DEG Spheres of Influence August 2017

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Division of Environmental Geosciences Mission Statement and Purpose

August 2017

- **Educating** the membership of AAPG and the general public about important issues that affect petroleum energy minerals exploration and production.
- **Communicating** to the general public and government agencies the Association's commitment to protect the environment while developing the world's natural resources in a responsible manner.
- **Applying** the expertise developed in the petroleum/energy minerals industries and hydrogeology to resolve environmental problems.
- **Promoting** environmental self-regulation within the petroleum/energy minerals industries.
- **Providing** relevant educational opportunities and services for professional development of the AAPG membership through seminars and conferences in environmental geosciences, hydrogeology and related fields.

We welcome your articles, comments and feedback for the quarterly newsletter publication. The submissions deadline for our next issue is Nov. 1, 2017.

Please submit to SOI managing editor Dr. Barbara Kutchko, at Barbara.Kutchko@netl.doe.gov.

Mary Barrett Begins Term as President-Elect

August 2017 | By Barbara Kutchko

Meet Dr. Mary Barrett, AAPG DEG president-elect for 2017-18.


Dr. Mary Barrett

Barrett, a sedimentary and petroleum geologist with professional backgrounds in both academia and industry, received her bachelor's and master's degrees in geology from Stephen F. Austin State University, Nacogdoches, Texas, and her doctorate in geology from the Johns Hopkins University, Baltimore, Maryland.

Barrett's professional experience with Mobil Oil included hydrocarbon generation and migration studies; log and core integration analyses; and assisting production teams in reservoir stratigraphy and properties within mature petroleum fields.

She became a geology professor at Centenary College of Louisiana, Shreveport, in 1992.

She also served as a consultant to independent exploration companies concerning the Austin Chalk, Eagle Ford and Woodbine formations of southeast Texas, and the Smackover Formation of Alabama and Arkansas. She and co-author John Goodson received the A. I. Levorsen Outstanding Paper Award in 2007 from the Gulf Coast Association of Geological Societies for their Woodbine work.

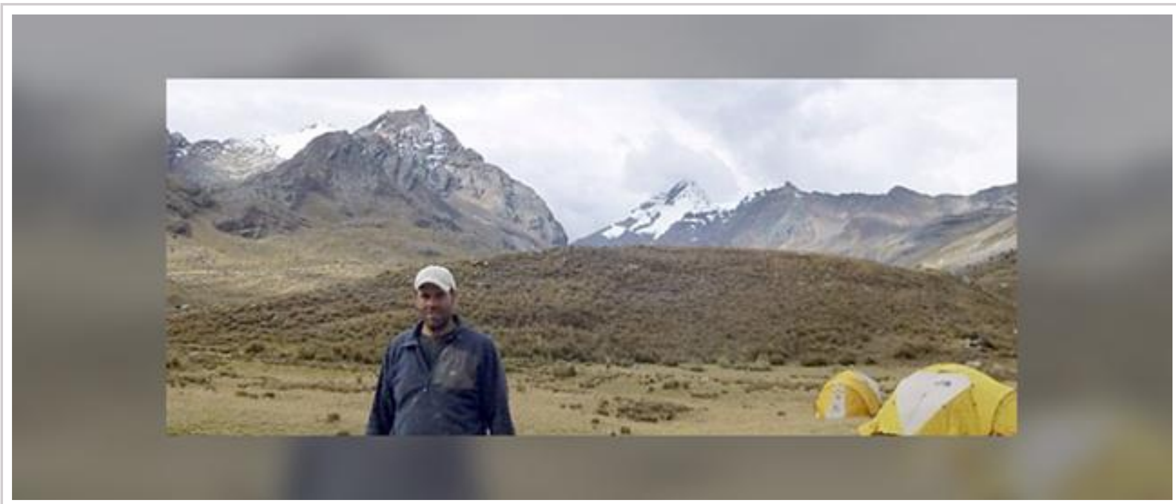
In the mid-1990s she added an interest in old hydrocarbon fields and their technical history and began the study of the history of oilfield wastes in America. She has presented and published papers concerning oilfield waste and the associated impacts and geochemical signatures, and in 2000 she received the DEG Outstanding Oral Presentation Award for her paper about reconstructing the waste history of the Smackover Field, Arkansas.

Barrett served as the DEG secretary-treasurer from 2003-05 and as a board member of the Petroleum History Institute from 2006-11. In 2012 she was awarded PHI's Samuel T. Pees "Keeper of the Flame" Award for her research and preservation work in the history of the petroleum industry.

Today she is professor emeriti of geology at Centenary College of Louisiana, and also a consulting geologist with interests in oilfield waste history and impacts.

