakes, in: *2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad,* India.

[08] Morthekai, P., Jain, M., ***Murari, M.K.***, Singhvi, A.K. and Cunha, P., 2009. On dynamic equilibrium of trapped charges in fading basaltic samples, in: *2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad,* India.

[07] Singh, R.N., ***Murari, M.K.*** and Singhvi, A.K., 2009. Flash heating in sand dykes: A possible Zeroing mechanism for OSL dating, in: *2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad,* India.

[06] Bhatt, N., Ukey, V., ***Murari, M.K***. and Singhvi., A.K., 2009. Geological indicators of palaeo-tsunami along Gujarat coast, western India: OSL chronology, in: *2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad,* India.

[05] Thomas, J.V., Anupama, K., ***Murari, M.K.***, Sangode, S.J., Balakrishnan, S., Singh, P., Chakravorty, S., Prasad, S., Juyal, N. and Singhvi, A.K., 2009. Dating rainfed reservoir sediments: A multi proxy case study from south India in: *2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad,* India..

[04] ***Murari, M.K.*** and Singhvi, A.K., 2008. Efficacy of component specific analysis of Optically Stimulated Luminescence decay in estimation of paleodose, in: *3rd Internation Conference on Luminescence and Its Applications (ICLA), New Delhi*, India.

[03] Biswas, R.H., ***Murari, M.K.*** and Singhvi, A.K., 2008. Component specific Alpha efficiency of Al2O3:C, Quartz and Feldspar, in*: 12th International Conference on Luminescence and ESR Dating, Beijing*, China.

[02] ***Murari, M.K.*** and Singhvi, A.K., 2006. Component Specific paleodose estimation in optically stimulated luminescence dating: Methodology, Applications and Implications (Oral Presentation), in: *Asia-Pacific Conference on Luminescence Dating (APLED), Hong Kong*, China.

[01] ***Murari, M.K.,*** Tyagi, A.K., Nagar, Y.C. and Singhvi, A.K., 2006. Quantitative studies of cross-talk of Riso and Daybreak OSL readers, in: *Asia-Pacific Conference on Luminescence Dating (APLED), Hong Kong*, China.

### *Abstract Book Compiled and Edited*

[01] Second Asia Pacific Conference on Luminescence and Electron Spin Resonance Dating AbstractBook. Compiled and Edited by **M.K. Murari**, P. Morthekai, N. Chauhan, R.H. Biswas, D.P. Shinde, K. Nag, et al., Published by *Physical Research Laboratory, Ahmedabad, India*, 2009.

### *Workshops and Conferences Organizing Activities*

[05] **3rd IR-RF Workshop 2018:** IR-RF state of art: Discussion on progress made so far toward establishing IR-RF as a dating method*. Max Planck Institute for Evolutionary Anthropology (MPI EVA), Leipzig, German.* (Feb, 26-28)

[04] **2nd IR-RF Workshop 2017:** IR-RF state of art: Discussion on progress made so far toward establishing IR-RF as a dating method*. University of Bordeaux Montaigne, France.* (May, 02-04)

[03] **1st IR-RF Workshop 2016:** IR-RF state of the art: Discussion on further progress towards IR-RF applicabilty *Raulschholzhausen, JLU, University of Giessen, Germany.* (Mar, 13-15)

[02] **OSL Workshop 2014:** Advance quateneary geochronology course in one week. It comprises graduate students, faculties and visitors from home univerisy and other Universities. *University of Cincinnati, Cincinnati, USA*. (Feb, 03-07)

[01] **APLED 2009 Conference:** Worked as an active team member in organizing this conference with host Prof. Ashok K Singhvi during my Post-doctoral fellowship stay at *Physical Research Laboratory, Ahmedabad, India.*

**Professional Lectures and Seminars Presented**

[22] 2018 "IR-RF state of art: Discussion on progress made so far toward establishing IR-RF as a dating method". 3rd Workshop at *Max Planck Institute for Evolutionary Anthropology (MPI EVA), Leipzig, German. (Feb, 26-28)*

[21] 2017 "Progress made towards Infrared Radiofluorescence (IR-RF) dating method." German LED Meeting, Bayreuth, Germany, (Oct, 27-29).

