Curriculum Vitae

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Professional Address

Department of Geology, University of Cincinnati
Cincinnati, OH 45221-0013, USA

Citizenship and Date of Birth

USA and UK; June 29, 1964

High School Education

1975 – 1982: St Teilo's Church in Wales High School, Cardiff, United Kingdom

Undergraduate Education

October 1982 – June 1985: B.Sc. honors in Geology, Imperial College of Science and Technology, University of London, London, United Kingdom

Graduate Education

August 1985 – June 1988: Ph.D., Departments of Geology and Geography, University of Leicester, Leicester, United Kingdom
Title: "Terraces, uplift and climate, Karakoram Mountains, Northern Pakistan"
Advisors: Professors Edward Derbyshire and Brian F. Windley

Present & Past Employment

9/15-present: Affiliate Professor, Center for Quaternary Research, Department of Earth and Space Sciences, University of Washington, Seattle, WA 98195, USA

9/09 – present: **Professor and Head of Department, Department of Geology, University of Cincinnati, Cincinnati, OH 45221-0013, USA**

9/08 – 9/09: Professor and Interim Head of Department, Department of Geology, University of Cincinnati

9/07 – 9/08: Professor, Department of Geology, University of Cincinnati

9/04 – 9/07: Associate Professor, Department of Geology, University of Cincinnati

7/01 – 7/04: Associate Professor, Department of Earth Sciences, University of California, Riverside, CA 92521, USA

8/97 – 7/01: Assistant Professor, Department of Earth Sciences, University of California, Riverside

8/95 – 8/97: Lecturer, Department of Geography, Royal Holloway, University of London, Egham, Surrey, TW20 OEX, UK

2/91 – 8/95: Lecturer, Departments of Geography and Geology, Royal Holloway, University of London

9/89 – 2/91: Lecturer, Department of Geography, Hong Kong Baptist University, Hong Kong

3/89 – 9/89: Engineering Geomorphologist, Geomorphological Services Ltd., UK

9/88 – 3/89: Post-Doctoral Researcher, Department of Geography, University of Leicester, UK: *Landslides and debris flows in the thick loess of China*

Awards

- **Clair P. Holdredge Award** (2012) - presented to authors of a publication that in the past five years has been judged to be an outstanding contribution to the advancement of the profession of engineering geology; awarded for Rockwell et al. (2010)

- **Busk Medal of the Royal Geographical Society (with Institute of British Geographers)** (2011) - senior medal for conservation research or for fieldwork abroad in geography or in a geographical aspect of an allied science; awarded for field research in paleoenvironmental history and geomorphology in tectonically active areas

- Elected **Fellow of the Geological Society of America** (2011)

- Elected **Fellow of Graduate School**, University of Cincinnati (2009)

- **Guest Professorship at the Qinghai Institute for Saline Lakes, Chinese Academy of Sciences**, Xining, for achievements in Quaternary research (2002)

- **Guest Professorship at the Quaternary Glacier and Environmental Research Center of China**, Lanzhou University, for achievements in Quaternary glacial geology (2000)

- Elected **Fellow of the Royal Geographical Society** (1995)

- **President's Award of the Geological Society of London** (1992) - for significant contributions before the age of 30; awarded for research in environmental geology

- Elected **Fellow of the Geological Society of London** (1988)

Affiliations

Geological Society of America (GSA; *Quaternary Geology and Geomorphology*, and *Geoscience Education* divisions); American Geophysical Union (AGU); Geological Society of London; American Association for the Advancement of Science (AAAS); American Quaternary Association (AMQUA); Royal Geographical Society with the Institute of British Geographers (RGS with IBG); International Association for Geoscience Diversity (IAGD)

Hobbies

Cycling, kayaking, scuba diving (PADI Divemaster and BSAC Club Instructor), and scotch tasting

Overall Summary of Research, Teaching and Professional Activities

My research and teaching focus on understanding the nature and dynamics of Quaternary paleoenvironmental change and landscape evolution, environmental geology and natural hazards, and geoarcheology, specifically along active plate margins. I have concentrated my efforts on two major geologic-geographic regions: 1) the Himalayan-Tibetan orogen; and 2) the western cordilleras of North and South America. This is because these regions provide some of the best natural laboratories for understanding the dynamics of geomorphic, tectonic and climatic processes, and ultimately they provide analogs for understanding the evolution of modern and many ancient tectonic plate boundaries. I have also undertaken research in other regions, including the American Midwest, Egypt, Venezuela, Morocco, Trinidad and Tobago, Thailand, Yemen, Azerbaijan, and the United Kingdom.

Throughout my career, I have been particularly concerned with defining the timing and quantifying the relationship between tectonics, geomorphic processes and Quaternary climatic change to understand the evolution of landscapes. Consequently, my efforts have concentrated on mapping and numerically dating of landforms and sediments to help determine the timing of geomorphic events, and rates of geomorphic and tectonic processes. To undertake the numerical dating, I established geochronology laboratories at the University of Cincinnati (UC), and previously in the Department of Earth Sciences at the University of California, Riverside (UCR), to utilize the newly evolving methods of terrestrial cosmogenic nuclide surface exposure and optically stimulated luminescence dating. These laboratories are providing the Department of Geology at UC with start-of-the-art facilities for research and teaching, and are also attracting numerous graduate students, researchers and professional geoscientists from other institutes to our university.

Before joining UC in 2004, I was on the faculty at UCR (1997–2004) and was promoted to Associate Professor of Geology (with tenure) in 2001. Prior to working at UCR, I was a permanent faculty member in the Center for Quaternary Research (CQR) in the Departments of Geography and Geology at Royal Holloway, University of London (RHUL; 1991–1997). Between 1989 and 1991, I was a lecturer in the Department of Geography at the Hong Kong Baptist University. I have taught a diverse range of courses to undergraduates and graduates, including geomorphology, natural hazards, neotectonics, environmental geology, engineering geology, structural geology, Quaternary science, and field classes. This has provided me with extensive experience in academia on three different continents, exposing me to a diverse range of teaching, research and service styles.

I have been the Head of the Department of Geology at UC during the past ten years. This service has been a very rewarding experience, especially since we have been able to hire ten new faculty members to enhance our areas of research and teaching excellence. During the past five years, I have also been the Director of the *Quaternary and Anthropocene Research Group* (QARG), which is a multidisciplinary group including faculty and students from the Departments of Anthropology, Biological Sciences, Geography and Geology at UC.

My external service has focused on working on editorial boards for some of the leading journals in the geosciences, including *CATENA*, *Geology*, *GSA Bulletin*, *Quaternary Research* and *Quaternary International*. I was an Editor-in-Chief for *CATENA* from 2010 to 2016. Since 2016, I have been one of three senior editors for *Quaternary Research*. Over the past few decades, I have also undertaken numerous consultancy projects for engineering, environmental and petroleum companies. This has provided me with a wealth of experience in applied aspects of geoscience.

RESEARCH

Summary of Research

My research focuses on the Quaternary geology, geomorphology, environmental geology, and natural hazards specifically along active plate margins. I am particularly concerned with quantifying the timing, and rates and magnitudes of landscape evolution to understand the dynamics and interactions between tectonics, geomorphic processes, and climate. This research involves remote sensing, field mapping, geomorphic and sedimentological analysis of landforms, and geochronology. To undertake the numerical dating, I direct geochronology laboratories at the University of Cincinnati (UC) to utilize the newly evolving methods of terrestrial cosmogenic nuclide surface exposure and optically stimulated luminescence dating (for more details please see http://lewisaowen.wixsite.com/main). I have concentrated my efforts in two major geographic-geologic regions: 1) the Himalayan-Tibetan orogen; and 2) the western cordilleras of North and South America. These regions provide some of the best natural laboratories for understanding the dynamics of and the interaction between geomorphic, tectonic and climatic processes along active plate margins. Ultimately, these studies provide analogs for understanding and modeling ancient and modern orogens and for predicting future environmental change. I have also done research in other geomorphic and tectonically active regions, including the Red Sea margin in Yemen, the Atlas Mountains of Morocco, the Venezuelan Andes, Trinidad and Tobago, Thailand, Azerbaijan, the Highlands of Scotland and the American Midwest. My main research interests are listed below. ***Please see the grant section of my cv for specific projects.***

● Quaternary paleoenvironmental change and landscape evolution

- Paleoenvironmental change and landscape evolution of the Himalayan-Tibetan orogen and the western cordilleras of North and South America.
- Tectonics and landscape evolution along active faults and fold systems, specifically along the San Andreas-Gulf of California transform plate margin, the Basin and Range Province in the US, the Andean margins and the Himalayan-Tibetan orogen.
- Defining rates of denudation and crustal displacement using geomorphic and geochronologic techniques in high mountains and their forelands.
- Defining the timing and extent of glaciation in high mountain regions, specifically the Himalaya, Tibet, western USA, and southern Alaska.
- Testing the role of paraglaciation on landscape development.
- Paleohydrological changes within desert basins and mountain forelands, including the Atlas Mountains, Precordillera of Argentina, Southern California and Nevada, Himalaya and Tibet, and Mongolia.
- Tectonic, climatic and autocyclic controls on alluvial fan development.
- River terrace formation, including studies in the Himalaya and Tibet, western USA, Argentina, Ohio River Valley, and Big Bone Lick in Northern Kentucky.
- Quaternary history and landscape evolution of the American Midwest.

- Defining rates and timing of paleoenvironmental change at archeological sites, e.g., Chaco Canyon in New Mexico, Fayum Basin in Egypt, Eastern Pampa-Patagonia transition, Argentina and middle Mississippi valley.

- Coastal evolution, specifically involving projects on marine terraces along the coast of California, Trinidad, and Portugal.

● Quaternary Geochronology

- Testing the applicability of terrestrial cosmogenic nuclide methods, specifically ^{10}Be, ^{26}Al and ^{36}Cl, for dating Quaternary landforms and surfaces.

- Applying and developing optically stimulated luminescence methods for dating Quaternary sediments and landforms.

- Inter-calibrating luminescence, terrestrial cosmogenic radionuclide surface exposure and radiocarbon dating methods.

● Environmental Geology

- Geomorphic hazard mapping, assessment and mitigation; specifically, for landsliding, erosion, and flooding.

- Earthquake geology; specifically, paleoseismic studies for earthquake hazard mitigation.

- Relationships between volcanic eruptions and climate change.

Selected notable research contributions

- Undertaking the most comprehensive study of the nature and timing of Quaternary glaciation in the Himalaya and Tibet, notably including detailed studies of Mount Everest and K2. (*Work featured on National Public Radio*)

- Providing some of the first quantitative studies of the timing, magnitude and rates of erosion, landsliding and sediment transfer in the Himalaya and Tibet. (*Work featured on the History Channel*)

- Helping to drive the development of *tectonic geomorphology* as a new discipline within the Earth sciences, in particular providing important studies along active faults including the San Andreas, Death Valley-Fish Lake Valley, and San Jacinto fault systems.

- Developing some of first applications of optically stimulated luminescence and terrestrial cosmogenic nuclide methods to define the timing of active faulting and past earthquakes, glaciation, and sediment transport in mountains and forelands.

- Determining some of the first numerical ages for alluvial fans and river terraces in the Himalayan and Tibet, the western USA and Ohio River valley.

- Providing some of the first comprehensive studies of ancient and earthquake-triggered landslides in the Himalaya.
- Helping to develop areas of environmental geology, including landslide and earthquake hazard assessments in the UK, USA, Pakistan, and India.

Detailed Outline of Research

My research focuses on the Quaternary paleonvironmental change and landscape evolution, environmental geology, natural hazards, and geoarchaeology. Most of my studies have been along active plate margins, but also include other settings. I am particularly concerned with quantifying the timing, and rates and magnitudes of Quaternary landscape evolution and climate change to understand the dynamics and interactions between tectonics, Earth surface processes and climate. I use remote sensing, field mapping, geomorphic and sedimentological analysis of landforms and sediments, and geochronology to address and help quantify rates of change and magnitudes of geologic processes. Throughout my career, I have concentrated much of my efforts in two major geologic-geographic regions: 1) the Himalayan-Tibetan orogen; and 2) the western cordilleras of North and South America. These regions provide some of the best natural laboratories for understanding the dynamics and the interaction between geomorphic, tectonic and climatic processes along active plate margins. I have also undertaken research in other regions including the American Midwest, Yemen, Mongolia, United Kingdom, Canadian High Arctic, Azerbaijan, Egypt, Morocco, Trinidad and Tobago, and Thailand.

My research program to date has resulted in ~20 graduate students completing PhDs and MSs under my supervision, > 170 papers in internationally peer-reviewed journals, > 25 articles in books or magazines, 15 edited volumes, and since 1998 over 130 abstracts. In 1992, the Geological Society of London acknowledged my early career research contributions by presenting me with the *President's Award* for my contributions to environmental geology. The Geological Society of London is the oldest and one of the most prestigious geological societies, and this award is given each year to a geoscientist who has made an outstanding contribution to their discipline before the age of 30. In June 2000, the Quaternary Glacier and Environment Research Center of China in Lanzhou University honored my research achievements by awarding me with a Guest Professorship. The Qinghai Institute for Saline Lakes (Chinese Academy of Sciences) also presented me with a Guest Professorship in 2002 for my contribution to the Quaternary geology of high Asia. In 2011, I was awarded the prestigious *Busk Medal* from the Royal Geographical Society with the Institute of British Geographers for my field research in palaeoenvironmental history and geomorphology in tectonically active areas. That same year, I was elected to fellowship of the Geological Society of America for my research contributions. The Environmental and Engineering Geology Division of the Geological Society of America recognized my collaborative work on environmental geology in 2012 when we were awarded the *Clair P. Holdredge Award* for our publication on the seismic hazard along the Panama Canal (B106)[1].

In numerous tectonically and geomorphic active regions, my research has: established new Quaternary stratigraphic frameworks; produced some of the first lithofacies models that show the relationships between sediments, landforms and environmental settings; helped reconstruct the nature of Quaternary paleoenvironmental change; has quantified rates of geomorphic and tectonic processes; and has produced geologic hazard assessments. In particular, this work has enabled me to become one of the leading researchers and authorities on the Quaternary glacial geology, geomorphology and paleoenvironmental history of the Himalayan-Tibetan orogen. In a broad sense, my research is providing frameworks and analogs to help reconstruct and understand the recent geologic past and paleoenvironmental evolution of young plate boundaries and orogenic systems. In particular, it has helped establish a modern foundation for reconstructing the nature of Quaternary paleoenvironmental change and landscape evolution in the high mountains and dryland regions the Himalayan-Tibetan orogen and western cordilleras of North and South America, with implications for understanding the nature of Quaternary climatic change and the dynamics of active plate margins. Furthermore, my work on the dynamics of

[1] Numbers refer to the publications listed in my publication section.

geomorphic systems and environmental change is important for hazard mitigation, environmental management and sustainable development.

