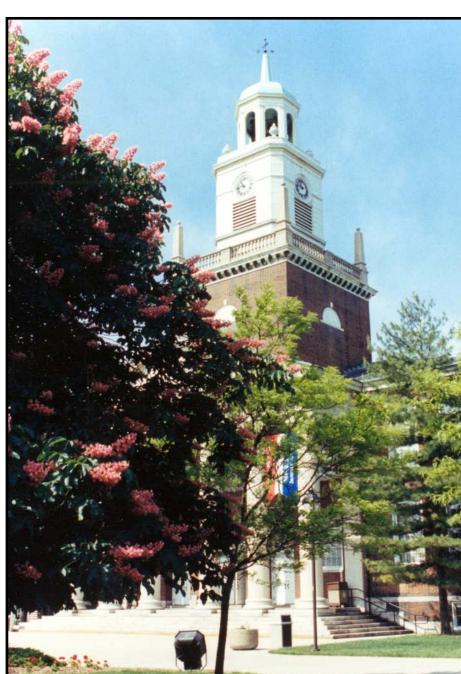


Buffalo State College and the Dept. of Earth Sciences Jill Singer, Professor and Director, Office of Undergraduate Research 1300 Elmwood Avenue · Buffalo, NY · www.buffalostate.edu/undergraduateresearch

About the Institution and Department



Buffalo State College is the largest comprehensive college in the State University of New York (SUNY) system (approximately 9,000 undergraduates and slightly over 2,000 graduate students) and is the only urban four-year campus in SUNY. Founded in 1871 as a Normal School to produce teachers, it became a part of the SUNY system in 1948 and is a public, coeducational, liberal arts college. The Earth Sciences and Science Education Department is a combined department. The Science Education part of the department does not offer a degree program of its own, but is responsible for teaching a sequence of courses required for all secondary science education majors seeking New York State certification. Earth Sciences offers three undergraduate



degree programs: B.A. Geology, B.S. Earth Sciences and B.S. Earth Science Education. There are approximately 100 students majoring in these programs, and more than half the students in the department are pursuing their earth science certification. Currently there are five tenured and tenure-track faculty covering the core areas within the geosciences and a Planetarium Director and an Introductory Geology Lab coordinator.

Richard Batt-historical geology, paleontology, and stratigraphy Elisa Bergslien-environmental geochemistry and hydrogeology Jack Mack-astronomy

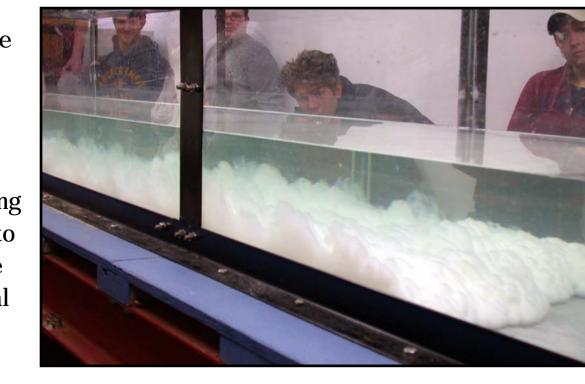
Gary Solar-mineralogy, petrology, structural geology, & field geology Jill Singer-oceanography, sedimentology, and environmental earth

Search in progress-geomorphology and glacial geology

Our location in an urban area with easy access to Devonian stratigraphy, the Lake Erie shoreline, glacial and fluvial geomorphologic features affords us numerous opportunities for field components in many of our courses and undergraduate research projects. Within a day's drive are the Adirondacks, Canadian shield, and New England. Housed within the sedimentology laboratory are a 16' long wave tank (pictured lower left), a 20' long recirculating flume (pictured middle and bottom right), a SediGraph and an ROV (remotely operated vehicle). Both the flume and wave tank were designed and constructed by students enrolled in ENT422, Machine Design II, a design course in the Buffalo State Mechanical Engineering

Technology program. Over the past five years, students and faculty in the Technology and Earth Sciences departments have successfully collaborated to provide research projects for the technology students and