[20] 2017 "Recent developments and progress towards establishing Infrared Radiofluorescence (IR-RF) as a dating method". 15th International Conference on Luminescence and Electron Spin Reasonance Dating, Cape Town, South Africa, (Sep 11-15).

[19] 2017 "Progress made so far towards establishing IR-RF as a dating method." 2nd Workshop at University of Bordeaux Montaigne, France. (May, 02-04)

[18] 2016 "Further steps to establish Infrared Radiofluorescence (IR-RF) as routine dating method." German LED, Emmendingen, Freiburg, Germany (Nov, 04-06)

[17] 2016 "State of the art of IR-RF." 1ST IR-RF workshop at JLU University of Giessen, Giessen, Germany

[16] 2014 "How many ways you go wrong when you apply OSL dating" Quaternary Geochronology course, University of Cincinnati, USA ( Invited by Graduate student Jenny Arkle)

[15] 2013 "OSL methodology for geologist and archeologist" Invited lecture for undergraduate class at University of Cincinnati, USA ( Invited by Profs. Bary Mynard and Lewis A. Owen)

[14] 2012 "Defining the timing and rates of floodplain deposition controlled by climate and tectonics along the central Ohio River" in: 8th New World Luminescence Dating Workshop, University of California, Los Angeles (UCLA), USA (Conf. Oral Presentation)

[13] 2012 "Use of OSL component in Tsunami Sediments". Invited lecture in Quaternary Geochronology course at University of Cincinnati, USA (Invited by Prof. Lewis A. Owen)

[12] 2011 "Timing of Esker and Dune Formation at the Eastern end of Oneida Lake, New York State, defined by Optically stimulated Luminescence Dating" in: GSA Northeastern/North-Central Section Meeting, Pittsburgh, Pennsylvania, USA (Conf. Oral Presantion)

[11] 2011 "Application and Implication of OSL Components". Invited lecture in Quaternary Geochronology course at University of Cincinnati, USA (Invited by Prof. Lewis Owen)

[10] 2010 "Use of Wavelet analysis of Single grain OSL" Geosciences division at Physical Research Laboratory, Ahmedabad, India (Departmental Seminar)

[09] 2009 "Flash heating of faults and resetting of TL clocks in shallow earthquakes" in: 2nd Asia Pacific Luminescence and Electron Spin Resonance Dating (APLED) Conference. Ahmedabad, India (Conf. Oral

Presentation)

[08] 2008 “Efficacy of component specific analysis of Optically Stimulated Luminescence decay in estimation of paleodose” in: 3rd International Conference on Luminescence and Its Applications (ICLA), New Delhi, India. (Conf. Oral Presentation)

[07] 2006 Component Specific paleodose estimation in optically stimulated luminescence dating: Methodology, Applications and Implications (Oral Presentation), in: Asia-Pacific Conference on Luminescence Dating (APLED), Hong Kong, China. (Conf. Oral Presentation)

[06] 2006 Quantitative studies of cross-talk of Riso and Daybreak OSL readers, in: Asia-Pacific Conference on Luminescence Dating (APLED), Hong Kong, China.

[05] 2006 “Component Specific paleodose estimation in optically stimulated luminescence dating: Methodology, Applications and Implications. at Physical Research Laboratory, Ahmedabad (Seminar), India. (Departmental Seminar)

[04] 2006 “Component Specific paleodose estimation in optically stimulated luminescence dating and its application” at Physical Research Laboratory, Ahmedabad, India. (Departmental Seminar)

[03] 2005 “Component specific Studies of Optically stimulated luminescence” at Physical Research Laboratory, Ahmedabad (Seminar), India. (Departmental Seminar)

[02] 2004 “Methodological studies of OSL and its applications” at Physical Research Laboratory, Ahmedabad (Seminar), India. (Departmental Seminar)