Much of my research in the Himalayan-Tibetan orogen has concentrated on understanding the dynamics of glacial systems. Studying the glacial system is because glaciation dominates the geomorphic and sedimentary systems in high mountain regions and their study provides a starting point for defining and quantifying the nature of earth surface processes and their relationship to the climate and tectonics, and their controls on landscape evolution. Three major problems exist: i) the dynamics of high mountain glacial sedimentary systems have not been adequately quantified; ii) the former extent of glaciers throughout the Quaternary is poorly defined, and reconstructions of past glaciers are problematic in many regions, and; iii) the timing of glaciation throughout the late Quaternary is not well known.

Giving the first problem, I have been developing lithofacies and landsystems models to characterize Himalayan-Tibetan and other high-altitude glacial systems (B3, B4, B40, B41, C1, C2, C4, C5, C11, B147, B154). Steep slopes that supply abundant debris to the surface of glaciers dominate these glacial systems. The abundance of debris on glacier surfaces poses problems in using them as proxies for reconstructing past climate, for example, using the standard techniques of reconstructing equilibrium-line altitudes depressions. I addressed this problem for the Himalayan-Tibetan region as part of PMIP (Palaeoclimate Modeling Intercomparison Project endorsed by PAGES and IGBP), by producing and compiling data from remote sensing and field studies throughout the Himalaya and Tibet to reconstruct the paleoclimatic conditions during the global last glacial maximum (LGM; B56, B57).

The second problem, defining the former extent of past glaciations throughout these regions, has emerged because of the difficulties in distinguishing former glacial deposits from mass movement deposits, and vice versa. I have, therefore, been systematically field checking previous studies and undertaking new field mapping based on our modern understanding of the glacial geology and geomorphology derived from my lithofacies and landsystem models. This is producing new and modern chronologies throughout the region (B11, B13, B15, B17, B19, B21, B22, B26, B28, B30, B31, B35, B36, B38, B43, B44, B49, B54, B60, B63, B72, B76, B85, B88, B90, B99, B101, B104, B121, B127, B130, B132, B135, B147, B154, B155, B164, B166).

The third problem, defining the timing of glaciation, has arisen because the standard method of radiocarbon dating cannot be readily applied in the Himalayan-Tibetan region due to the scarcity of organic matter necessary for the technique. I have therefore been addressing this problem by defining the timing of glaciation using the newly developing techniques of terrestrial cosmogenic nuclides (TCN) and optically stimulated luminescence (OSL) dating. By selecting distant study areas through the Himalaya and Tibet, my students and I have been dating the glacial successions and testing if glaciation was synchronous throughout the region during the Late Quaternary. This work is also allowing us to examine the relative importance of the south Asian summer monsoon and mid-latitude westerlies that control the climatic system and glaciation in the region (B30, B31, B35, B36, B37, B38, B43, B44, B48, B49, B54, B60, B63, B72, B76, B85, B88, B90, B99, B101, B104, B113, B121, B127, B130, B132, B135, B147, B155, B156, B164, B166, B172). My graduate students and I have undertaken more than a twenty detailed regional studies and have determined ~2000 TCN ages on the glacial successions. This research shows that glaciation was very restricted during the global last glacial maximum (LGM) but was more extensive in the early part of the last glacial cycle and that monsoon precipitation and cloud cover is the primary control on glaciation in this region (B35, B36, B37, B38, B43, B44, B46, B48, B49, B54, B60, B63, B72, B76, B85, B88, B90, B99, B101, B104, B113, B121, B127, B130, B132, B135, B147, B154, B155, B164, B166, B172). Of particular note is our work in the Karakoram Mountains and around Mt. Everest that provides the most detailed geochronological studies for the timing of multiple glaciations in central Asia (B37, B72, B90). I will continue to develop this extensive program in the coming years by extending my field studies and geochronological work with

several of my graduate students and colleagues. My interest in glaciation has also included examining recent glacier fluctuation. In particular, our work in the Karakoram is showing that some glaciers are advancing, contrary to the simplified view that they might retreat due to human-induced global warming (B116).

My work on Himalayan-Tibetan glaciation was internationally recognized when I was asked to contribute to: EPILOP (Environmental Processes of the Ice Age: Land, Oceans, Glaciers) of IGBP/PAGES, which aims to reconstruct the nature of glaciation during the LGM; PMIP that aimed to model the climatic conditions during the LGM; and INQUA's (International Union for Quaternary Research) global glacial mapping project (B36). The above research has important implications for climatic modelers who are emphasizing the need to understand variations in tropical and subtropical climatic systems for accurate modeling of past and future climate change. Recently, my work was part of a global synthesis of Holocene glaciation (B141, B150).

The influence of glaciation on hydrologic and climatic systems is another one of my primary interests; and was the subject of IGCP415 (International Geological Correlation Program 415: Glaciation and reorganization of Asia's network of drainage). As part of this program, I led a working group on the glaciation of Tibet and the bordering mountains and co-edited four volumes of papers that examined the regional and global implications of Himalayan-Tibetan glaciation (F6 to F9). I also helped lead an INQUA and NSF funded field workshop on mountain glaciation, which resulted in two edited volumes of papers on mountain glaciation and geomorphology (F11, F12).

With regard to glaciation and hydrology, I have been testing the paraglacial concept, i.e., the view that most landscape changes in glacial and periglacial regions take place during deglaciation in relatively short periods of time as the glacial, fluvial and mass movement systems readjust themselves to the changing conditions. This work is showing the importance of climate change and hence oscillations in the extent of mountain glaciers, and on the rates and magnitudes of erosion and sediment transfer in the Himalaya and Tibet (B6, B10, B24, B39, B51, B52, B59, B61, B63, B89, B108, B112, B154, B162). I have been continuing this work by examining moraines and alluvial fans in the Garhwal Himalaya, and in the valleys around Mount Everest and Nanda Devi, in the Kunlun Mountains, Pamir and Ladakh (B51, B52, B59, B61, B63, B154, B162). Presently, we are working on river terraces and alluvial fans in Kulu Himalaya, Lahul and Zanskar in northern India.

Over the last few years, we have been using TCNs to help define rates of fluvial incision, basin-wide erosion, and headwall erosion throughout several glacial basins in the Himalayan-Tibetan orogen. This research is helping us to quantify the importance of glacial and associate processes in landscape evolution and has resulted in several papers (B83, B87, B88, B104, B114, B115, B142). The data we are obtaining is showing strong temporal controls on rates of erosion, specifically that Holocene rates of erosion are much higher than Late Quaternary rates (B114). The reasons for this are many fold including episodic erosion, climate controls and autocyclic processes. Some of this work was featured on the History Channel's series *How the Earth was made*. We are continuing this work by examining glacial erosion in Kulu Himalaya, Lahul and Zanskar in northern India, and the Khumbu Himal in Nepal. I am developing this work with Professor Jim Spotila and his students at Virginia Tech by working in the Chugach and Kenai mountains in Alaska, the Scottish Highlands and the White Mountains of New Hampshire (B146, B163, B165). We are also using low-temperature thermochronology to look examine long-term rates of erosion (B146, B163).

I have also worked in desert regions of central Asia and have included studies in the Qaidam Basin of Tibet and the Gobi of southern Mongolia and northern China. In these regions, alluvial fan, lacustrine and glacial sediments provide information on the role of the climate, tectonics and autocyclic processes in the evolution of deserts and their fluctuating margins. In particular, this

work has concentrated on the alluvial fans in the Gobi desert, Qaidam Basin and Tien Shan to show that although they are associated with the tectonically active Gobi Altai and Kunlun Mountains, their formation was largely controlled by changes in the hydrological system when the region became drier during the late Pleistocene (B18, B39, B63, B151). I was also able to show that much of the Gobi desert had experienced permafrost conditions during the last glacial and that permafrost degradation had occurred by ~10 ka (B25). Furthermore, this research delimited the southernmost extent of permafrost in northern Asia during the Late Quaternary, which has also helped in determining paleotemperatures for the region. Ultimately, these studies will link the paleoclimatic records for the Himalaya, the Tibetan Plateau, the Loess Plateau of central China and the Gobi Desert to provide detailed regional reconstructions of late Quaternary climatic change in central Asia.

My interest in the role of tectonics on the landscape evolution of the Himalayan-Tibetan orogen which extends through the Tien Shan and Gobi Altai mountains, have involved several large research projects. The first large project began along the Gobi Altai-Tien Shan (GATS) fault system and the associated transpressional mountain ranges in China and Mongolia. The GATS fault system is critical because it represents the northernmost extension of the Indian-Asia collision zone. This research aimed to quantify the amount of deformation that was accommodated along this fault system and to provide one of the first examinations of the evolution of young transpressional mountain ranges along a major strike-slip fault system within a continental interior (B16, B27, C10). As part of this research we also completed a study of the western termination of this fault system in the easternmost Tien Shan, which is highlighting the importance of structural controls on the geomorphic evolution of transpressional mountain ranges (B45). From these studies, we were able to assess rates of mountain uplift and calculate earthquake recurrence intervals by applying OSL methods to date deformed sediments and landforms within the foreland regions (B27). These studies are also important because they may be used as analogs in similar tectonic settings, such as in transpressional zones along the San Andreas Fault or intracontinental fault/seismic systems including the New Madrid Seismic Zone in the central US. This research also has important implications for predicting the geometry and nature of active faulting for seismic hazard mitigation. My interests in the Tien Shan continued with studies on active tectonics in the Kyrgyz Tien Shan with Dr. Reed Burgette (New Mexico State University), Professor Ray Weldon (University of Oregon), and Drs. Kanatbek Abdrakhmatov and Cholponbek Ormukov (Kyrgyz Insitute of Seismology; B151).

Another major project included research on the Karakoram Fault in the Pamir Mountains at the western end of the Himalayan-Tibetan orogen to help determine its evolution and role in orogensis (B138). This research was collaborative with Drs. Alex Robinson (University of Houston), Jie Chen (China Earthquake Administration) and Lindsay Schoenbohm (University of Toronto). This involved mapping landforms and structures, and developing glacial and river terrace chronologies using TCN and OSL methods. Our work on the Karakoram fault has shown that while the structure is active along its southern end, the northern half of the fault has been inactive for >100 ka (B138). Th variance in activity has important implications for understanding how deformation is partitioned across Tibet.

Research on the Himalayan-Tibetan orogen extended to work on the Chaman fault that runs along the western margin of the Indian-Asian (Afghanistan block) collision zone in Pakistan and Afghanistan. This research was very challenging because of much of its crosses politically inaccessible regions. This research was in collaboration with Professor Shuhab Khan (University of Houston) and Professor Abdul S. Khan (Quetta University, Pakistan). To help overcome the political/logistical problems of working in the region, we trained Pakistani scientists in the California and Nevada in tectonic geomorphic methods and sampling techniques for OSL and TCN dating. These scientists were then able to return to Pakistan and work along the Chaman fault. We, in turn, undertook remote sensing and the dating analysis. Study of the Karakoram and Chaman faults is critical in helping to determine the extent to which deformation of continental

crust is best modeled as a continuum with distributed deformation, or as rigid plates with discrete boundaries (B124, B129).

I have also undertaken studies of the geomorphic effects of large earthquakes in the Himalaya and Tibet. The first set of studies involved work throughout the Garhwal Himalaya that was shaken by two large earthquakes during the 1990s. This research was followed by a series of studies on the recent Kashmir earthquake in 2005. These earthquakes produced extensive landsliding, and we were able to examine their contribution in terms of overall effect on denudation and landscape modification. The maps and databases that we created in these research projects are being used to aid in hazard mitigation in the study areas (B14, B33, B73, B77, B95, B102, B120, B122, B126). I am planning to extend this work by undertaking a systematic study of geomorphic hazards throughout northwestern Himalaya in the coming years. Also, I directed and completed a study of earthquake-induced giant ice avalanches in the Kunlun Mountains of Tibet that were produced by the 2001 Magnitude 7.9 Kokoxili earthquake (B50).

My research on the western cordilleras of North and South America has focused on San Andreas-Gulf of California Transform System (SAGCTS), the Alaska Range, the Venezuelan Andes, the Atacama Desert, and Precordillera of Argentina. These include studies on tectonic geomorphology and Quaternary paleoenvironmental change (B117, B125). With regard to tectonic geomorphology, I am particularly concerned with quantifying, on geomorphic timescales (10's to 100,000's years), the partitioning of deformation across the SAGCTS (B34, B42, B53, B58, B65, B68, B71, B80, B84, B94, B100, B103, B118, B119, B122, B134, B137, B145, B148, Bip2). We are addressing this by a combination of remote sensing, field mapping, fault trenching and dating of sediments and landforms. This research has including studies of offset rates and paleoseismic events on the southern stretch of the San Andreas fault and on the San Jacinto, Raymond, Malibu, Banning, Brawley, Mission Creek, and Puente Hills faults (B103, B122, B137, B161). These projects are involving many collaborators', who are listed in the collaborators section later in my curriculum vitae. Most of these studies were funded by the NSF, the Southern California Earthquake Center (SCEC), and the National Earthquake Hazards Reduction Program (NEHRP; for details see the grant section later in my curriculum vitae). Currently, we have funded projects to work on the strike-slip and extension across Walker Lane in Nevada and the Eastern California Shear Zone in the Mojave Desert to determine rates of crustal deformation and seismic hazard.

I have also been examining the evidence for crustal deformation, particularly the early stages of mountain uplift, in the Mecca Hills along the eastern margin of the Salton Trough (B137, B161). Our studies are defining uplift rates and are providing the oldest (» 400 ka) ages on pediment and alluvial fan surfaces in the western USA (B137). Numerous faults deform these surfaces and in the coming years, we plan to use these dated faulted surfaces to test diffusion models of fault scarp degradation. Recently, we have been modeling off-fault deformation along the San Andreas fault that bounds the western margin of the Mecca Hills (B161).

My paleoenvironmental research on the SAGCTS has involved the study of the glacial geology of the San Gorgonio Mountain and the paleohydrological history of the adjacent foreland regions. My research on the San Gorgonio Mountain provided the first data on the timing of glaciation in the southwesternmost glaciated area of North America (B47). This research is allowing us to quantify the nature of climate change in the region during the late Pleistocene and it fills an important gap in our knowledge of timing and extent of mountain glaciation in the American Cordilleras. This work was featured on *CNN* and the *Discovery Channel* websites and highlighted in *Geotimes* and several regional newspapers (including the *LA Times*). I am presently extending this work by examining the late Quaternary glacial successions in the southern Sierra Nevada of California (B158). Research has also involved collaboration with the USGS (B.F. Cox and J.W. Hillhouse) on the evolution of the Mojave River drainage system (B42, B97, B109). Our work combined field mapping, coring, sedimentology, geomorphology,

paleomagnetism, OSL dating, and vertebrate paleontology to reconstruct the evolution of the drainage system as the Transverse Ranges grew and lacustrine basins developed in response to tectonics and climate change throughout the Quaternary.

