COLLEGE OF SCIENCE AND HEALTH
WILLIAM PATERSON UNIVERSITY
www.wpunj.edu

Department of Environmental Science Newsletter

Spring, 2013 | William Paterson University | Vol.2

Cave Stalagmites: *Windows to Past Climate Change*

There's an eerie silence in the depth of caves in remote mountains. Of course, if you're looking for stalagmites (speleothems) that can tell a story about climate history, these caves are the perfect place. Newly appointed faculty member, Dr. Mick Griffiths, is interested in using geochemical tracers preserved in cave-carbonate deposits (speleothems) to reconstruct the Quaternary (i.e. last approx. 2 million years) history of climate variability in tropical Australasia. Specifically, he is focused on building high-resolution and well-dated paleoclimate records—using stable isotopes (of C and O) and trace elements (Mg, Sr, Ba, P, U) as tracers for past environmental changes—to better understand the role of the tropics in global climate change over many different timescales (e.g. glacial-interglacial, last 2,000 years). Whilst the environmentally-sensitive geochemical tracers preserved in the stalagmites are primarily controlled by fluctuations in temperature, rainfall, and/or the overlying vegetation (above the cave), the underlying processes controlling the cycling of these tracers through the atmosphere, soil, and karst systems are extremely complex. Hence, Mick's research employs a multi-pronged approach of combining modern cave drip-water studies and geochemical modeling, with the chemical and physical analysis of fossil stalagmites, to gain a deeper understanding of how these processes govern the isotopic– and trace-elemental–signals in the stalagmite carbonate; understanding these processes is essential for robust environmental interpretations of the natural archives. Mick is primarily working on paleoclimate records from SE Asia (Laos), Indonesia and northern Australia, where, in light of recent research success in the region (including the lead article in an issue of *Nature Geoscience* in 2009), he is hoping to extend the climate records back through multiple glacial-interglacial cycles. In addition, by analyzing speleothem geochemistry at high resolution, he is hoping to improve our understanding of major modes of ocean-atmospheric circulation, such as the El Nino Southern Oscillation (ENSO), which have major societal, environmental, and economic impacts on regions surrounding the Pacific Ocean.

Dr. Griffiths sampling cave stalagmites

Growing as a Scientist, By Elena Noonan

Being enrolled in the Environmental Science Program has given me many opportunities to further my academic career and valuable experiences to use in the future. In the summer of 2011 I was selected to participate in a highly competitive REU (research experience of undergraduates) program because of the classes I was able to take as a student at William Paterson. In this program I learned many field and laboratory analysis techniques. These techniques involve sample collection in the field; then determining organic content, water content and particle size analysis in the laboratory. The particle size analysis techniques I learned during this research gave me the opportunity to then be chosen as a member of a research team at William Paterson. During the fall semester I was part of a research team headed by Dr. Jennifer Callanan where I was able to use the techniques I learned during my REU. The purpose of this research is to determine fires effect on chlorite clay weathering within soil. My responsibility in this project was running the particle size analysis, which I was chosen to conduct because of my prior experience. We are analyzing samples collected from underneath prescribed burn brush piles at 1, 2, 3 and 6 month intervals so the observations can be made on any changes in the soil over time. Being part of the research team here at WPU has given me valuable tools that I may now apply to my future whether that be continuing my academic career as a graduate student or applying my skills in a rewarding career in the field of Environmental Science.