TAB 20: NATIONAL SCIENCE FOUNDATION

REPORT OF ACTIVITIES OF
THE NATIONAL SCIENCE FOUNDATION (NSF)
OF THE UNITED STATES OF AMERICA
UNDER THE U.S.-CHINA S&T AGREEMENT
for the period January 1, 2002 – December 31, 2003

NSF has prepared this report in response to an email request dated December 1, 2003 (attached), from the Office of Science and Technology Cooperation (OES/STC) of the Department of State (DOS). Agencies are required to submit reports of their scientific activities with China conducted under the auspices of the US-China S&T Agreement to the Department of State. The Department of State uses these reports to compile the biennial China Report to Congress mandated under Sec 1207 DoD Authorization.

The National Science Foundation conducts cooperative scientific activities with China under the following protocols: *

- The "Basic Sciences Protocol," i.e., the "Protocol Between the National Science Foundation of the United States of America and the Chinese Academy of Sciences and the Chinese Academy of Social Sciences and the State Education Commission [currently the Ministry of Education] on Cooperation in Basic Sciences," 1980, amended in 1994 to include the National Natural Science Foundation of China. This Protocol elapsed in 2001 and has not been renewed. However, cooperation continues.

- The "Earthquake Studies Protocol," i.e., the "Protocol Among the China Seismological Bureau and the National Natural Science Foundation of the People's Republic of China and the U.S. Geological Survey of the Department of Interior and the National Science Foundation of the United States of America for Scientific and Technical Cooperation in Earthquake Studies." NSF's activities in earth sciences are conducted under the overall Protocol whereas NSF's activities in earthquake engineering are conducted under Annex 3, "Cooperation in Earthquake Studies: Cooperative Research on Earthquake Engineering and Hazards Mitigation."

(Note: In 1985, the National Science Foundation became a participant in the "Earth Science Protocol" between the U.S. Geological Survey and the Chinese Academy of Geological Sciences and the Ministry of Geology and Mineral Resources. However, for many years NSF has largely been inactive under this Protocol.)*

In calendar years 2002-2003, NSF spent $7,156,729 on collaborative activities with China under the S&T Agreement, including $2,839,309 under the Basic Sciences Protocol, $1,342,097 on earth sciences activities under the "Earthquake Studies Protocol," and $2,975,323 on earthquake engineering and hazards mitigation activities under Annex 3 of the "Earthquake Studies Protocol."

Activities Under Separate Arrangement(s) Not Under the "S&T Agreement"

NSF also conducts scientific activities with China in ocean drilling under the following Memorandum of Understanding, a separate arrangement, apart from the "S&T Agreement:"

"Memorandum of Understanding [MOU] Between the National Science Foundation of the United States of America and Marine High-Technology Bureau of the State Science and Technology Commission [now the Ministry of Science and Technology] of the People's Republic of China on the Participation of the People's Republic of China in the Ocean Drilling Program as Associate Member."

De Angelis: 1-9-04

NSF AWARDS FOR US-CHINA COLLABORATION UNDER THE BASIC SCIENCES PROTOCOL
January 1, 2002-December 31, 2003
(Note: Although the Basic Science Protocol elapsed in 2000, cooperation has continued.)

Next Stage for US-China Cooperation in Science Policy, Research and Education - Seminars for 2002, 2003, 2004
Award Number: 0139168
Start Date : April 15, 2002
Expires : March 31, 2005
Total Amt. : $602277
Investigator: J. Thomas Ratchford jratchfo@gmu.edu (Principal Investigator current)
Sponsor : George Mason University
4400 University Drive
Fairfax, VA 220304443 703/993-1000