My work has also included examining the western Transverse Ranges, Camarillo fold belt and marine terraces in southern California to understand their tectonic evolution, particularly for seismic hazard mitigation (B118, B119, B131). This research has involved studies of marine terraces and sea-level change (B131). Other work on marine terraces is involving studies in Trinidad and Tobago, and Portugal (C27). In addition, I have also recently developed several projects in southern California and Baja California to examine the mode and timing of formation of alluvial fans. Our recent results show a strong correlation between times of climatic instability and alluvial fan development (B65, B97, B134, B139).

In Alaska, we have been working on the glacial successions around Mt. Denali in the Alaska Range, and the Chugach and Kenai ranges. This research involves developing a glacial chronostratigraphy, and examining the spatial and temporal variability in erosion using TCN methods. So far this work has resulted in the first comprehensive numerically dated glacial chronology for the regions (B96, B105, Bs2). We plan to develop this work into a long-term research program to help understanding the links between tectonic, glaciation and climate change across the Alaskan Range. We are presently completing a project to examine temporal and spatial variations in rates of glacial erosion across the Kenai and Chugach Mountains in southern Alaska using TCNs and apatite (U-Th)/He dating (B146).

In the Atacama Desert of Chile, I have been working with Professors Richard Allmendinger (Cornell University) and Jason Rech (Miami University) to date alluvial fan and pediment surfaces that are traversed by giant cracks that form during great earthquakes. Some of these surfaces date to > 8 Ma and provide a record of numerous great earthquake events and are helping provide us with a history of landscape development in one of the driest places on our planet (B125).

Extending my interest into the forelands of mountain belts, I have been working in the Precordillera of the Argentina Andes with Professors Andrew Meigs (Oregon State University) and Thomas Rockwell (California State University, San Diego). In the Precordillera, we are improving the chronology of deformation and earthquakes at La Rinconada near San Juan, an area that has experienced some of the most significant earthquakes in Argentina. We have developed a river terrace chronology across the La Rinconada fault zone using TCN and OSL dating to define at least the last four rupture events and to determine rates of vertical uplift and erosion (B133). We have also been examining the alluvial fan development around the active faults (B113).

I have also been working in the Venezuelan Andes with Professor Steve Wesnousky (University of Nevada) and Marc Caffee (Purdue University). This research has involved developing glacial chronologies and using deformed glacial landforms to determine rates of horizontal and vertical crustal displacement in this transpressional mountain range (B117).

During the past decade, I have been undertaking research in the Atlas Mountains and their forelands with students and colleagues (Alvar Pastor, Antonio Teixell and Maria-Luisa Arboleya) from the Universitat Autònima de Barcelona to help define rates of deformation and erosion (B78, B144). This collaboration has also extended into examining rates of erosion across the Eastern Cordillera of Columbia (B156).

My research in the American Midwest includes the study of the river terraces along the lower Ohio River (B140). This research has involved developing chronostratigraphies using OSL dating and reconstructing paleoenvironments. We have also been able to recognize active

faulting that displaced the Ohio River during the late Holocene (Bs1). Also, I have been working on the famous Big Bone Lick site in Kentucky to help develop chronostratigraphies for vertebrate paleontological and archaeological research (B143). My work has also extended into the caves of the Midwest, including undertaking TCN burial age dating of sediments at Sheridan Cave in Ohio and Great Saltpetre Cave in Kentucky. Other archaeological work has focussed on Chaco Canyon in New Mexico to help understand the paleoenvironmental setting for the Ancestral Puebloan peoples and how they managed water resources (B149, B152, B160, B169, B171). My interest in archaeological work has also extended to examining the evidence for the impact of volcanism on climate change (B170).

The lack of numerical dating is one of the biggest hurdles in determining rates of landscape evolution and paleoenvironmental change in many of my study areas. Therefore, when I moved to UCR in 1997, I established an OSL dating laboratory. I also developed strong links with the Lawrence Livermore National Laboratory and PRIME Lab at Purdue University to establish a program of TCN dating. This laboratory is enabling us to date landforms and sediments from a wide variety of environments (as discussed above). Since moving to UC, I have established new laboratories for Quaternary geochronology, which are enabling us to date large numbers of rock and sediment samples. Our laboratories have attracted many faculty and students from outside UC, including visitors from the Scotland, Spain, University of Oregon, Central Washington University, University of Kentucky, California State University San Diego, University of Southern Florida, Purdue University, Yale, Virginia Tech, University of California - Davis, University of Houston and University of St. Louis. These scientists are working with us on tectonic and geomorphic projects. This research is helping us to foster links with other universities and broaden our research activities.

Although OSL and TCN dating methods are now providing a whole range of new possibilities for quantifying rates of geologic change, these techniques are still in the early stages of development. I have, therefore, been developing projects to help advance methodologies for these techniques in varied geologic settings. In particular, the project that I initiated to date Late Quaternary shorelines in the Mojave Desert is allowing us to compare radiocarbon, OSL and TCN dating techniques (e.g., B67). In addition, I have been working in Death Valley and at the Calico Archaeological Site in the Mojave Desert to test the applicability of TCN and OSL methods for dating and erosion studies (B107 and B109). I am also working with Marc Caffee on the Isle of Skye in Scotland to test the production rates for ^{10}Be, ^{26}Al and ^{36}Cl TCNs by dating moraines that formed during the Younger Dryas Stadial. We have also explored the use of in situ ^{14}C and noble gas techniques in our study areas on Skye. This work was part of multi-campus research as part of a multimillion-dollar NSF program (CRONUS) to help improve our knowledge and understanding of TCNs.

My research funding for all these projects has come from many sources, including the Royal Society, NERC (UK National Environmental Research Council), US National Science Foundation (NSF), National Earthquake Hazard Reduction Program (NEHRP), Southern California Earthquake Center (SCEC), the National Geographic Society (NGS), the Department of the Energy funded LLNL/IGPP program, Earthwatch and consultancy work. Please see the grant section of my curriculum vitae for details of my funding.

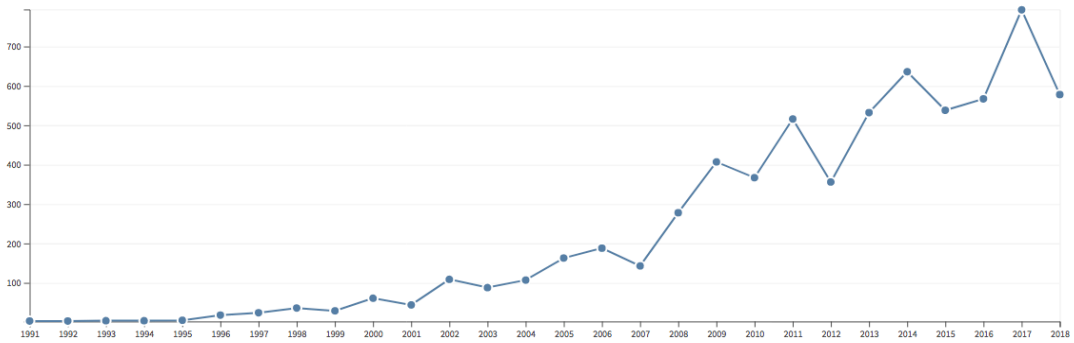
In the coming years, I will continue to examine the nature of Quaternary landscape evolution and paleoenvironmental change in active tectonic setting by utilizing my skills as a geomorphologist, sedimentologist, and Quaternary geochronologist. In particular, my focus will be on the Himalayan-Tibetan orogen and bordering mountains, and the mountains and basins of the western US. While undertaking research in these regions, I will continue to develop TCN and OSL methods for geoscience applications, particularly for applied aspects including hazard mitigation and erosion studies.

Publications

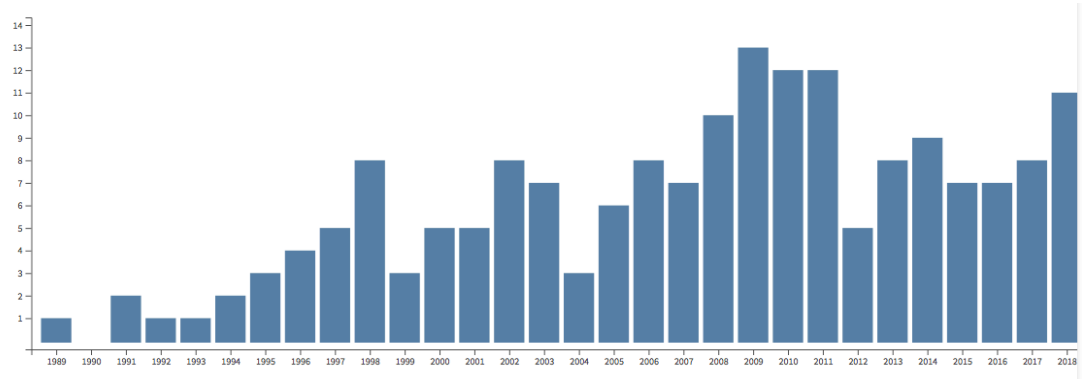
ISI Web of Science Citation Report (November 1, 2018)

Results listed = 181; Sum of the times cited = 6,597; Average citation per item = 36.5; h-index = 47

Citations Each Year



Publications Each Year



Google Scholar (November 1, 2018)

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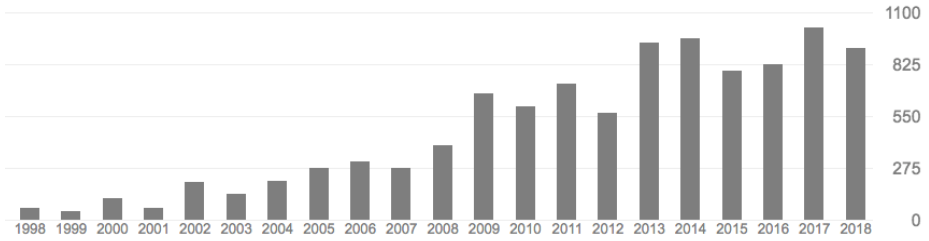
h-index	60	41
i10-index	156	132

Citations Each Year



Please note in citations below that student authors are highlighted with * and post-doctoral researchers with #

A. Books

A3. Pickering, K.T. and Owen, L.A. (1997) *Instructor's manual for an Introduction to Global Environmental Issues*. Routledge, London, 106 pp.

A2. Pickering, K.T. and Owen, L.A. (1997) *An Introduction to Global Environmental Issues*. Routledge, London, 2nd edition, 512 pp.

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Aip. Books in preparation

Aip1. Pickering, K.T. and Owen, L.A. (in prep) *Global Environmental Issues: An Earth Science Perspective*. Cambridge University Press, Cambridge, ~700 pages (final draft due August 2018).

B. Publications in international peer-reviewed journals

Summary of peer-reviewed publications in journals (published and in press): Annals of Geography - 1; Annals of Glaciology - 1; Antiquity – 1; Arctic, Alpine and Antarctic Research - 1; Boreas - 7; Bulletin of the Seismological Society of America - 3; CATENA - 3; Current Science - 1; Earth and Planetary Science Letters – 3; Earth Surface Processes and Landforms – 3; Erdkunde - 1; Geology - 6; Geomorphology - 27; Geophysical Research Letters - 1; Geological Society of American, Bulletin - 10; Geological Society of America Special Paper - 1; Geological Society of London Special Paper - 3; Journal of Archaeological Sciences: Reports - 3; Journal of the Geological Society, London - 6; Journal of Korean Geographical Society - 1; Journal of Geophysical Research - 3; Journal of Himalayan Geology - 1; Journal of Quaternary Science - 12; Lithosphere – 5; Natural Hazards - 1; Nature - 1; Nature Geoscience – 1; Nature Scientific Reports – 1; *PLOS One – 1; Quaternary International - 12; Quaternary Proceedings - 2; Quaternary Research - 6; Quaternary Science Reviews - 26; Sedimentary Geology - 3; Tectonics - 1; Tectonophysics - 6; Turkish Journal of Earth Science – 1; Zeitschrift für Geomorphology - 6.*

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I114. Pierce, I., Wesnousky, S., Kent, G. and Owen, L. (2015). Preliminary Vertical Slip Rate for the West Tahoe Fault from six new Cosmogenic ^{10}Be Exposure Ages of Late Pleistocene Glacial Moraines at Cascade Lake, Lake Tahoe, California. *EOS,* Abstract T31A-2827 presented at 2015 Fall Meeting, AGU, San Francisco, Calif., 14-18 Dec.

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I110. Marshall, J., Morrish, S., Lafromboise, E., Butcher, A., Khaw, F., Ritzinger, B., Utick, J., Wellington, K., Gardner, T. and Owen, L. (2014). Megathrust earthquakes and morphotectonic evolution of the Nicoya Peninsula forearc, Costa Rica, Central America. Annual Meeting of the Geological Society of America, Vancouver, October 2014, Geological Society of America *Abstracts with Programs*. Vol. 46, No. 6, p.0, Paper No. 90-12.

I109. Fame, M.L. Spotila, J. A. and Owen, L.A. (2014). Testing glacially induced landscape transience; Glen Shiel and the Mamore Range, NW Scotland. Annual Meeting of the Geological Society of America, Vancouver, October 2014, Geological Society of America *Abstracts with Programs*. Vol. 46, No. 6, p.0, Paper No. 69-4.

I108. Valentino, J., Owen, L.A. and Spotila, J. (2014). Glaciology in the Chugach Range of South Central Alaska. Annual Meeting of the Geological Society of America, Vancouver, October 2014, Geological Society of America *Abstracts with Programs*. Vol. 46, No. 6, p.341, Paper No. 69-4**.** Paper No. 137-14.

I107. Owen, L.A. (2014). Paleonvironmental change and landscape evolution in the Himalaya. *Geological Society of London Meeting on Sustainability*, Leh, Ladakh, Northern India. June, 2014,

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I105. Fame, M., Spotila, J. and Owen, L.A. (2014). The effect of late Cenozoic glaciation on denudation in the White Mountains of New Hampshire. Northeastern Section - 49th Annual Meeting (23–25 March), Geological Society of America Abstracts with Programs, Vol. 46, No. 2, Paper No. 58-5

I104. Dortch, J., Owen, L.A. and Caffee, M.W. (2013). Timing and climatic drivers for glaciation across semi-arid western Himalayan-Tibetan orogen. EGU Annual Meeting, Vienna, Austria, April 7-12; 2013-11762, GM9.3/CR1.6

I104. Haritashya, U.K., Bishop, M.P., Bolch, T., Copland, L., Owen, L.A. and Mani, S. (2013). Past fluctuations and current status of the Gangotri Glacier. CONTROL ID: 1813212. American Geophysical Union Annual Meeting, San Francisco, December 2013.