Researching Glaciers and Environmental Change Around the World

August 2017 | By Nathan D. Stansell, Northern Illinois University



My research interests apply a wide range of methods to better understand the timing and causes of climatic changes during the Quaternary.

I have an on-going project in the tropical Andes, funded by NSF, to explore how Pacific and Atlantic Ocean processes combine to affect the pattern of glaciation on a range of time-scales. This project is in collaboration with Don Rodbell at Union College, Joseph Licciardi of the University of New Hampshire, and Bryan Mark at Ohio State University.

Through these projects we have worked extensively to collect records of glaciation from eastern and western slopes of the Peruvian Andes, as well as the northern Andes of Venezuela. We have applied a combination of terrestrial cosmogenic radionuclide dating methods and high-resolution lake sediment records to determine the timing of glacial fluctuations in these regions.

These records provide new insight into how processes like the South American summer monsoon, tropical Atlantic sea surface temperatures and ENSO in the tropical Pacific Ocean combine to drive temperature and precipitation changes across the South American continent.

I have a recent project to work in Central America that also is funded by NSF to apply carbonate stable isotope systems and climate modeling efforts to develop detailed and quantitative reconstructions of past precipitation amounts along a transect through the "dry corridor" of Guatemala, El Salvador, Honduras and Nicaragua. This project will develop new lake sediment records to compare to both proxy-reconstructions and climate model simulations of tropical Pacific and Atlantic Ocean-atmosphere variability in order to further evaluate the relative importance of these systems in driving past rainfall changes. This project is in collaboration with Byron Steinman from University of Minnesota-Duluth and Matthew Lachniet from UNLV.

I also have a research partnership with University of Oxford, where we are developing pollen-based records of past climate changes in Central America. Currently I am applying similar carbonate isotope systems to understand the climate history of eastern Europe. This ongoing project has been generously supported by grants from NIU to develop decadal-scale quantitative reconstructions of past precipitation changes from the Baltic region. This project is in collaboration with Tallinn University, Tartu University and Tallinn University of Technology.

In tandem with this project, we are focusing on peatlands as records of climate change and carbon dynamics. Northern peatlands are collectively one of the largest carbon pools in the northern hemisphere, and they are a potential major source of greenhouse gases including carbon dioxide and methane.

In order to evaluate the potential climate feedbacks associated with high northern latitude peatlands, we are working to develop longer temporal perspectives on the linkages between shifts in climate and carbon accumulation rates in these environments.

Beauty in Geology - Niagara Falls

August 2017 | By Barbara Kutchko

In our previous Spheres of Influence Beauty in Geology section we highlighted both the geology and tourist potential of Lake Erie. As part of the system of Great Lakes, these majestic geologic features are here thanks to the last ice age.

Not to diminish the magnificence of the Great Lakes, however, there is nothing as resplendent as the raw power and beauty of Niagara Falls – and we have the Great Lakes and glaciers themselves to thank for this glorious geologic natural wonder.

Niagara Falls is located on the Niagara River, which essentially acts as a channel in which Lake Erie drains into Lake Ontario.

The falls span the border between Canada (Ontario) and the United States (New York), and encompass three waterfalls: Horseshoe Falls, American Falls and Bridal Veil Falls.

While Niagara Falls aren't the tallest falls in the world (that title goes to Angel Falls in Venezuela, at 979 meters tall), they are impressive by their width and sheer volume of water. It is reported that more than 168,000 cubic meters (six million cubic feet) of water go over the falls' crestline every minute during peak time. It also has the highest flow rate of any waterfall in the world – accounting for the pure power one feels when standing at the precipice.

In a brief summary (I encourage readers to delve into the more complex geologic processes involved than I can get into here – I promise it is fascinating), the falls were formed by a series of geological events following the Wisconsin glaciation, when the glaciers retreated and melt water formed what eventually became the Great Lakes. Water flowing from the Great Lakes gouged out the Niagara Escarpment.

The sedimentary strata of Niagara Falls region include limestone, shale marine and sandstone that were deposited during the Silurian period 430-390 million years ago. The rapids fall over a harder (more erosion resistant) limestone and dolomite from the Lockport Formation (Middle Silurian). The softer underlying strata consist primarily of marine shale of the Rochester Formation (Lower Silurian). This shale was easily eroded, undercutting the Lockport, and eventually carving out the falls we see today.

For more information click on any of the links provided below.

Catch up on our Great Lakes series with our last issue:

Beauty in Geology: Lake Erie

For more information about the geology of Niagara Falls:

Origins of Niagara

Niagara Falls Info

Niagara Falls Geology: Facts and Figures

Graphic Representation of Niagara Escarpment