This award supports the second stage of the decade of U.S.-China Science Policy Dialogues that was initiated under a previous grant (INT 9986117). The Science Policy Dialogues occur under the auspices of the National Science Foundation of the United States (NSF) and the National Natural Science Foundation of China (NSFC). The principal objective of the decade of science policy dialogues is to explore issues facing the United States and China that have significant implications for the vitality of science and engineering in the borderless, knowledge-based economy of the 21st century. Funds provided in the first phase supported an initial seminar in October 1999 in Beijing under the theme Enhancing Links between the Production, Dissemination, and Application of Research and a second major seminar on in December 2000 entitled U.S.-China Forum on Biotechnology and Biomedicine held on the campus of the National Institutes of Health in Bethesda, Maryland, and will be used to support the Technical Innovation Workshop that will be held in Washington in March 2002. The second phase will include four major events: 1) the Policy/Strategy Workshop (i.e., the meeting of the Advisory Council), Beijing, June 2002); 2) the U.S.-China Seminar on Engineering Education for the Global Economy, Shanghai and Beijing, October 2002; 3) a trilateral U.S.-Japan- China seminar on Science. Society and the Internet (Hawaii, December 2003); 4) and bilateral seminars on science policy formulation. The Advisory Council envisioned in the first phase was be fully implemented in the second phase to guide the selection of topics and to monitor progress toward the overall objectives.

U.S.-China Cooperative Research: Impacts of Water Column and Sediment-Water Interface Nitrogen Dynamics on Water Quality in Taihu Lake, China
Award Number: 0318794
Start Date : September 1, 2003
Expires : August 31, 2004 (Estimated)

Total Amt. : $41880
Investigator: Wayne S. Gardner gardner@utmsi.utexas.edu (Principal Investigator current)
Sponsor : U of Texas Austin
P.O Box 7726
Austin, TX 787137726 512/471-6424

This is a U.S.-China cooperative project between Dr. Wayne Gardner, the University of Texas at Austin, and Professor Yang Longyuan, Nanjing Institute of Geography and Limnology, Chinese Academy of Sciences, proposing to study the impact of water column and sediment-water interface nitrogen dynamics on water quality in Taihu Lake, China. This is important aquatic environmental research and can have a major impact on the control of eutrophication in China and water pollution elsewhere. It provides a U.S. student with international experience in working with counterpart scientists and students and with this unique lake system in China. The project is jointly supported by the National Science Foundation and the Chinese Academy of Sciences.

U.S.-China Cooperative Research: Isotopic Evidence for Late Cenozoic Climate and Ecosystem Changes in China
Award Number: 0204923
Start Date : July 1, 2002
Expires : June 30, 2005
Total Amt. : $153833
Investigator: Yang Wang ywang@magnet.fsu.edu (Principal Investigator current)
Sponsor : Florida State University
Tallahassee, FL 323064166 850/644-5260

This is a 36 month project submitted by Dr. Yang Wang, Florida State University with Professor DENG Tao, Institute of Vertebrate Paleontology and Paleoanthropology, CAS, China, to study isotopic evidence for late Cenozoic climate and ecosystem changes in China. They propose to collect isotopic evidence of the expansion of C4 plants in China, and to see whether this expansion corresponds to the late Miocene C4 plant expansion noted in America, Africa, Pakistan and Nepal. This project will advance our knowledge of the timing and extent of the global C4 grassland expansion in the late Cenozoic. The long-term climate data collected in the course of this project can fill a data gap for the area adjacent to the Tibetan plateau. A U.S. graduate student and undergraduate student will benefit considerably from collaborating with the Chinese scientists and from the experience of working on this research in China. The NSF and the Chinese Academy of Sciences jointly support this project.

U.S.-China Joint Workshop: Ecological Complexity and Ecosystem Services on Opportunities for China - USA Collaboration

Award Number: 0228894
Start Date : August 15, 2002
Expires : July 31, 2004
Total Amt. : $70000
Investigator: James J. Elser j.elser@asu.edu (Principal Investigator current)
Sponsor : Arizona State University
Box 3503
Tempe, AZ 85287 480/965-9011

This is a U.S.-China joint workshop proposed by Dr. James Elser, Arizona State University, on ecological complexity and ecosystem services. The workshop will bring together American and Chinese researchers in biocomplexity and ecosystem services in a series of interactions designed to establish a network of international collaboration and exchange. A preliminary meeting between U.S. and Chinese organizers will be held in November, 2002, and a U.S. delegation of 12 scientists will visit China in spring, 2003.