I103. Dortch, J., Hughes, P., Owen, L.A., Murari, M.K. and Caffee, M.W. (2013). Patterns of glaciation and topographic hypsometry across semi-arid western Himalayan-Tibetan orogen *(Invited). EOS,* CONTROL ID: 1801652. American Geophysical Union Annual Meeting, San Francisco, December 2013.

I102. Valentino, J., Spotila, J.A., Owen, L.A. and Buscher, J. (2013). Transience and Glacial Erosion in South Central Alaska. *EOS,* CONTROL ID: 1803956. American Geophysical Union Annual Meeting, San Francisco, December 2013.

I101. Babault, J., Capó, A., Van Den Driessche, J., Owen, L.A. and Caffee, M.W. (2013). Switch from longitudinal to transverse drainage during mountain building: as case study from the Himalaya. *EOS,* CONTROL ID: 1799552. American Geophysical Union Annual Meeting, San Francisco, December 2013.

I100. Owen, L.A. (2012). Nature and Timing of Quaternary glaciation in the Himalaya: Review and Speculation. (Invited presentation). *EOS,* Abstract C32A-05 presented at 2012 Fall Meeting, AGU, San Francisco, California, 3-7 December.

I99. Counts, R.C.*, Murari, M.[#] 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 *Abstracts with Programs.* Vol. 44, No. 7, p.186.

I98. Gray, H.*, Owen, L.A., Dietsch, C., Beck, R. and Mahan, S., (2012). Geomorphic response to tectonic activity within the Mecca Hills, California. Geological Society of America *Abstracts with Programs.* Vol. 44, No. 7, p. 93.

I97. Owen, L.A. (2012). Climate change, glaciation, sediment transfer, landscape development and loess in and around the Tibetan-Himalayan orogen: A tribute to Professor Edward Derbyshire. *International Conference on Loess Research: A tribute to Edward Derbyshire (ED@80)*. University of Novi Sad, Novi Sad, Serbia, 27-30 September, 2012, p 15-16.

I96. Chen, J., Schoenbohm, L.M., Yuan, Z., Li, W., Li, T., Owen, L.A., Sobel, E.R., Kirby, B.T., Huang, M. and Hedrick, K.* (2011). Holocene slip rate along the Northern Kongur Extensional

System, Chinese Pamir. *EOS,* Abstract T43F-2447, 2011 Fall Meeting, AGU, San Francisco, California, 5-9 December.

I95. Imrecke, D.B., Robinson, A.C., Chen, J., Li, W., Hedrick, K., Owen, L.A., Yuan, Z., Schoenbohm, L.M. and Xiaodong, Y. (2011). The Margin of a Gneiss Dome: Development of the Waqia Half-Graben, Southeast Pamir. *EOS,* Abstract T43F-2449, 2011 Fall Meeting, AGU, San Francisco, California, 5-9 December.

I94. Wesnousky, S.G., Arenguren, R., Rengifo, M., Owen, L.A. and Caffee, M.W. (2011). Some additional observations for understanding the glacial history and neotectonics of the Venezuelan Andes and Bocono fault. *EOS,* Abstract T11B-2321, 2011 Fall Meeting, AGU, San Francisco, California, 5-9 December.

I93. Blisniuk, K., Oskin, M.E., Sharp, W.D., Meraux, A.B., Rockwell, T.K., Fletcher, K. and Owen, L.A. (2011). Spatial variability of time-constant slip rates on the San Jacinto fault zone, southern California (Invited). *EOS,* Abstract T431-02, 2011 Fall Meeting, AGU, San Francisco, California, 5-9 December.

I92. Stewart, A.K., Owen, L., Szabo, J.P., and Lowell, T., (2011). Timing and formation of late Quaternary kames in Northeastern Ohio: implications for understanding the spatial and temporal variability in glacier erosion and the preservation of glacial landforms. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 452.

I91. Hedrick, K.A., Owen, L. A., Dietsch, C. and Caffee, M.W., (2012). Rates of landscape erosion in Zanskar, Northern India. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 272.

I90. Longbottom, T.L., Owen, L., Caffee, M.W. and Murari, M.K., (2011). Quaternary history of glacier morphology and landform development in the Garhwal and Lahul Himalaya. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 475.

I89. Reynhout, S., Owen, L.A., Dietsch, C., Dortch, J.M. and Caffee, M.W. (2011). Quantifying the glacial buzzsaw within an arid mountain range: Ladakh, northwestern Himalaya. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 385.

I88. Owen, L.A. (2011). Developing Quaternary glacial chronologies for the himalayan-tibetan orogen to help define the nature of paleoclimate change for high-latitudes in subtropical regions. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 64. (invited presentation)

I87. Yuan, Z., Chen, J., Owen, L.A., Li, W., Hedrick, K.A., Caffee, M.W. and Schoenbohm, L.M. (2011). Cosmogenic nuclide dating of landslides/rock avalanches in NE Pamir, China. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 5, p. 444.

I86. McGill, S.F., Owen, L.A., Kent, E.O., Rockwell, T.K. and Onderdonk, N.W. (2011). Slip rate of the northern San Jacinto fault from offset landslides in the San Timoteo Badlands, Abstract A-151, Southern California Earthquake Center, 2011 Annual Meeting, *Proceedings and Abstracts*, v. 21, p. 200.

I85. Domack, E.W., Hess, D.P., Owen, L.A. and Murari, M.K. (2011). Landforms and surface geology of eastern Oneida lake and Oneida county, New York: new insights from matching bathymetry with lidar topography. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 1, p. 58.

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luminescence dating. Geological Society of America *Abstracts with Programs*, Vol. 43, No. 1, p. 58.

I83. Ul-Hadi, S., Khan, S., Owen, L.A. and Khan, A.S. (2010). Geomorphic response to an active transpressive regime: a case study along the Chaman strike-slip fault, western Pakistan. Geological Society of America *Abstracts with Programs,* 42, 5, 620.

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I76. Dortch, J.M.*, Owen, L.A. and Caffee, M.W. (2009). Landscape evolution and morphology of the Tangtse river valley controlled by catastrophic partial drainage of Pangong Tso. Geological Society of America *Abstracts with Programs*, Vol. 41, No. 7, p. 624.

I75. Rech, J.A., Owen, L.A., Allmendinger, R.W. and Baker, A. (2009). Assessing the role of seismic pumping in the formation of co-seismic soil cracks, Atacama Desert, Chile. Geological Society of America *Abstracts with Programs*, Vol. 41, No. 7, p. 172.

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I73. Baker, A., Owen, L., Rech, J. A. and Allmendinger, R.W. (2009). Coeseismic crack production and reactivation in the northern Chile forearc. Geological Society of America *Abstracts with Programs*, Vol. 41, No. 7, p. 128.

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I69. Owen, L. A. (2008). Quaternary glaciation of the Himalaya and Tibet. *Eos Trans. AGU, 89*(53), Fall Meeting, GC11B-01. (invited presentation)

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I67. Miller, D.M., Owen, L. and Mahan, S.A. (2008). Medieval climate in the Mojave Desert suggests regional lake rise between extended droughts. Geological Society of America *Abstracts with Programs.*

I66. Miller, D.M., Mahan, S. A., McGeehin, J. P. and Owen, L. (2008). Geomorphic response to seasonality of storms during the Holocene in the Mojave Desert, California. GSA *Abstracts with Programs,* Vol. 40, No. 1.

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I33. Le, K. Lee, J., Owen, L. and Finkel, R. (2005). Late Pleistocene to Holocene extension along the eastern Sierra Nevada, California. *Abstract volume of the Penrose Conference: Kinematics and Geodynamics of Intraplate Dextral Shear in Eastern California and Western Nevada*, April 21-26, 2005: Mammoth Mountain, California, p. 100.

I32. Owen, L.A., Finkel, R.C., Barnard, P.L.*, Ma Haizhou, Ashai, K., Caffee, M.W. and Derbyshire, E. (2005). Dating the timing of Late Quaternary glaciation in the semi-arid regions of the Himalaya and Tibet. Abstract volume of INQUA Dryland Dating Workshop, Zzyxx, Mojave Desert, March 23-26, p. 11.

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I18. Barnard, P.L.*, Owen, L.A. and Finkel, R.C. (2003). The role of paraglacial processes in the evolution of high mountain landscapes, the high Himalaya of India and Nepal. *Programs with Abstracts, XVI INQUA Congress, Reno*, p. 65.

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I1. Owen, L.A., Richards, B.*, Cunningham, D.W., Windley, B.F., Dorjnamjaa, D. and Badamgarav, J. (1998). Style and timing of foreland propagating thrust faults along the Gobi Altai Mountains of Southern Mongolia. *GSA Abstracts with Programs*, 30, 5, March.

J. Field guides

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K. Bibliographies

K1. Barnard, P.L.* and Owen, L.A. (2000). A Selected bibliography for Late Quaternary glaciation in Tibet and the bordering mountains. *Quaternary International*, 65/66, 193-212.

L. Reports

L1. Owen, L.A. (January 20, 2010). ASIA: Glaciers defy predicting but will bring change. *Global Strategic Analysis*. Oxford Analytica.

M. Electronic publications

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M1. Owen, L. (2012). Defining rates of erosion using terrestrial cosmogenic nuclides in the Himalaya. *Vignettes, Key Concepts in Geomorphology*. URL: http://serc.carleton.edu/60234

Research Grants

National Science Foundation

NSF; Collaborative Research: Neotectonics and Structural Development of the Northern Walker Lane; September 2014–August 2018; $538,881 (UC's share $55,720); PI; EAR-1419789

NSF; Collaborative Research: Transient landscapes, temporally variable erosion rates, and the impact of glaciation and climate change on landscape morphodynamics; January 2012–December 2014; $430,001 (UC's share $111,110); PI; EAR-1123643

NSF; Collaborative Research: Continuation and Termination of Karakorum and Karakax Faults in Western Tibet: Implications for the Role of Regional Strike-Slip Faults in Orogenic Belts; August 2009–July 2012; $401,711 (UC's share $228,354): PI; EAR-0910759

NSF; Collaborative Research: Improving the Chronology of Deformation and Earthquakes at La Rinconada, Argentina: Testing Segmentation and Recurrence Patterns of Blind Thrust Regimes; August 2009-July 2012; $84,273 (UC's share $39,112); PI; EAR-0838344

NSF; Tibetan Workshop; September 2006-August 2007; $10,000; PI; with NSF; US-China Workshop on Mountain Glacier Fluctuations, October 2005–September 2007; $64,303 (UC's share $10,000); PI

NSF; Collaborative Research: Deglaciation chronology of the Des Moines Lobe – implications for ice sheet dynamics & climate change; July 2006–May 2008; $30,000; co-PI

NSF; Collaborative Research: Determination of slip rates on the Death Valley-Furnace Creek-Fish Lake Valley fault system; January 2005–December 2008; $185,427 (UC's share $52,458); PI

NSF; Human and geomorphic consequences of the October 8 Pakistan earthquake; 1/3/06–2/30/07; $29,000; PI

NSF; (subcontract from University of Nebraska); Alpine glaciation and mass-movement relief production in the Western Himalaya; 7/15/03–7/01/06; $300,989 (UC's share = $43,680); PI

NSF; Recent kinematic evolution of the northern Eastern California; 7/02–6/05; $127,789 (UC's share $125,000); PI

NSF; Geomorphic consequences of the 28 March 1999, Garhwal Earthquake; 6/99–1/00; $7,100; PI

Southern California Earthquake Center (USGS-NSF funded)

Southern California Earthquake Center; Optically stimulated dating of sediments in the Eastern California Shear Zone; March 2016–February 2017; $15,000; PI

Southern California Earthquake Center; Optically stimulated dating of sediments in the Eastern California Shear Zone; June 2015–May 2016; $17,000; PI

Southern California Earthquake Center; Optically stimulated dating of sediments in the Eastern California Shear Zone; January 2012–February 2013; $18,000; PI

Southern California Earthquake Center; Optically stimulated dating of sediments in the Eastern California Shear Zone; January 2010–February 2011; $10,000; PI

Southern California Earthquake Center; Optically stimulated dating of sediments in the Eastern California Shear Zone; January 2008–February 2010; $20,000; PI

Southern California Earthquake Center; Optically stimulated dating of sediments in the Southern California; January 2007–February 2008; $20,000; PI

Southern California Earthquake Center; Optically stimulated dating of sediments in the Southern California; January 2006–February 2007; $11,232; PI

Southern California Earthquake Center; Optically stimulated dating of sediments in Southern California; January 2005–February 2006; $20,000; PI

National Earthquake Hazard Reduction Program (USGS funded)

NEHRP: Collaborative Research with University of South Florida and University of Cincinnati: Characterization of long-term slip rates for Camp Rock Fault (Eastern California Shear Zone) using terrestrial cosmogenic nuclide dating. May 2018-April 2019; $36,966; co-PI

NEHRP: Collaborative Research with University of South Florida and University of Cincinnati: Terrestrial cosmogenic nuclide dating for determining slip rates along Calico fault, Eastern California Shear Zone. March 2016–February 2017; $39,126; PI

NEHRP: Collaborative Research with University of Nevada, Reno and University of Cincinnati: ^{10}Be Terrestrial cosmogenic nuclide dating for determining slip rates of normal faults in the Lake Tahoe Basin; September 2015–August 2016; $39,126; PI

NEHRP; Collaborative Research with University of Nevada, Reno and University of Cincinnati: Cosmogenic and OSL dating for determining slip rates of normal faults near Reno; June 1, 2014–May 30, 2015; $36,357; PI

NEHRP; Determining the deformation and earthquake hazard for a newly discovered Holocene fault in the Wabash Valley Seismic Zone, Western Kentucky; Dec 1, 2010–Nov 30, 2011; $90,669; PIs- Ronald Counts and Lewis Owen

NEHRP; Slip rate for the central and southern San Jacinto Fault Zone, southern California: Towards understanding variations in rate over time (Collaborative Proposal between San Diego State University and University of Cincinnati); December 2006–November 2007; ~$32,000; PI

National Geographic Society

NGS: Archaeological occupations of the Mid-Holocene in the Eastern Pampa-Patagonia transition, Argentina. 9/16–8/17; $19,850; co-PI

NGS: Past, present and future glaciations of Nanda Devi, in the monsoon-dominated Garhwal Himalaya, northern India; 1/1/10–12/20/10; $19,000; PI

NGS; Past and present glaciation around Mount Everest; 6/03–10/04; $20,250; PI

NGS; Paleoclimate change in northern Tibet; 8/98–8/00; $14,900; PI

International Union for Quaternary Research (INQUA)