[01] 2003 “Meteorite studies using Luminescence Techniques” at Physical Research Laboratory, Ahmedabad (Seminar), India. (Departmental Seminar)

## *Collaborators*

| | |
|---|---|
| Bhatt, N. | The M.S. University of Baroda, Vadodara, India |
| Biswas, R.H. | University of Lausanne, Switzerland |
| Caffee, M. | Purdue University, Purdue, USA |
| Dietsch, Craig | University of Cincinnati, Cincinnati, USA |
| Domack, E.W | Hamilton College, Clinton, New York, USA |
| Dortch, J. | University of Manchester, Manchester, United Kingdom |
| Fuchs, M | Justus-Liebig-Universiy Giessen, Germany |
| Fuchs, M | Justus-Liebig-University Giessen, Germany |
| Jain, M. | Risoe National Laboratory, Roskilde, Denmark |
| Jayangondaperumal, J. | Wadia Institute of Himalayan Geology, Dehradun, India |
| Juyal, N. | Physical Research Laboratory, Ahmedabad, India |
| Kadlec, J. | Institute of Geology, Prague, Czech |
| Mayya, Y.S. | Bhabha Atomic Research Centre, Mumbai, India |
| Morthekai, P | Birbal Sahni Institute of Palaeosciences, Lucknow, Indaia |
| Owen, L. | University of Cincinnati, Cincinnati, USA |
| Rhodes, E. | University of California, Los Angeles, USA |
| Rockwell, T. | California State University San Diego, USA |
| Sebastian, K. | Université Bordeaux Montaigne, France |
| Seong, Y. | Korea University, Seoul, Korea |
| Sharma, M. | Jawaharlal Nehru University, New Delhi, India |
| Sharma, S.K | Freiberg Technical University, Freiberg, Germany |
| Singh, R.N. | National Geophysical Research Institute, Hyderabad, India |
| Singhvi, A.K. | Physical Research Laboratory, Ahmedabad, India |
| Tanlskey, K.B. | University of Cincinnati, Cincinnati, USA |
| Thomas, J.V. | Indian Space Research Organization, Bangalore, India |

## *Referees*

1. **Prof. Markus Fuchs** (Present Post-Doctoral Research Advisor)
   Department of Geography
   Senckenbergstr. 1
   Justus-Liebig-University Giessen
   D-35390 Giessen, Germany

   Ph. +49 641 9936205 (office), +49 151 40237913 (Mobile)
   Email: Markus.Fuchs@geogr.uni-giessen.de

2. **Prof. Ashok Kumar Singhv**i (Thesis Advisor)
   Geosciences Division
   Physical Research Laboratory,
   Navarangpura, Ahmedabad 380 009, India

   Ph. : +91 79 26314366 (Office), +91 9909950962 (Mobile)
   Email : singhvi@prl.res.in, aksprl@yahoo.com

3. **Prof. Lewis A. Owen** (Post Doctoral Research Advisor)
   500B Geology-Physics Building
   Department of Geology
   University of Cincinnati,
   Cincinnait, Ohio, USA 45221

   Ph. 001 513-556-4203 (Office), 001 513-410-2339 (Mobile)
   Email: lewis.owen@uc.edu

4. **Prof. Craig Dietsch**
   500B Geology-Physics Building
   Department of Geology
   University of Cincinnati,
   Cincinnait, Ohio, USA 45221

   Ph. 001 513-556-2547 (Office)
   Email: craig.dietsch@uc.edu

5. **Prof. Dylan Ward**

   500B Geology-Physics Building
   Department of Geology
   University of Cincinnati,
   Cincinnait, Ohio, USA 45221

   Ph. 001 513-556-2174
   Email: warddy@ucmail.uc.edu

6. **Prof. Rishi Narain Singh**
   (Former Director of National Environmental Engineering Research Institute)
   Emeritus Scientist,
   National Geophysical Research Institute
   Uppal Road, Hyderabad 500 007, India

   Ph. 91-40-23434604 (Office), 91-9346352339 (Mobile),
   E-mail: rnsingh@ngri.res.in, rishiprem@hotmail.com