The intellectual merit of this proposal is outstanding. The area of ecosystem services is emerging as a topic for fundamental research. The proposed collaborative activities would benefit ecological science and its contribution to the management of complex ecological/economic systems. The Chinese Academy of Sciences, the National Natural Science Foundation of China, and NSF will jointly support the cooperative activities.

U.S.-Chinese Workshop on Sediment and Environmental Studies
Award Number: 0204450
Start Date : May 1, 2002
Expires : April 30, 2004
Total Amt. : $26172
Investigator: Charles S. Melching charles.melching@marquette.edu (Principal Investigator current)
Sponsor : Marquette University
P.O. Box 1881
Milwaukee, WI 532011881 414/224-7200

This is a U.S.-China joint workshop proposal on sediment transport and environmental studies submitted by Dr. Charles Melching, Marquette University, in cooperation with Dr. Zhao-Yin Wang, Tsinghua University, Beijing, China. The meeting will be held in Milwaukee, Wisconsin in July 2002. This is the second of the two workshops on river sediment related problems. The first was on sediment transport and sediment-induced disasters in Beijing, China in March 1999. The topic of the second workshop is important and could contribute to the U.S.-China cooperation on research concerning remediation of comtaminated sediments and restoration of river ecosystems. The NSF and the Natural Science Foundation of China jointly support this workshop.

U.S.-China Cooperative Research: BTeV Calorimetry
Award Number: 0223602
Start Date : September 1, 2002
Expires : August 31, 2005
Total Amt. : $65550
Investigator: Sheldon Stone stone@phy.syr.edu (Principal Investigator current)
Sponsor : Syracuse University
113 Bowne Hall
Syracuse, NY 132441200 315/443-2807

This is a 36 month project submitted by Dr. Sheldon Stone, Syracuse University, to cooperate with Professor CHEN Ting-Yang, Nanjing University, and Professors HE Mao and FENG CunFeng, Shangdong University, China, to carry out a U.S.-China cooperative project on BteV calorimetry. This is an excellent proposal for understanding the use of lead tungstate crystals for applications in calorimetry, and can contribute to the research and training interactions between high-energy physics groups in the U.S. and China. This proposal addresses an important scientific question and contributes to the NSF goals of human resource development. The National Science Foundation of China and NSF will jointly support this project.

Planning Visit to China Collaborative Study of the Extent of Late Pleistocene Glaciation on the Eastern Qinghai-Xizang Plateau, China
Award Number: 0209993
Start Date : April 1, 2002
Expires : March 31, 2003
Total Amt. : $11592
Investigator: Jeffrey Munroe jmunroe@middlebury.edu (Principal Investigator current)
Patrick M. Colgan (Co-Principal Investigator current)
Sponsor : Middlebury College
Old Chapel Building
Middlebury, VT 05753 802/388-3711

This is a proposal submitted by Dr. Jeffrey Munroe, Middlebury College, to request a planning visit to the Qinghai and Tibetan Plateau, China, to collect information for developing a cooperative study with Lanzhou University on late Pleistocene glaciation. This is an important topic for understanding the amount of water tied up in glacial ice. This visit can also provide a unique opportunity to two American investigators early in their career to visit the plateau and to enrich their knowledge of Asian continental glaciation with first-hand observations.

U.S.-China Cooperative Research: Study In Bimetallic Catalysis Between University of Delaware and Peking University
Award Number: 0321942

Start Date : September 1, 2003
Expires : August 31, 2006
Total Amt. : $40800
Investigator: Jingguang G. Chen jgchen@udel.edu (Principal Investigator current)
Sponsor : University of Delaware
Newark, DE 19716 302/831-2136

This is a cooperative project between Dr. Jingguang Chen, University of Delaware, and Professor Xie Youchang, Beijing University, on synthesis and characterization of bimetallic catalysts and their catalytic properties. The proposed research on the Ni/Pt bimetallic catalytic system project is innovative. The project provides opportunities to train U.S. students. The expertise involved in the U.S. and China is complementary and benefits are mutual. The project is jointly supported by the National Science Foundation and the National Science Foundation of China.