INQUA; Dryland dating workshop in India; July 2006–June 2007; $3000; PI
INQUA; Dryland dating workshop in Canary Islands; July 2005–June 2006; $3000; PI
INQUA; Dryland dating workshop in Mojave Desert; March 2005; $2000; PI

Foundations

Max Kade Foundation, Post-doc Research Grant, March 2007–February 2008; $33,500; PI

Calico Early Man Site Archaeological Project; Luminescence and cosmogenic dating of Calico Early Man site; March 1, 2005–May 30, 2007; $49,123; PI

Calico Early Man Site Archaeological Project; Luminescence and cosmogenic dating of Calico Early Man site; March 1, 2005–February 28, 2006; $19,135; PI

Western Center Community Foundation; Geochronology of Pleistocene Lake Mojave; 8/00–12/01; $41,967; PI

Lawrence Livermore National Laboratory Grant Programs (Department of Energy)

IGPP/LLNL; Defining the timing of glaciation in western Tibet; October 2004–September 2005; $7000; PI

IGPP/LLNL; Defining the timing of Late Quaternary Glaciation in Tibet using cosmogenic radionuclide surface exposure dating; 8/03–7/03; $29,142; PI

IGPP/LLNL (Dept. of Energy); Quaternary glaciation of the Mushitage Massif, NW Tibet: testing the nature and synchroneity of climate change throughout Northern Tibet; 8/03–7/03; $39,117; PI

IGPP/LLNL (Dept. of Energy); A Quaternary chrono-stratigraphy for alluvial fans, pediments and terraces in the Mecca Hills (Salton Trough): a framework for defining rates of crustal displacement and landscape evolution; 8/02–7/03; $30,500; PI

IGPP/LLNL (Dept. of Energy); Rates of Landscape Evolution in an Active Himalayan Valley: Gongotri, Garhwal Himalaya, Northern India; 10/00–9/01; $29,936; PI

CAMS/LLNL (Dept. of Energy); Rates of paraglacial fan formation in the Upper Indus Valley, Ladakh: the use of cosmogenic and optically stimulated luminescence dating in quantifying rates of paraglacial processes; 10/99–9/00; $15,380; PI

IGPP/LLNL (Dept. of Energy) Timing of Late Quaternary glaciation in the mountains bordering the northeastern and southeastern margins of Tibet; 10/99–9/00; $32,116; PI

IGPP/LLNL (Dept. of Energy); Timing of Late Quaternary glaciation in the Hunza valley, Northern Pakistan; 10/98–10/99; $29,180; PI

Royal Society (UK)

Royal Society; Cenozoic tectonics in the Gobi Altai-En Tien Shan, Central Asia; 10/95–10/97; $28,000; co-PI

National Environment Research Council (UK)

NERC; Cenozoic tectonics in the Gobi Altai- En Tien Shan, Central Asia: rates, magnitudes and styles of deformation; 7/95–10/97; $26,500; co-PI

University of Cincinnati Research Council

University Research Council (URC) Interdisciplinary Grant Program; Living and Researching at the Top of the World: The Science and Design of Extreme Environments Research Habitats; August 2010–July 2011; $24,725; PIs - Brian Davies, Jainagesh Sekhar, Lewis Owen

University of California Research Expedition Program

University of California Research Expedition Program; Rates and Magnitude of Landscape Evolution on a Scottish Isle: The Isle of Skye, Inner Hebrides; summer 2002; $3,850; PI

University of California Research Expedition Program; Paleoenvironmental changes & landscape evolution in the Zanskar Himalaya; 8/00–12/01; $9,780; PI

University of California Research Expedition Program; Landscape Evolution in the Himalayas; 8/00–12/00; $9,300; PI

University of California Regents

UC Regents; Advancing & retreating glaciers at the source of the Ganges River, Garwhal Himalaya, Northern India; 7/02–6/03; $1900; PI

Pacific Rim Grant; Long-term Glaciological and Hydrological Responses to Variations in the Southeast Asian Monsoon in Eastern Tibet; 10/00–6/02; $37,197; PI

UC Regents; Quaternary Glacial History of Gonga Shan, S.E. Tibet; 7/00–6/01; $2,700; PI

UCR Academic Senate; Rates of Denudation Across the Himalayas; 6/00–5/01; $3,500; PI

UCR Academic Senate; Landscape evolution of the upper Indus valley. Ladakh, Northern India; 7/99–6/00; $2,350; PI

UCR Academic Senate; Late Quaternary paleoenvironmental change in the Kullu and Spiti Valleys, Indian Himalaya; 7/98–6/99; $2,700; PI

UCR Regents; A test of the applicability of luminescence dating of Quaternary sediments in the Coachella Valley; 8/98–8/00; $3,000; PI

National Academies

Neotectonic and Earthquake-Hazard Study of the Chaman Fault, Western Pakistan; 10/1/13–09/30/15; $80,242

Miscellaneous Contracts

Earth Observatory of Singapore; OSL dating to help define slip rates and base level changes on the Main Frontal Fault, Nepal; 1/1/18–12/30/18; $11,000; PI; with Judith Hubbard

Earth Observatory of Singapore; TCN and OSL dating of landforms along the Mae Chan fault, Thailand; 4/1/16–3/30/18; $19,000; PI; with Ray Weldon

University of Oregon; OSL dating of Alaskan sediment; October 2005; $7000; PI

Instituto Superior Tecnico; Preparation of Sediment Samples for Optically Stimulated Luminescence Dating of Sediment in the Quaternary Geochronology Laboratories; 4/30/2007–4/1/2008; $10,000; PI

Scientific Superior Education and Research Center of Ensenda; Cosmogenic Dating of Rock and Sediments from Baja California; 10/1/2007–12/30/2007; $13,500; PI

Universitat Potsdam; Cosmogenic Nuclide Dating of Sediment from Mustag Ata and Kongur; 12/1/2007–11/30/2008; $7,500; PI

University of California, Santa Barbara; Luminescence Dating of Sediments from Southern California; 10/1/2007–12/31/2007; $9,282; PI

Jawaharlal Nehru University; Preparation of Sediment Samples for Optically Stimulated Luminescence Dating of Sediment in the Quaternary Geochronology Laboratories; 4/1/2007–4/1/2008; $3,000; PI (with Dr. Shuhab Khan at University of Houstan and Dr. Abdul Salam Khan at Univeristy of Balochistan)

Pending proposals

NASA: Hybrid High-Resolution Multispectral LWIR Thermal and Multispectral VNIR Imaging CubeSat Constellation for Monitoring and Characterizing Inland Waters, Tropical Coral Reefs, Arctic Thermokarst Lakes, and Polar Ice Sheets. Collaboration with University of Alabama, Tuscaloosa and University of Maryland, NASA Goddard Space Flight Center; 07/012019-06/30/2028; $24,204,581 (UC share - $3,703,965); co-PI

NEHRP; Age of Displaced Surfaces and Initial Estimate of Slip Rate Across the East Carson Valley Fault Zone near Carson City (this proposal); Proposed Award Period: 01/01/2019 – 12/31/2019; Requested Funds: $47339; Person Months: 0.25 month

NEHRP; Collaborative Research University of Nevada, Reno and University of Cincinnati: The 1915 Pleasant Valley Earthquake Ruptures; Proposed Award Period: 01/01/2019 – 12/31/2019; Requested Funds: $45727; Person Months: 0.25 month

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TEACHING

Overview

I have taught and developed undergraduate and graduate courses at the Hong Kong Baptist University, Royal Holloway-University of London, University College London, University of California-Riverside (UCR), and the University of Cincinnati (UC). This experience has provided me with the opportunity to teach students from a broad range of different cultural and socio-economic backgrounds in contrasting urban settings. This has also allowed me to develop a broad range of very different types of courses, which are listed in detail below.

While teaching at the Hong Kong Baptist University, I developed and taught geomorphology and general Earth science courses for students whose first language was Chinese. These courses focused on teaching students about the dynamics of surface processes in tropical coastal environments and included aspects of environmental geomorphology and management. While at the University of London, I taught students in the Departments of Geography and Geology. This involved specialist courses on alpine and polar geomorphology, neotectonics, Quaternary sedimentology and environmental geology. I was particularly involved in running field camps in the Himalaya, Scotland and Southern Spain. These included training students in surficial geologic mapping, Quaternary geology and geomorphic methods.

I taught upper-division classes on geomorphology and Quaternary paleoenvironmental change, and a graduate course on Quaternary field methods while at UCR. These courses had a substantial fieldwork component that included excursions in the local area, the Salton Trough, the Basin and Range and Baja California. I also taught an introductory course on Earth's dynamic surface, which was supported by an instructor's manual and textbook that I co-authored (A2). This textbook, which has sold > 20,000 copies, and my book on environmental management (F4), have been used in a large number of courses at other universities throughout the US and UK. We are currently rewriting this textbook (Aip1), which Cambridge University Press plans to publish early in 2019. While at UCR, as part of my commitment to involving students in fieldwork, I took students and volunteers to the Himalaya and Scotland as part of a University Research Expedition Program.

Since joining UC in September 2004, I have developed many new courses including Quaternary geochronology, Quaternary geology, natural hazards, landscape change in Trinidad, and the

changing landscapes of the Himalaya. The latter class involves a three weeks-long field trip traversing the Himalaya of northern India, which we have run five times. As far as we are aware, no other university teaches such as course. This course has been featured in the College's promotional video and magazine, making it a flagship course for our Department and College. My Quaternary geochronology course has a significant laboratory component, which includes laboratory training in methods of preparation for terrestrial cosmogenic nuclide surface exposure and optically stimulated luminescence dating. This course is probably unique to UC and provides our students with highly competitive skills for both research and/or careers in applied geology. I have also taught three existing courses and co-taught four graduate seminar courses at UC. These courses include a significant laboratory and fieldwork component. I also teach a freshman geology class, which is very field based and was part of a three-course sequence that has been very successful in attracting students into our major.

Presently, I am the primary advisor for three graduate students and on the committees for four other graduate students. While at UCR, I advised approximately two graduate students per year. This number of graduate students has increased since moving to UC because we have a critical mass of faculty at UC who teach and undertake research in Quaternary geology and geomorphology that helps us to attract a large and well-qualified pool of students into our Quaternary geology and geomorphology program.

I believe that much of what we teach should directly filter down to our students from our research activities. My philosophy has been to expose and involve students in research and applied projects very early in their careers. I also believe that students learn the best while in the field and should be involved in hands-on projects. I therefore actively encouraged students to take part in my field research and applied projects. I also believe it is essential to expose students to international travel to broaden their outlook and to provide them extra confidence and experience to help prepare them for a professional career. Therefore, many of my field trips have taken students to distant locations such as the Himalaya, Mexico, Trinidad, and Scotland.

Details of courses taught since 1991

GEOL5001 and GEOL8001 Tectonic and landscape evolution of the southern San Andreas transform plate margin (2017–present); ***Department of Geology, University of Cincinnati***
The course examines the tectonics and landscapes across the south end of the San Andreas-Gulf of California transform plate boundary during a week-long field trip to Southern California. The tectonic and stratigraphic framework is introduced from the Precambrian to recent, but with emphasis on the Quaternary history of the region. Important aspects of the fieldwork including examining the evidence for normal and strike-slip faulting, recent earthquakes and landsliding. Glacial, fluvial, aeolian and lacustrine landforms and sediments are also examined to help reconstruct paleoenvironmental conditions. Socioeconomic and political aspects of geoscience are discussed, particularly concerning water and oil. Students are expected to keep field notebooks and produce a short documentary video of the field trip. (~20 students)

GEOL6011 Quaternary Geology (2012–present); ***Department of Geology, University of Cincinnati***
This course examines the geologic evidence for the nature of Quaternary paleoenvironmental change. Attention is paid to the various forms of evidence, including sedimentological, geomorphic, geochemical and paleontological, that can be used to establish the history and scale of past environmental change. Emphasis is placed on understanding the possible forcing mechanisms that have driven environmental change throughout the Quaternary, and defining and quantifying the rates and magnitudes of these changes using geologic tools. Students are trained in laboratory and field methods, and explore the links between the lithosphere, hydrosphere, cryosphere, atmosphere and biosphere on Quaternary timescales. Attention is also given to how this geologic knowledge may be applied to help predict future environmental change. The course is taught as a series of formal lectures and guest lectures from members of the Quaternary and Anthropocene Research Group. (~30 students per year)

GEOL6021 and GEOL6041 Changing Landscapes, Dynamic Environments and Geohazards in the Himalaya (2013–present); *Department of Geology, University of Cincinnati*
The goal of this course is to better understand the nature and dynamics of natural processes, past, present and future human impacts, and how one might protect, plan, and design for a sustainable future in the Himalaya. Student consider landscape change (e.g., mountain building, glaciation, erosion), geohazards, ecology, and complex socio-economic and cultural issues, including those surrounding the growing eco-tourism industry. The course is open to students from any discipline, and builds on our experiences of teaching GEOL590 (see below), and including a component of design analysis taught by a professor from the College of Design, Architecture, Art and Planning. (~15 students per year)

GEOL1006 Natural Hazards (2014–present); *Department of Geology, University of Cincinnati*
This course provides an introduction to geologic hazards and natural disasters, their effects on society, and the attempts at hazard mitigation. Hazards covered include earthquakes, volcanic eruptions, floods, landslides, hurricanes, tsunamis, erosion and climate change. Central to the course is the understanding of the technical cooperation required for hazard and vulnerability assessments, including the use of technologies for mapping and analysis for hazards and resource management. (~100 students per year)

GEOL174/GEOL1002 Freshman seminar on earth surfaces processes and environmental issues (2008–2012/2013–present); *Department of Geology, University of Cincinnati*
This course was developed as a freshman seminar for geology and other A&S majors. The course focuses on examining natural hazards as the interface between humanity and its needs for space and resources. The basic principles of geology, including tectonics, earth surface processes and climate change are explored to help understand the nature of geologic hazards. Students are trained in interpreting geologic data, recognizing the risk from geologic hazards and basic field methods. (~ 20 students per year)

GEOL380/GEOL3080 Landscape evolution and environmental change on the edge of the Caribbean, Trinidad (2012); *Department of Geology, University of Cincinnati*
This honors course examined how landscapes in Trinidad have developed from their geologic origins to their occupation by humans some 7,000 years ago, to post-Columbian settlement and into the present day. Aspects of how humans have influenced Trinidad's landscapes and how they will continue to influence them the coming years were considered from geologic and anthropologic perspectives. In addition, the course examined how natural processes such as earthquakes, landslides, floods and extreme weather threaten the inhabitants of Trinidad. A key component of this course was to develop scientific hypotheses that could be tested during a 10-day field trip to Trinidad to help faculty and future students develop a long-term commitment to examining environmental change and landscape evolution in Trinidad and adjacent regions. I lead this course in collaboration with colleagues from the Department of Anthropology, Biological Sciences and Geography. (~15 students)