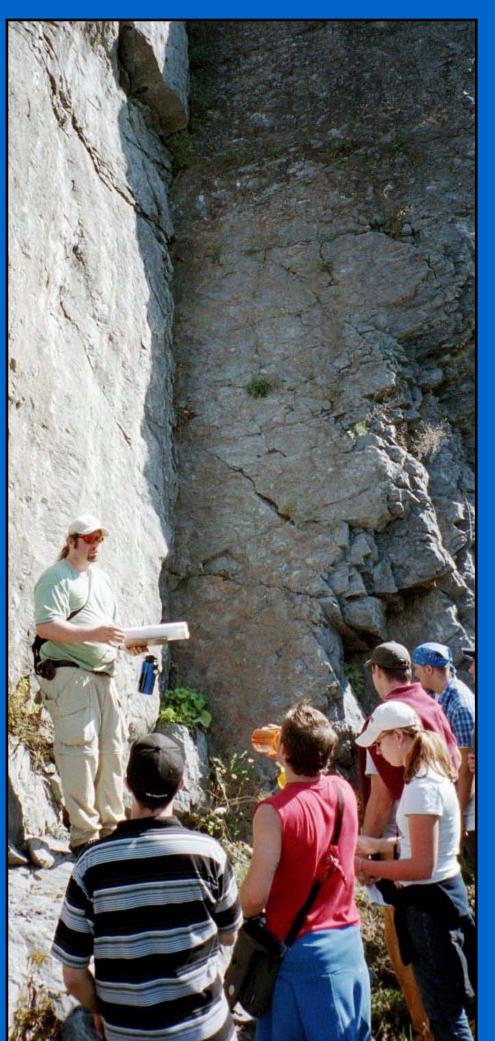
> demonstration equipment for students enrolled in earth science courses (e.g., geomorphology, sedimentology, geological hazards). Recent funding through the NSF-CCLI program has been used to acquire an XRD (pictured top right). The College also maintains a field station on Black Rock Canal with easy access to the Niagara River, Buffalo River and Lake Erie. Faculty and students have



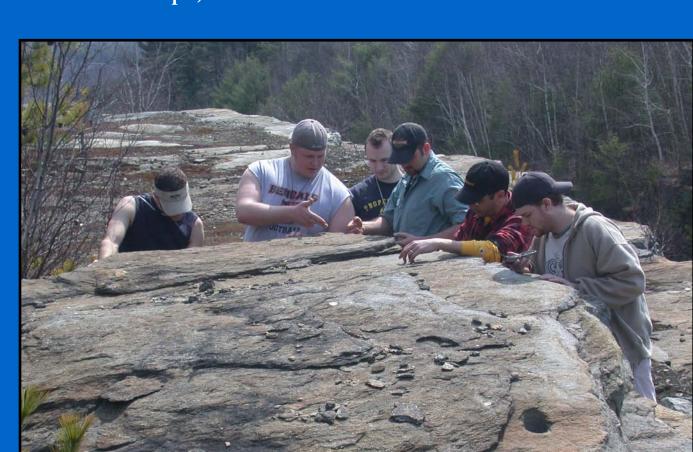
access to any of the resources within this facility (which includes several Boston whalers, two research vessels, assorted sediment and water column sampling equipment). There are two boat captains that provide support for any course or research project.



