Sedimentary Studies at McMaster University

Sedimentary rocks cover most of the earth's surface, record much of the earth's history, and harbor the fossil record. Sedimentology is that branch of geology concerned with understanding the characteristics of sedimentary rocks originally deposited in sedimentary basins. Sedimentologists apply their understanding of modern processes to sedimentary rocks to understand how they formed.

McMaster has a proud history of excellence in geology and its related disciplines – particularly sedimentology. Over the years, faculty members in the Department of Geology included some of the world's foremost experts in geology and geochemistry. Professors such as Gerry Middleton and Roger Walker inspired students and directed leading-edge research that was truly "groundbreaking" in every sense of the word!

Today that tradition continues within McMaster's Department of Geography and Earth Sciences where students are attracted by leading edge courses and programs – at both the undergraduate and graduate levels – as well as by the opportunity to learn from renowned experts and faculty members. *(See Appendix 1: http://www.mcmaster.ca/ua/ia/documents/Middleton_Walker_APPENDIX_1.pdf)*

High Enrolment and Keen Student Engagement

The teaching skills and research interests among the Department's faculty are largely responsible for the high enrolment of students. Recent years have seen larger numbers of students registered in sedimentology/paleontology courses (currently 43 in third-year sedimentology) than was ever the case previously.

The Earth & the Environment, Earth History and Glacial Sediments & Environments are running at full capacity and are capped at 400, 120 and 30 students per year respectively. Each year 12 students participate in field camp studies on-site in locations such as Arizona. *(See Appendix 2: http://www.mcmaster.ca/ua/ia/documents/Middleton_Walker_APPENDIX_2.pdf)*

There are currently 14 graduate students doing pure and applied sedimentology under the supervision of professors Carolyn Eyles, Joe Boyce and Eduard Reinhardt alone. *(See Appendix 3: http://www.mcmaster.ca/ua/ia/documents/Middleton_Walker_APPENDIX_3.pdf)*

Teaching and Research Excellence

Carolyn Eyles is a recipient of this year's prestigious 3M Teaching Award which recognizes excellence and leadership in university teaching. Each year up to 10 professors are chosen from among more than 35,000 faculty members across the country to receive Canada's highest teaching award.

Eyles, whose teaching includes an introductory course on earth sciences and one on glaciers, attributes her passion for teaching to her students and to her willingness to take risks. She challenged her students to create a wiki to build an inventory of Canadian glaciers

Eyles' Glacial Sedimentology group is focused on applying sedimentological approaches to the study and interpretation of the deposits found within glaciated basins. The approach used is field-based, and in many cases involves quantitative geo-spatial analysis of field data. Recent studies have included glaciated basins ranging in age from Paleoproterozoic (Huronian) to modern (Canadian Rockies) and have formed the basis for numerous undergraduate and graduate thesis projects.

Many students graduating from the Glacial Sedimentology research group have pursued further research in sedimentology and are now working in academic, government and industry positions. Several students are currently working on a project that involves detailed sedimentological analysis of Quaternary sediments in the Halton Region of southern Ontario. This sedimentological information is being used by hydrogeologists working for the region who are seeking potable water sources for expanding urban centres.

Joe Boyce's research group investigates past changes in Holocene (last 10,000 years) paleoenvironments using sediment archives from lake basins and coastal environments. This work employs coring, measurements of sediment physical/geochemical properties (grain-size, geochemistry, microfauna, magnetic properties) and geophysical methods to document and interpret past changes in environmental conditions and human impacts on natural ecosystems.

Recent work has documented human impacts due to deforestation and land clearance following pre-Columbian and European settlement in southern Ontario (Col By Lake, Rice Lake; Sonnenburg M.Sc. and Ph.D. work) and changing Holocene coastal environments at archaeological sites in the Mediterranean (western Turkey, Italy, Greece) and in the Middle East (Oman, Israel). Other recent work has investigated magnetic property methods for mapping contaminated sediment layers (Hamilton Harbour) and for documenting historical pollution in lake basins.

Studies in Frenchman's Bay (Pickering, Ontario) have yielded high-resolution grain-size and magnetic records of the onset of European colonization and changes in basin hydrologic conditions associated with subsequent land-use changes. More recent work in Hamilton Harbour is developing new, innovative methods for remotely mapping contaminants using magnetic survey methods and measurement of sediment magnetic properties.

Eduard Reinhardt conducts research on coastal sedimentary environments and in sea-level and climate change and their impacts on coastal systems. More recently he has focused on catastrophic events (tsunamis, hurricanes and earthquakes) and has worked extensively on marine archaeological projects from around the world but mainly in the Mediterranean and Middle east. He is also interested in caves and their sediment records for understanding groundwater issues. In 2006, he and his students began working on sediments from Yucatan caves which are showing promising results for future research.

Carolyn, Joe and Eduard are three outstanding representatives of a vibrant programme in sedimentary geology and an excellent faculty complement. *(See Appendix 4 : http://www.mcmaster.ca/ua/ia/documents/Middleton_Walker_APPENDIX_4.pdf)*