GEOL590 Geology of the Himalaya (2004–2013); *Department of Geology, University of Cincinnati*
This field course was developed with my colleague, Craig Dietsch, to allow students to examine the geology of the Himalayan-Tibetan orogen by undertaking a 500 km-long N-S traverse in northern India from the Indo-Gangetic Plain through the Himalaya to the edge of the Tibetan Plateau. The course exposed students to the nature of the geologic processes that are currently shaping this active mountain belt to provide them with an understanding of modern processes and a foundation for studying ancient orogens. Attention was given to investigating the structural geology, petrology, and geomorphology at key locations along the traverse. Students were trained geologic techniques that are used to study active mountain belts, including field mapping, sampling of rocks and sediments for geochronology, metamorphic petrology, structural analysis, and monitoring geomorphic processes. The students were assessed on the presentation of a field report at the end of the course. (~ 20 students every other year)

GEOL204 Structural Geology (2012); *Department of Geology, University of Cincinnati*
This class develop and co-taught with my colleague, Craig Dietsch, to introduce students to the fundamentals of structure geology through lectures and labs. Emphasis was placed on the fracturing and folding of rock, and structural analysis. The class included a weekend fieldtrip to the Appalachians, particularly to help prepare them for field camp. (~30 students)

GEOL699 Geology Colloquium (2004–2008); *Department of Geology, University of Cincinnati*
This course comprised weekly seminars given by external speakers. All graduate students were required to attend this course. (~ 30 students per year)

GEOL527 Quaternary Geochronology (2004–2014); *Department of Geology, University of Cincinnati*
This course provided students with an introduction to newly developing Quaternary dating methods. The course examined the main principles, techniques and applicability of the sidereal, isotopic, radiogenic, chemical and biological dating methods to provide training for Quaternary geologists, neotectonists, paleoseismologists, biogeographers, pedologists, and archaeologists 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 cosmogenic radionuclide surface exposure and luminescence dating. The course comprises 10 lecture topics, 5 labs, a poster-presentation, a field trip, and a final examination. (~ 12 students per year)

GEOL104 Environmental Geology (2004–2011); *Department of Geology, University of Cincinnati*
Students were introduced to the study of environmental geology highlighting the interaction of humans with the geologic environment including the atmosphere, biosphere, lithosphere, and hydrosphere. The course focused on: management of geological resources; mitigation of effects of natural hazards on humans; geological engineering, including the construction in and use of the geological environment; and waste disposal and minimization of the effects of pollution. The course examined the nature of these processes from an environmental geology perspective to help students understand the dynamics of geologic processes that are relevance to the well being of humankind. The course comprised 20 lectures, 10 labs, a poster-presentation, tests, and a final examination. (~ 100 students per year)

GEOL108 Geological Environments of Cincinnati (2004); *Department of Geology, University of Cincinnati*
The geology of Cincinnati was examined through lectures, labs and field trips. Topics includes: 1) Introduction to Geology; 2) Bedrock of Cincinnati; 3) Fossils of Cincinnati; 4) Building Stone of Cincinnati; 5) Glaciation of Ohio; 6) Karst in Ohio and Kentucky; 7) Landsliding; and 8) Flooding. The course comprises 10 lecture topics, 5 field trips, tests, and a final examination. (~20 students per year)

Quaternary Geochronology (MS and PhD) (1997–2004); *Department of Earth Sciences, University of California, Riverside*
This course was cotaught with Robert Finkel from the Lawrence Livermore National Laboratory. The course provided training in Quaternary dating methods for graduate students. Attention was given to the application of methods to different geologic problems, and the nature of the different analytical methods. Students were provided with hands-on experience in sampling and sample preparation and measurement for radiocarbon, cosmogenic radionuclide and luminescence dating. The assessment was in the form of a research paper. (~ 5 students and 5 external participants per year)

Quaternary Field Methods (MS and PhD) (1997–2004); *Department of Earth Sciences, University of California, Riverside*
This course provided training in Quaternary field techniques for graduate students. Attention was given to field mapping, the analysis and interpretation of Quaternary landforms and sediments, and the collection of samples for geochronological work. Students spent about two weeks in the field examining parts of the landscapes in Southern California. The students were asked to write a research paper on their studies as part of their assessment. (~ 5 students per year)

Quaternary Paleoenvironmental Change (Upper-level) (1998–2004); *Department of Earth Sciences, University of California, Riverside*
This upper-level course examined the possible forcing mechanisms that have driven climate change throughout the Quaternary and the nature of Quaternary environmental change. Attention was paid to the various forms of evidence that can be used to establish the history and scale of the environmental changes

and how this knowledge may be applied to help predict future environmental change. Students were trained in the Quaternary laboratory and field methods and they explored the links between the lithosphere, hydrosphere, biosphere and atmosphere on Quaternary timescales. The course comprised 20 lecture, 10 labs, a poster-presentation, two weekend-long fieldtrip, and a final examination. (~ 12 students per year)

Geomorphology (Upper-level BS) (1997–2004); ***Department of Earth Sciences, University of California, Riverside***
This upper-level course examined the relationships between processes and landforms within a modern conceptual framework. Geomorphic systems were considered in terms of their geologic, climatic, biotic and anthropogenic settings. Emphasis was placed on tectonic, desert, fluvial, glacial, periglacial, mass-movement and coastal processes. Landforms and sediments were considered in terms of their recognition, genesis, and environmental and economic importance. Attention was given to methods of measuring, monitoring and interpretation of collected data from various spheres. Several weekend-long field trips provided the students with examples of tectonic and desert landforms. The course was examined through a laboratory book, tests and a final examination. (~ 12 students per year)

Earth's Dynamic Surface (Lower-level BA and BS) (1998–2004); ***Department of Earth Sciences, University of California, Riverside***
This was a lower-level course for Arts and Science students. The course examined tectonic, climatic, geomorphic, hydrologic and biological processes to show how they continuously operate to produce Earth's landscapes and environments. The course comprised 20 lectures, 10 labs, a poster presentation, tests and a final examination. (~ 100 students per year)

Advanced Sedimentology (BSc) (1996); ***University College London, London, UK***
This course covered aspects of sedimentological research for final year B.Sc. geology students. I taught the terrestrial sedimentology research topics while one of the instructors was on sabbatical. Lectures included: glacial processes and deposits; fluvial systems; aeolian sediments; lacustrine deposits; mass movements deposits; alluvial fans; and deltas; shallow coastal deposits. A lab followed each lecture topic and the course was assessed using the labs and a final 3-hour-long examination. (~15 students per year)

Geographical Environments (BA and BSc) (1993–1997); ***Department of Geography, Royal Holloway, University of London, UK***
This was the main first year core course for Geography students. The course comprised ~ 80 lectures that examined the breath and nature of geography. I was responsible for planning and coordinating the course that involved ten separate modules, each comprising 8 lectures. Attention was given to methods of measurement, monitoring and the interpretation of collected data from various spheres. I taught modules on environmental geomorphology and climatology. The course was examined using a 3-hour-long final examination. (~ 100 students per year)

Geology of the Continents (BSc) (1992–1994); ***Department of Geology, Royal Holloway, University of London, UK***
This course introduced freshmen geology students to continental dynamics and geological methodologies. My responsibilities included teaching earth surface processes (5 lectures plus lab sessions). This course comprised 20 lectures, with each lecture followed by two labs. The course was assessed with a final examination and the submission of a lab book. (~ 80 students per year)

Engineering Geology (BSc) (1992–1994); ***Department of Geology, Royal Holloway, University of London, UK***
This course introduced final year B.Sc. geology students to a detailed working knowledge of engineering geology. I was course coordinator for this course and was responsible for overseeing its contents and teaching two engineering geology topics. I supervised students in the field and oversaw the examination. The course comprised 20 lectures, 10 labs, a field excursion and a final exam. (~ 40 students per year)

Quaternary Sedimentology (MSc) (1992–1997); ***Departments of Geology and Geography, Royal Holloway, University of London, UK***

I designed and taught this course as part of a M.Sc. degree in Quaternary science. The main aim was to develop the expertise in Quaternary sedimentological research. Practical work, including field and laboratory training, was an important component of this course, introducing the students to conventional and newly developed techniques for the analysis of sediment. Emphasis was placed on the study of glacial, mass-movement, fluvial, aeolian and lacustrine sedimentation. Processes of transportation, deposition, deformation and diagenesis were studied using examples from both contemporary and ancient environments. The course comprised 10 lectures, 20 hours of lab work, a three-day field trip, a research project and a final examination. (~ 10 students per year)

Environmental Geology (BSc) (1991–1995); ***Department of Geology, Royal Holloway, University of London, UK***
I co-designed and jointly taught this course for environmental geologists and biologists. Students were introduced to the principles of environmental geology including earth systems, endogenetic and exogenetic processes, material properties of rocks and sediments, environmental hazards, climatic change, hydrogeology, waste disposal and environmental management. The course comprised 20 lectures, 10 labs, two field trips, two assessed assignments and a final written examination. (~ 50 students per year)

Polar and Alpine Geomorphology (BSc) (1991–1997); ***Departments of Geology and Geography, Royal Holloway, University of London, UK***
I designed and taught this course for second-year geography and geology students. The relationships between processes and landforms were examined within a modern conceptual framework for high-altitude and high-latitude environments. Mountain and polar systems were introduced in terms of their geologic, climatic, biotic and anthropogenic settings. Emphasis was placed on studying glacial, periglacial, mass-movement, aeolian and fluvial processes. Landforms and sediments were considered in terms of their recognition, genesis, and environmental and economic importance. A three-day field course was held in South Wales. The course comprised 20 lectures, 10 labs, two assessed assignments and a final written examination. (~ 40 students per year)

Neotectonics (BSc) (1991–1997); ***Departments of Geology and Geography, Royal Holloway, University of London, UK***
I designed and taught this course for final year BSc geography and geology students. This course examined the methods of neotectonic study that included geologic, geomorphic, historic and geodetic information. Attention was given to tectonic processes such as earthquakes, volcanic activity, and isostasy, and their role as landscape forming processes. A field course was held in western Scotland to examine recent faulting, paleoseismicity and uplift. The course comprised 20 lectures, 10 labs, two independent assignments and a final written examination. (~25 students per year)

Graduate students advised

Christine H. Scott, 1989–1992. Ph.D. thesis: *Contemporary sediment transfer in Himalayan glacial systems: implications for the interpretation of the Quaternary record*. (School teacher in UK)

Milap C. Sharma, 1992–1996. Ph.D. thesis: *Quaternary history and landscape evolution of NW Garhwal, central Himalaya*. (Professor at JNU Delhi)

Shaun Richardson, 1993–1997. Ph.D. thesis: *Deglaciation and shoreline displacement adjacent to a spreading ridge, N.E. Iceland*. (Hub Master, University of Swansea, UK)

Patrick A. Fothergill, 1994–1998. Ph.D. thesis: *Late Tertiary and Quaternary intermontane basin evolution in North-East Tibet: the Guide Basin*. (Independent Geological Consultant, Calgary, Canada)

Ben Richards, 1995–1999. Ph.D. thesis: *Palaeoclimate of South Asia over the last 80 ka: luminescence ages of sediments from former glaciations in Nepal and Pakistan*. (Corporate Sales Representative, London)

Gary Patt, 1998–2000. Master's thesis: *Tectonic geomorphology of the Mecca Hills, Southern California*. (CIA-MOD, Washington DC)

Kelly Ruppert (Bovard), 1999–2001. Master's thesis: *Landscape evolution and paleoenvironmental change in the upper Indus valley*. (Lecturer, California State University Fullerton)

Patrick Barnard, 1998–2003. Ph.D. thesis: *The timing and nature of glaciofluvial erosion and resedimentation in the Himalaya: the role of glacial and paraglacial processes in the evolution of high mountain landscape*s. (USGS, Santa Cruz)

Anne Perez, 2000–2003. Master's thesis: *The Late Quaternary glaciation of San Gorgonio Mountain, Transverse Ranges, Southern California*. (Geologist, AECOM, California)

Jason Dortch, 2004–2006. Master's thesis: *Glacial history of the Nevana Valley, Alaska***.** (Lecturer, University of Manchester, UK)

Yeong Bae Seong, 2003-2008. Ph.D. thesis: *Quaternary glaciation and its role on landscape evolution of the Muztag Ata-Kongur Shan and K2 regions in the Westernmost Himalayan-Tibetan orogen*. (Associate Professor, Korea University, Seoul)

Patrick Smith, 2002–2009. Ph.D. thesis: *Landscape evolution of the San Caparistro River Terrace in Southern California*. (Professor Mount San Jacinto College)

Katheryn Hedrick, 2007–2009 Master's thesis: *Towards defining the transition in style and timing of Quaternary glaciation between the monsoon-influenced Greater Himalaya and the semi-arid Transhimalaya of Northern India*. (Accountant, Cincinnati)

Jason Dortch, 2006–2010. Ph.D. thesis: *Rates of landscape development in the Transhimalaya: a framework for testing the links between climate, erosion and tectonics*. (Lecturer, University of Manchester, UK)

Ronald Counts, 2006–2012. Ph.D. thesis: *River terraces and paleoenvironmental evolution of the Ohio River*. (Mendenhall Fellow, USGS; Associate Director of Mississippi Minerals Resource Institute)

Fred Budinger, 2006–present. Ph.D. Candidate. *Landscape evolution and paleonvironmental change at Calico Archaeological Site, Mojave Desert*. (Retired)

Harrison Gray, 2011–2013. MS. *Tectonic geomorphology within a transpressional zone along the southern San Andreas Fault.* (Doctoral candidate, University of Colorado, Boulder)

Katheryn Hedrick, 2009–2017. Ph.D. student. *Alluvial fan formation in the Pamir and Precordillera of Argentina.* (Accountant, Cincinnati)

Sourav Saha, 2014–2018. Ph.D. *Reconstructing high-frequency Holocene glacial chronostratigraphies in the Himalayan-Tibetan orogen*. (Post-doc., UCLA)

Jeanette Arkle, 2012–present. Doctoral student. *Rates of transpression along the southern margin of the Caribbean Plate Boundary, Trinidad and Venezuela*.

Elizabeth Orr, 2015–present. Doctoral student. *Rates of glacial erosion in the Himalaya*.