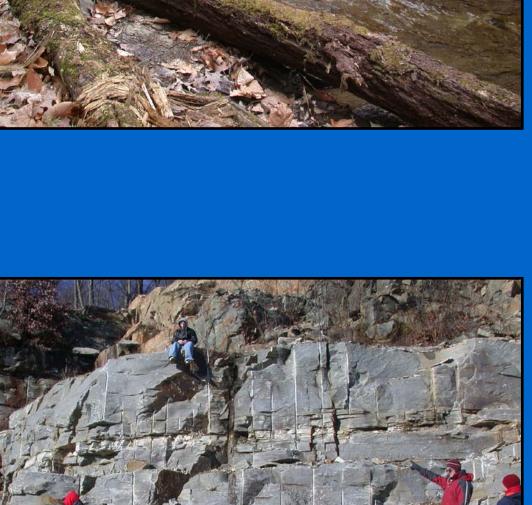
Laboratory of Orogenic Studies



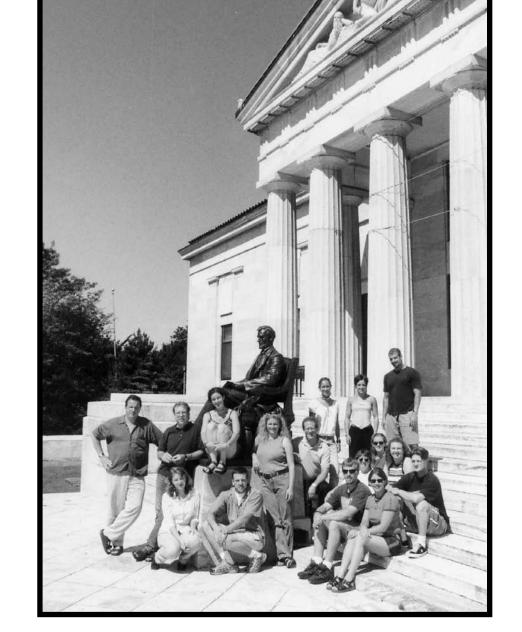
Established Fall 2000, the Laboratory for Orogenic Studies (LOS) brought together the research and teaching interests of Gary Solar and our undergraduates to form a field and laboratory research team. The LOS laboratory houses a research-grade petrographic microscope (with attachments for micro-photography) and two hand-specimen microscopes. There also are equipment for mineral separation and thin section preparation. Projects conducted by the LOS focus on mountain-building processes using techniques of structural geology and petrology. Field areas and projects to date include the Grenville orogen of the southern Adirondacks, Appalachian orogen of Pennsylvania, and parts of New England. Pictured from left to right are Professor Solar and his students conducting fieldwork n: Catskill, NY; Western Massachusetts; Mine Hill Granite Quarry, Roxbury, CT; and I rish Gulf, Boston, NY. Since 2000, four students have completed departmental honor theses and 14 students have conducted independent research projects. Most students have received either external or campus funding to support their research (e.g., NE section GSA, Sigma Xi, and three students were awarded BSC Undergraduate Summer Fellowships).







NCUR-Lancy Program: A Centennial Celebration of the Pan-American Exposition



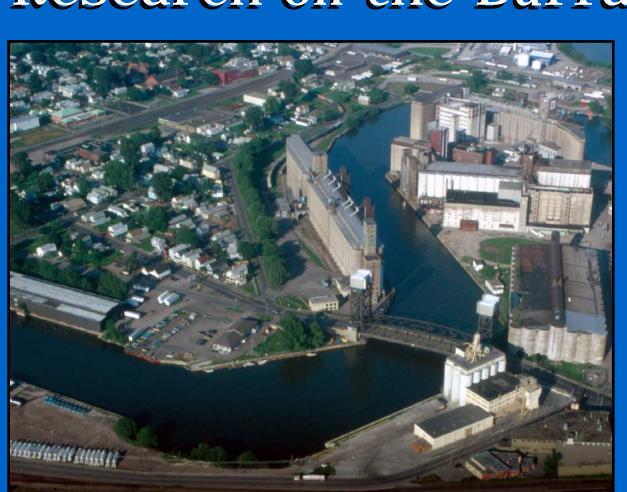
In 2000-2002, Buffalo State was funded through the NCUR-Lancy initiative designed to encourage institutions to develop interdisciplinary and collaborative research programs built around a common theme. The central theme of our research focused on environmental and social changes in Buffalo over the past century. Buffalo's celebration of the centennial of the 1901 Pan-American Exposition made this research focus especially timely and also took advantage of the College's proximity to the exposition grounds (across the street) and easy access to the ethnically diverse neighborhoods that characterize the city. Twelve students and four faculty mentors participated in the program each summer. The faculty mentors represented four academic departments: history, sociology, earth sciences and performing arts and the undergraduates were majoring in science, education, sociology, history, and humanities. Several earth science

majors participated in the program. Students and faculty mentors participating in the first year were on the cover of the September 2000 issue of the CUR Quarterly (pictured) Rather than each student writing a paper or creating their own poster, students were