Post-doctoral researchers supported

Dr. Lyn Gualtieri, 1998–1999. *Cosmogenic radionuclide dating of moraines in the Himalaya*. (Professor, Seattle University, Washington)

Dr. Joel Spencer, 1998–2001. *Luminescence dating of Quaternary sediments.* (Assistant Professor, Kansas State University)

Dr. Markus Fuchs, 2007–2008. *Luminescence dating, tectonics and paleoenvironmental change.* (Professor, Justus-Liebig-University Giessen, Germany)

Dr. Madhav Murari, 2010–2015. *Luminescence and cosmogenic nuclide dating.* (Post-doctoral researcher, Justus-Liebig-University Giessen, Germany)

Dr. Paula Cristina dos Santos Marques De, 2016–present. *Active tectonics in the American Southwest*

PROFESSIONAL ACTIVITIES

Overview

My service to the scientific community and academia has included reviewing manuscripts and editorial duties for international journals, running symposium and workshops, helping to lead international scientific research programs, and playing an active role in administration at departmental, college and university levels.

My role reviewing journals has included reviewing > 20 manuscripts per year, plus serving as an associate editor for the leading journal of the Geological Society of America (*Bulletin of the Geological Society of America*), the top geologic journal (*Geology*), one of the top journals for Quaternary science (*Quaternary Research*) and one of the leading geomorphology journals (*Geomorphology*). Furthermore, I was on the editorial board of *Quaternary International* from 1997 to 2016, which is the journal of the International Union for Quaternary Research (INQUA). I was a senior editor for *CATENA* from 2010 to 2106*,* which is one of the leading journals for geoecology and landscape evolution. Presently, I am one of three senior editors for *Quaternary Research*.

My service to the profession has included presenting my work at national and international meetings and workshops. Over the past decade, I presented >50 external research lectures, including keynote addresses at the annual meetings of the American Geophysical Union and Geological Society of America invited talks at universities throughout the US, India, Sweden, and China. I was fortunate in 1997 to have been invited to organize a working group on the glaciation of Tibet and the bordering mountains for International Geological Correlation Program (IGCP) 415. Since then, I have organized three international meetings and a field excursion in northern India for IGCP 415. These are helping to collate and extend our knowledge and stimulate new research on the nature of Late Quaternary paleoenvironmental change in central Asia. I have also been actively involved in the Himalayan Interdisciplinary Paleoclimate Project of PAGES and the global glaciation-mapping program of INQUA. In 2006, I co-organized a two-week long workshop in Tibet, which included examining the glacial geology and geomorphology along a 500-km long traverse across Tibet. Over 50 scientists from China, USA, and Europe attended our workshop, and it resulted in two edited volumes of papers on mountain glaciation and landscape evolution.

My contribution to geochronology involved co-organized a workshop on Quaternary geochronology in the spring of 2004. This workshop was offered to students and professional geologists within the USA. The workshop provided training in sample collection and preparation, with emphasis on cosmogenic nuclide, optically stimulated luminescence and radiocarbon dating methods. Since then, my expertise in geochronology has involved me in the activities of INQUA's Commission on Stratigraphy and Chronology. As a consequence, I was funded by INQUA to hold the first workshop of the Drylands Dating Subcommission in the Mojave Desert in March 2005 and to co-organize the second workshop in the Canary Islands in March 2006. I am presently the President of Commission on Stratigraphy and Chronology (SACCOM) of the International Union for Quaternary Research (INQUA).

My professional activities have also included applied/environmental geology. This interest developed when I undertook post-doctoral research on landslides and debris flows in the thick loess of China and when I was employed by a consultancy firm (*Geomorphological Services Ltd.*) to work on landslides and environmental risk assessment in the UK. Since moving to the US, I

have been involved in a variety of different environmental projects. This has included work with the *Environmental Systems Research Institute* (ESRI) on an environmental sensitivity-mapping project in Nigeria, which involved developing protocols, techniques, and training for Nigerian scientists to undertake environmental work on oil spills on the Niger Delta. Also, I have also completed studies on geomorphic hazards along the Karakoram Highway, one of the world's greatest highways, in Northern Pakistan to aid in hazard mitigation.

My work has also included several development and site investigation projects for *Environmental Consultants International* (ESI) over the past two decades. These projects have involved luminescence dating of Quaternary sediments in testing for active faulting across the several stretches of the San Andreas and Malibu faults in Southern California, and for seismic hazard assessments in Portugal and Panama. In 2009, I was asked to be a consultant on a seismic hazard assessment for the renewal of a license for a nuclear reactor in Argentina for *D'Appolonia Engineering*. In 2011, I worked for *AECOM* on a consultancy project to examine sand drifts around Owens Lake in California. During the last few years, I have worked with URS earthquake hazard assessment projects along the Panama Canal and the Haiwee Dam in California. Recently, I have been working at the West Valley Nuclear Site (NY) with DOE-NYSERDA to help define rates of surface erosion. These applied research projects provide me with useful resources for teaching, and they also allow me to develop my research interests and publish on aspects of applied geology, as well as keeping me in touch with industry. Furthermore, these projects help open up employment opportunities for my students.

My professional service in the universities where I have worked has included serving on a variety of student, departmental, college and university committees (see details below). At UC, for example, I have been a member of the University Research Committee, the University's Grievance Committee, Dean's Faculty Advisory Committee, College Diversity and Inclusion Committee, College Budget Committee and the University of Cincinnati Field Station Steering Committee. I have also been regularly involved in other college activities such as judging graduate posters during our annual graduate research forum and helping in the production of the college promotional videos. Outside the college, I am involved in K–12 activities including judging at the Ohio Science Fair and visiting local schools to talk about Earth science.

Since taking over of Head of Department in 2008, my administrative duties at UC have clearly increased and involve all the regular duties of a department head, including such matters as budget management, allocation of faculty and staff duties, conducting annual faculty and staff reviews, advocating for the department, recruitment and retention of students, and working with the Dean's Office. Being the head of department has allowed me to develop and implement many new initiatives to help expand our research and teaching excellence. These are listed and described below in the section of my curriculum vitae entitled "Major initiatives since becoming Head of Department." Below are summaries of my other professional activities.

Editorial duties

- Senior Editor for *Quaternary Research* (September 2015–present)
- Associate Editor for *Geomorphology* (September 2016–present)
- Editorial Advisory Board *Himalayan Geology* (2011–present)
- Editor-in-Chief for *CATENA* (2010–2016)
- Editorial board member for *Quaternary International* (1997–2016)
- Associate Editor for *Quaternary Research* (January 2006–September 2015)
- Associate Editor for *Geology* (January 2006–2009)
- Associate Editor for *Geological Society of America Bulletin* (January 2005–2008)

Course directorships

- Director of the Environmental Earth Science B.Sc. degree for Departments of Geography and Geology at Royal Holloway, University of London (1991–1997)
- Director of the Geography-Geology B.Sc. for Departments of Geography and Geology at Royal Holloway, University of London (1991–1997)

Laboratory directorships

- Director of the Luminescence Dating Laboratory at the University of Cincinnati (2004–present)
- Director of the Terrestrial Cosmogenic Nuclide Laboratory at the University of Cincinnati (2004–present)
  See website: https://lewisaowen.wixsite.com/main

Research cluster directorships

- Director of the Quaternary and Anthropocene Research Group (QARG) at UC (2011–present)
  See website at: http://www.uc.edu/orgs/qarg.html

Examples of workshops and conference organization

- Symposium convener for the GSA Annual Meeting (October 2011)
- Symposium convener for the GSA Annual Meeting (October 2010)
- Co-organizer of International Workshop and field excursion on Mountain Glaciation in Tibet (September 2007)
- Symposium convener for the 2007 INQUA Congress in Cairns (August 2007)
- Co-organizer for Drylands Dating Subcommission workshop in the Canary Islands (April 2006)
- Co-organizer for Drylands Dating Subcommission workshop in the Mojave Desert (March 2005)
- Organizer for Quaternary Geochronology Workshop in Riverside (May 2004)
- Member of the INQUA Commission on Stratigraphy and Chronology (2003–present)
- Symposium convener for the 2003 INQUA Congress in Reno in August 2003
- Working Group Leader, International Geological Correlation Program 415 (1997–2002)

Examples of consultancy projects

- Consultancy work for DOE-NYSERDA on landscape erosion at West Valley Nuclear Site, (August 2016–present)
- Consultancy work for BP on active faulting in the Aspheron Peninsula and erosion in the Caucus Mountains, Azerbaijan, (August 2013–July 2014)
- Consultancy work for URS on active faulted sediments along the Panama Canal, Panama (January 2013–December 2014)
- Consultancy work for URS on OSL and TCN dating of active faulting at the Haiwee Dam, California (Summer 2012)
- Consultancy work for AECOM on dating sand drift deposits around Owens Lake, California (October–November 2011)
- Consultancy work for D'Appolonia Engineering on active tectonics for renewal of nuclear power station license in Argentina (June 2009–April 2010)
- Consultancy work for Environmental Consultants International for seismic hazard assessment for engineering projects in Southern California, Portugal, and Panama (5 projects: 2001–2012)
- Consultant for Geomorphologist for Murday Consulting Corporation and Environmental Systems Research Institute for environmental sensitivity index mapping of the Niger Delta (November 1998–October 1999)

• Contract work for USGS including OSL and ^{10}Be cosmogenic nuclide dating of sediments from Mongolia and the Mojave Desert for paleoenvironment studies (September 1998 – present)

External examining

• Faculty Opponent for doctorate examination of Robin Blomin, Department of Geography, Stockholm University, Sweden (2016)
• Faculty Opponent for doctorate examination of Feng Pu, Department of Geography, Stockholm University, Sweden (2016)
• Ph.D. Examination Committee for Jakob Heyman, Department of Geography, Stockholm University, Sweden (2010)
• Ph.D. Examination Committee for Ronald Spelz, CICESE, Ensenada, Mexico (2008)
• External Examiner for Environmental Geosciences Degree at University College London (1995–1998)

External committees

• President of Commission on Stratigraphy and Chronology (SACCOM) of the International Union for Quaternary Research (INQUA) (2018–2019)
• Vice-President of Commission on Stratigraphy and Chronology (SACCOM) of the International Union for Quaternary Research (INQUA) (2015–2018)
• Ex officio member of the Executive Committee of the American Quaternary Association (AMQUA) (2017–present)

University of Cincinnati committees

• Chair, Graduate Fellows Membership Committee (2016–present)
• Graduate Fellows Executive Committee (2016–present)
• University Grievance Committee (2009–present)
• University Research Committee (2006–2009)
• University International Office Advisory Committee on India (2013–2016)

College of Arts and Science committees

• College of Arts and Sciences Diversity and Inclusion Committee (2016–present)
• Chair, International Diversity Subcommittee (2017–present)
• College Executive Committee (2012–present)
• Dean's Finance Committee (2010–2011)
• Dean's Faculty Advisory Committee (2008–2009)
• University of Cincinnati Center for Field Studies Steering Committee (2008–present)

Major initiatives since becoming Head of Department

Directing the Department

- **Establishing collaborative leadership.** Since becoming Head of Department, I have endeavored to direct the Department by process of collaborative leadership involving faculty, staff, students and the college administration. Overwhelmingly, we recognized the need to integrate research, teaching, and service in our everyday activities. We have strived to have a level/flattened learning and working environment where staff, undergraduates, graduates and faculty collaborate on teaching, research, and service projects.

- **Reiterating our mission.** We re-evaluated and updated our department's mission statement soon after I became Head to agree that we will: *"strive to generate and disseminate geoscience knowledge of fundamental scientific and societal importance, to educate students about the materials, processes, and history of Earth's major systems, geologic resources and hazards, and human effects on them, and to provide students with skills for careers in the geosciences and related fields. In addition, we serve educators, policymakers and the public regarding geology and the environment, natural resources, and hazards*."

- **Identifying areas of excellence.** Soon after becoming Head of Department, we identified areas of research and teaching that we could grow into program/centers of excellence to focus on our hiring priorities, teaching needs and funding opportunities. We recognized that we could develop three areas of research and teaching excellence building on our current strengths and resources. The first of these areas is *paleontology/paleobiology/paleoecology* for which the *US News and World Report* has ranked us the 6th best graduate program in paleontology in the country. The second area is *Quaternary geology and geomorphology/environmental geology/surface processes*. This builds on our recent success in obtaining numerous research grants from the NSF and our strong publication record in this research area, and our cross-department strengths. The third area is *sedimentology/stratigraphy/sedimentary and low-temperature geochemistry*. Low-temperature geochemistryt has been a traditional area of expertise in our department but was not adequately supported in past years. However, we were able to strengthen this area by hiring five new faculty members in Quaternary and environmental geology who work on aspects of geochemistry (see below). Our teaching priorities build on these areas of excellence, but we also recognized the need to provide a holistic education for our students, and we are supporting teaching in areas outside of our research foci by attracting adjunct professors to our department. For example, we were able to attract Dr. William Haneberg (one of the leading engineering geologists in the US and now State Geologist for Kentucky) to become an Adjunct Professor and teach structural geology to our students until we were able to appoint a new faculty member.

Staffing

- **Re-organization of our staff**. This involved the abolishment of an inefficient staff position and its replacement with a new position, an Academic Director. The Academic Director has a background in geology, has advanced many administrative aspects of our graduate program, including streamlining and better organizing our entire graduate student application process, maintaining graduate student records, keeping all of our graduate students in accord with College and University requirements and deadlines, and scheduling departmental activities and teaching. In addition, the Academic Director has been extremely helpful in facilitating communication among students and faculty, and she has been instrumental in updating older departmental documents so that they are compatible with various documents of the College, Graduate School and the University. This new hire has transformed how our Departmental Office works and has considerably reduced the administrative workload for many of our faculty members and students. This innovative position has become a model that several other science departments within our College have adopted.

- **Promoting staff**. I also worked with all our department staff to ensure that they received promotions or bonuses for their contributions to our Department and College. These promotions were long

overdue. I also made sure that our staff received recognition awards from our College for their long service and outstanding contributions during the past few years.

- **Recruiting of new faculty**. Since becoming Head of Department, we have successfully recruited and hired ten new faculty members. These new faculty members have helped us address the chronic problems of age structure and diversity that our department had a decade ago. I was the last faculty member hired by the department before the new hiring spree, which was in 2004, and the previous hire was in 1998. Recruiting new faculty members has been very exciting for our department and has brought many new dimensions to our program. The new faculty members help support each of our three areas of research strength.

Teaching

- **Undergraduate and graduate program assessments**. I oversaw the writing of assessment documents and external reviews for our undergraduate and graduate programs in 2010. These comprehensive documents summarized the details of our teaching and research programs, students and faculty profiles, our successes and failures, and plans. They formed the foundation for much of what we have done since I started my tenure as Head. The documents were so well received by our external and internal reviewers that the university provided us with a budget to hire two research professors for a five-year period, with a half position becoming permanent after five years. Recently, I was able to convince the administration to convert these two research professor positions into tenure-track positions. We are currently completing a new review of our undergraduate and graduate programs, which will likely form the basis for the coming decade.

- **Re-designing our teaching curriculum**. In 2014, UC changed from the quarter to the semester system. This change provided us we an opportunity to re-organize our teaching curriculum. During the past few years, particularly with the help of our new Academic Director, we have totally re-designed our teaching curriculum, which includes all new lecture, laboratory and field courses. During February 2015, we organized a workshop funded by the NSF to help develop stronger geoscience programs. We are currently evaluating our existing program, particularly in the light of our new hires, to best serve our students in preparing them for the future workforce. Preparing our students for the future workforce includes strengthening existing courses, providing new tracks for students.

- **Updating our graduate handbook**. I oversaw the rewriting of our graduate handbooks with the help of our Academic Director and Director of Graduate Studies. The graduate handbooks provide all the information our students need about graduate life in our department that includes information on course requirements, available scholarships, places to obtain advice, rules, and regulations, and information on stipends and tuition.

- **Initiating and developing a graduate-undergraduate mentoring program.** I initiated and helped develop a graduate-undergraduate mentoring program with our undergraduate and graduate geology clubs. In this program, our graduate students partner with one or more undergraduates to hold informal meetings to help encourage them to participate in departmental activities, to provide career advice, and to see if they would like to be involved in research projects. This program also provide opportunities for graduate students to start to develop their mentoring skills.

- **Enhancing the teaching experiences for our graduate students.** I have started to develop a program on geoscience education for our graduate students to provide them with training and so that they can appreciate the importance of propagating their science through outreach. The students will keep a portfolio of their activities, which would include details of such things as cooperative ventures with various local agencies and groups to conduct environmental assessments; presentations for classes at local elementary and secondary schools, both public and private; participation in the Cincinnati Gem and Mineral Show and the Southwest Ohio Science Fair, and other programs open to the general public; and lectures to the Dry Dredgers (a local organization of amateur paleontologists). In addition, our doctoral students now have the opportunity to teach a whole laboratory in physical geology during the regular academic year and/or an introductory geology course as part of our

summer school. Having our finishing graduate students teach a summer course provides them with experience to help them be competitive when applying for academic and applied jobs, and it is also saving us a lot on summer salaries that in the past went to tenured faculty.

Enhancing research

- **Developing a research culture.** I have worked with colleagues to build a solid research culture in our department, particularly increasing the pursuit of externally funding. To help build this culture, I rewarding research productivity through our merit system. But, more importantly making sure that I congratulate faculty on their research productivity. This is done verbally, in *Rolling Rocks* (see below) and in their annual reviews. I have also made sure to obtain continuous research funding myself to lead by example. We have also enhanced the research culture among our graduates and undergraduates by ensuring they apply for research funding, and by encouraging them to present their work at conferences and write research papers. Almost without exception, all our faculty members are research active.

- **Supporting pilot projects.** I have been very proactive in supporting pilot projects to help any colleagues and students struggling with research. This has including small grants for fieldwork and laboratory analysis, research teaching support and/or reduction in teaching.

- **Establishing new laboratories.** Recruiting new faculty has enabled us to develop more than ten new research laboratories over the past decade. Building new laboratories has helped make us more analytically competent and competitive, and this is providing our students with many new opportunities. These laboratories are attracting numerous researchers from outside our university, which is helping to enhance research collaboration and funding. The new faculty members are very productive and our research output is very impressive and is accelerating.

Developing a sense of place

- **Establishing and editing a weekly newsletter.** After taking over as Head of Department, I developed a weekly newsletter called *Rolling Rocks*. I circulate *Rolling Rocks* to students, staff, faculty, university administrators, and alumni to inform them of our weekly activities and achievements. *Rolling Rocks* include photographs to make it attractive and a little bit of humor (at least what I consider funny). *Rolling Rocks* is also posted on our new website to make it available to a broader audience. Please check it out at http://artsci.uc.edu/departments/geology/news-and-events.html.

- **Involving our undergraduate students in broader aspects of our Department**. We have been very proactive in encouraging students to become thoroughly involved in the academic and social life of our department to help increase student recruitment and retention. For example, all the students are invited to join our departmental field trips, picnics, parties, banquets, and soccer matches. Our new Academic Director makes sure our students are aware of these activities, and I highlight them in *Rolling Rocks*. The creation of an undergraduate lounge and a graduate-undergraduate mentoring program has also helped to make them feel part of the department. In the last decade, we have tripled the number of majors in our program. In essence, we are trying to create a sense of place within our department to help our students be as productive as possible and have a good support system, which is assisting us with recruitment and retention.

- **Holding regular meetings with graduates**. I have held regular meetings (at least once a semester) with our graduate students since taking over as Head of Department. This provides them with the opportunity to raise issues and present ideas to help improve and develop our program. I have also held meetings with our students to obtain their views on candidates for new faculty positions that we have invited for interviews during the past few years. We also hold open forums once a semester where undergraduate and graduate students, and faculty meet to discuss issues. In addition, as Head of Department, I have an open-door policy so that any student can visit me to express any concerns and/or let me have new ideas about how we can help improve their educational experience.

- **Running annual fall field trips**. At the beginning of every academic year, we run a four-day field trip for all our faculty and graduate students. Over the past few years, these have included field trips to the Cascades, Kentucky, Lake Erie, Smokey Mountains, Lower Ohio valley, and Appalachia. These trips help us to discuss aspects of research and teaching in a relaxed and educational setting. Recently, we have started a spring fieldtrip for our department. I ran the first one, which was to California. The next one will be in Ontario Province in Canada. The department covers the costs of these trips from our endowments.

Departmental initiatives

- **Enhancing our available space**. With the recruitment of ten new faculty, I have worked to make sure that we utilize our available space as best as possible to provide them with offices and new laboratories. This is including renovating of seven old laboratories to build biogeochemistry, geochemistry, Quaternary paleoecology, numerical modeling, microscope, fission track dating, and invertebrate paleontology laboratories. I was also able to revamp an old faculty lounge into an undergraduate lounge to help foster a sense of place for our students. In addition, we were able to make enough space to provide the Department of Geography with five of our rooms to accommodate two new hires that they have made during the past few years. I have also made creative use of space to help accommodate our growing graduate student population.

- **Producing of a new departmental website**. Our departmental website was very outdated when I took over as Head of Department. I worked with staff in the Dean's Office to update and redesign our website in our new College's corporate style. Unfortunately, the University has re-styled their websites and has disrupted the work we had done. Our websites are once more a work in progress.

Diversity and inclusion

- **Enhancing student diversity.** Increasing diversity has been one of the most challenging areas for us to address. We have done well regarding addressing gender, with > 50% of our students being female. However, we aim to do much better with increasing diversity in minorities. In 2013, we were awarded a grant from the Graduate School to enhance diversity in our graduate program. This covered the costs of having faculty recruit diverse graduate students, and stipends and tuition costs for two graduate students from a diverse background for three years. Also, as part of this program, several of our faculty members and graduates have been visiting local middle and high schools that have diverse student bodies to help encourage students to apply to our program. We have also been proactive in helping to first-generation students. This includes faculty who were first-generation students highlighting to students that they are available for discussion, mentoring and support.

  We have recently had Dr. Christopher Atchison become an affiliate faculty member. Dr. Atchison is the Executive Director of the International Association for Geoscience Diversity, which is creating access and inclusion for persons with disabilities in the geosciences. He is running very innovative programs that are helping us to recognize how to promote efforts of inclusion through collaboration in research, dissemination of instructional best practices, and professional development opportunities.

- **Enhancing faculty diversity.** We had no women on our faculty in 2009. However, four of our ten recent hires are women. Unfortunately, we are struggling with enhancing diversity of minorities (a problem for geoscience overall). We were successful in hiring faculty members from the Canary Islands and Iran.

Cross-department initiatives

- **Expanding cross-departmental research and teaching**. I have worked closely with faculty in the Departments of Anthropology, Biological Sciences, Chemistry, and Geography to help develop two College-funded new research clusters: 1) Geographical Information Network Systems; and 2) Molecular Markers. We have recruited new faculty as part of these clusters and are establishing new research and teaching programs. These clusters are also helping to strengthen research and teaching links between our departments. In addition, I have been working with faculty within the College to help establish an environmental quality initiative to help address environmental problems within the

Tri-State region and to help attract students into the STEM disciplines. In addition, I have also been part of a committee examining how we can rationalize our computer teaching laboratories and pool our resources in terms of teaching statistics. We are presenting developing a new cluster that is focused on water. This promises to link our College with the College of Engineering and Applied Sciences, and this enabled us to hire a hydrogeologist.

- **Initiating and developing the Quaternary and Anthropocene Research Group (QARG).** Building on the existing expertise in Quaternary science within the Departments of Anthropology, Biological Sciences, Geography and Geology, I initiated, and now direct, a new research and teaching cluster known as the *Quaternary and Anthropocene Research Group* (QARG). We hold meetings and colloquium on Quaternary science, and these are developing new research projects in places such as Trinidad, Alaska, New Mexico, and Kentucky. As a consequence of developing QARG and our new research collaborations, our Dean approved a faculty hire in Quaternary science who became a joint appointment in the Departments of Geology and Anthropology. See website at: http://www.uc.edu/orgs/qarg.html

- **Initiating and developing a Paleontology, Stratigraphy & Macroevolution Research Group (PSMRG).** I suggested and encouraged my colleagues to develop this research group that spans the Departments of Geology, Anthropology and Biological Sciences. This group examines the evolving relationships of Earth Systems - lithosphere, hydrosphere, atmosphere, and biosphere, through the full range of geologic times, including the present day. In particular, they are dedicated to understanding Earth's history as preserved in its paleontological and stratigraphic records, and, from this, determining the ways that the physical-chemical-biological history of Earth has impacted the evolutionary trajectories and extinction histories of life. See website at: http://www.artsci.uc.edu/departments/geology/research-and-scholarship/PSMRG.html

Cross-college initiatives

- **Developing interdisciplinary research and teaching project between colleges**. During the past few years, I have worked with faculty in the College of Design, Architecture, Art and Planning, and the College of Engineering to develop a research project that links some of our interests in research and living in extreme environments. We were successful in receiving support from the University to fund a research and teaching project to design habitats for high altitude research. This involved our students designing and making a habitat, which they tested on a Himalayan glacier in Northern India.

- **Initiating a water cluster.** The university provided support to develop a cluster of hires in the broad area of water research. This is involving our College, the College of Engineering and Applied Science and the College of Design, Architecture and Art. I help prepare the proposal and working document for the cluster. We are currently searching for a director and we recently hired a hydrogeologist as part of this cluster.

International initiatives

- **Developing an international field program for our students**. I believe that field research and international travel is an essential part of a geoscientist's education. I initiated a program to provide a series of three international field trips on a regular, rotating, annual basis to enhance our students' global outlook and geoscience experiences. The field trips span our three areas of research strength and are multi-week excursions to: 1) coastal marine settings of the Florida Keys and the Bahamas to examine coastal and shallow water marine processes, sedimentary environments, coastal ecology, and marine ecosystems; 2) high-latitude regions of Iceland to examine modern glaciers, glacial processes, and glacial landforms, glacial sediments and depositional settings, and their record of modern high-latitude climate; 3) high-altitude regions of the Himalaya in northern India to examine archetype collisional bedrock geology, high-altitude glaciers, glacial processes, and glacial landforms, river systems, landslides, and other aspects of one of Earth's most dynamic mountain landscapes. We are subsidizing these fieldtrips from our endowments and grants from our International Office. Participants from outside of our department, including alumni and students and scientists from other universities, join these fieldtrips and help subsidize the costs. Students at any level of their education

can take these courses. The idea is that an undergraduate, masters or doctoral student can take all three courses during their time with us. The courses are taught in a way that junior students can learn from more senior students, and in turn the senior students get teaching experience from mentoring the junior students. An essential aspect of all three field trips is to have students participate in small field-based, self-contained research projects; thus, the field trips are clearly important venues for student education. As with all our others field trips, I believe that one of their essential goals is to "bring geosciences to life" for the participants and to help create a bonding experience for our students and faculty.

- **Developing collaborative links with institutes in Asia**. Over the last few of years, I have had been trying to establish collaborative links with colleagues at institutes in Asia to developing exchange programs between students and faculty. This has included field and laboratory training for Chinese, Indian and Thai scientists, and field experiences for our students. These links have been particularly useful in helping to increase the number of graduate applications that we receive from Asia. This has included students and faculty from India, South Korea, Thailand and China working with us in our laboratories and in the field.

Alumni relations

- **Establishing an Alumni Advisory Committee**. In 2009, I established an Alumni Advisory Committee that comprises ten alumni from industry, government, and academia to help advise us on issues such as curriculum and research development, employment and fundraising. The Committee meets at UC once a year (coincident with our spring departmental banquet), and it holds a semi-annual conference call with faculty, and exchanges e-mails on issues that arise throughout the year. I encouraged the Committee to write a report in 2013 on the state of the department and the future needs of the profession to help us with strategic planning. I also asked the Committee to be proactive in helping to raise the level of our endowments. As a consequence, our endowments are continuing to increase. With help from our Committee, we plan to develop formal recruiting visits, short courses, and workshops given by alumni with the goal of helping both our MS and PhD graduates find job placements.

- **Holding annual alumni receptions.** We have continued to support alumni receptions at the annual meetings of the Geological Society of America. This allows our students and faculty to interact with former students in a relaxed setting.

- **Producing an annual newsletter.** We continue to produce an annual newsletter (*Upper Crust*) that is mailed to our alumni during the summer of each year. This is also available on our website (http://artsci.uc.edu/departments/geology/news-and-events.html).

- **Undertaking individual visits.** I have visited many to alumni while traveling throughout the US. This has allowed me to enhance my network and has helped with fundraising. Also, many of our alumni have visited me in our department throughout my tenure as Head of Department.

Fundraising

- **Fundraising and increasing our endowments.** During my tenure as Head of Department, I have been working with our Development Office on plans to help increase donations from alumni to enhance our endowments. This has included identifying and planning meetings with our top prospects, and this has involved numerous visits to Denver and Houston to talk with potential donors. I also meet alumni when visiting cities throughout the US to discuss our departmental initiatives and needs.

- **Establishing a new endowment for career development**. I helped establish a new endowment for career development for our students. This covers the costs of bringing professional geoscientists into our department for a two-day workshop on geoscience careers. As a spinoff of this initiative, we have now developed a course in geoscience careers to help enlighten our students on career prospects and

opportunities and to help prepare them for job applications and the future workforce.

- **Establishing endowments for faculty positions.** I initiated an endowment to raising money for a faculty position in Basin Dynamics to help us train students in aspects of petroleum geology. As a consequence, we recently appointed a faculty member to this position whose responsibilities include teaching basin dynamics, petroleum geology, and our careers course. Recently, we have had a pledge for $2 million for the establishment of a faculty position in sedimentology/petroleum geology. This should come into effect in 2022.

References

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