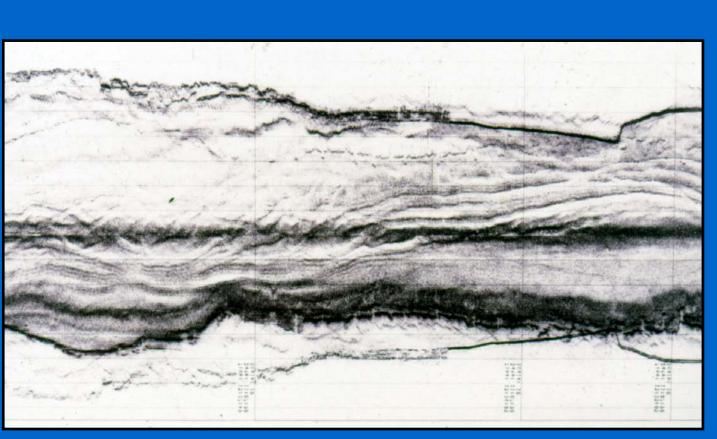
taught 'tricks of the trade' from set design and were mentored in the process of designing and constructing plywood flats to display their results (pictured from left to right). The December 2004 issue of the CUR Quarterly includes a review of the NCUR-Lancy program and a follow-up of BSC's program.



Research on the Buffalo River



The Buffalo River (aerial view of the river showing active grain elevators) flows along the southern boundary of the City of Buffalo and its watershed includes both agricultural and urban (industrialized and residential) areas. The lower 9.2 km of the river is a designated Area of Concern (one of 42) within the Great Lakes region) because of its impaired water quality and contaminated sediments. Since 1990, J. Singer, working with collaborators at Middlebury College, SUNY-Buffalo, and GeoSea Consulting have conducted research in sediment dynamics and processes responsible for transporting and depositing sediment within the river. This work has resulted in senior theses at Middlebury College, honors theses at Buffalo State College and more than a



dozen independent undergraduate research projects. One of the most interesting features documented through this research are sedimentary furrows (pictured above right) that are persistent within one segment of the river.

College's Office of Undergraduate Research



Buffalo State has identified increased undergraduate research opportunities as a priority in its academic strategic plan. As part of our efforts to institutionalize undergraduate research, the College established in 2003 the Office of Undergraduate Research and appointed a half-time director (currently J. Singer). The Office coordinates and promotes undergraduate research and creative activities on campus. There are a number of programs administered by the Office:

- · annual student research and creativity celebration (now in its 7th year)
- undergraduate summer research fellowship program (also in its 7th year) providing student stipends and travel/supply money to support 8 weeks of full-time research
- · travel support for students to attend meetings, conferences, performances, and/or art exhibits to present their research/creative work (in its 4th year) small grants program to provide support for academic year research/creative
- activities · several programs aimed at faculty development

The Office maintains a website at: www.buffalostate.edu/undergraduateresearch



NSF-STEP Program

"Creating Opportunities for Success through Recruitment, Retention and Faculty Development" is a five-year (2005-2009) \$1 million project awarded to Buffalo State by the NSF-DUE. J. Singer is the project director and all seven STEM departments at the College are participating. The primary goal of the project is to increase the number of students entering STEM majors and increase the number of students receiving baccalaureate degrees in the STEM disciplines. In order to accomplish our project goals, a number of activities will be carried out, including:

- · Increased outreach and recruitment activities in area high schools
- · Introduction of a year-long learning community with the theme "the urban environment" open to students expressing an interest in becoming a STEM major
- · Offering Freshman Seminar STEM courses for those students entering the College as Freshman that are either interested in becoming STEM majors or with a declared STEM major
- · Providing an early undergraduate research experience for students interested in becoming a STEM major, or for students that declared a STEM major as a result of participating in either the learning community or Freshman Seminar programs
- · Increased support services for any student enrolled in introductory STEM courses that are the gateways into the majors by establishing peer tutoring centers in all seven STEM department and by introducing problem-solving sessions in math (pre-calculus through calculus II and statistics)
- · Faculty development opportunities to support substantive revision of introductory courses to change from primarily lecture to guided inquiry with an emphasis on developing problem-solving skills