A Planning Visit to China: Cretaceous Extensional Basins above the Louzidan Detachment, Inner Mongolia, China -- Cooperative Reconnaissance
Award Number: 0320578
Start Date : August 1, 2003
Expires : July 31, 2004
Total Amt. : $8994
Investigator: Bradley D. Ritts ritts@cc.usu.edu (Principal Investigator current)
Sponsor : Utah State University
Sponsored Programs Office
Logan, UT 843221415 435/797-1226

Dr. Bradley Ritts, Utah State University, proposes a planning visit to Inner Mongolia, China to carry out a field reconnaissance of Cretaceous Extension Basins above the Louzidan Detachment. The purpose of this visit is for him to develop a full research proposal. In addition, this project will provide opportunities for two U.S. graduate students to gain the field experience in this area. The project is jointly supported by the National Science Foundation and the Chinese Academy of Sciences.

A Planning Visit to China: Cooperative Research Between Nanjing University and the University of Missouri
Award Number: 0309074
Start Date : July 15, 2003
Expires : June 30, 2004
Total Amt. : $2420
Investigator: Eric Sandvol sandvole@missouri.edu (Principal Investigator current)
Sponsor : U of Missouri Columbia
Office of Sponsored Prgm Admin
Columbia, MO 65211 573/882-7560

This is a planning proposal for Dr. Eric Sandvol, the University of Missouri, to visit Nanjing University to develop a collaborative project on tectonics and seismic structure of the Tien Shan Mountain belt. This is an important region in China for understanding seismic hazard determination. The proposed visit will allow Dr. Sandvol to lay the foundation for developing this US-China collaborative project.

U.S.-China Workshop: Strategic Management of Technology and Innovation
Award Number: 0224602
Start Date : September 1, 2002
Expires : August 31, 2004
Total Amt. : $60815
Investigator: Mingfang Li mli@csun.edu (Principal Investigator current)
Sponsor : Univ Corp, Northridge Fdn
18111 Nordhoff Street
Northridge, CA

This workshop award supports fifteen American researchers in technical innovation to meet with leading Chinese researchers in technical innovation on the occasion of the Third International Symposium on Management of Technology, Hangzhou, China, October 2002. The U.S. and Chinese researchers will exchange information and explore opportunities for collaborative research in an area of research, namely technical innovation, that has been identified by NSF and the National Natural Science Foundation of China together as a key area of policy discussion and joint research during the first decade of the 21st century. Members of the U.S. and Chinese teams have participated in two NSF-NSFC sponsored policy dialogues. This bilateral workshop extends to discussions toward greater research collaboration.

U.S.-China Research Development Visit with EASI: Experimental Study on Humanoid Robots
Award Number: 0314120
Start Date : April 1, 2003
Expires : March 31, 2004
Total Amt. : $26000
Investigator: Ning Xi xin@egr.msu.edu (Principal Investigator current)
Sponsor : Michigan State University
East Lansing, MI 48824 517/355-1855

The project is about a planning visit for developing collaborative research work in developing collaborative research work in in humanoid robots with researchers at the CAS Institution of Automation in China. The proposed study would contribute to the advanced humanoid robot systems, strengthening the research collaboration between U.S. and China in the subject area.

AWARE U.S.-China Cooperative Research on Pleistocene Hunter-Gatherers of the Tibetan Plateau

Award Number: 0214870
Start Date : July 1, 2002
Expires : June 30, 2005
Total Amt. : $137190
Investigator: P. Jeffrey Brantingham pjb@santafe.edu (Principal Investigator current)
Sponsor : Santa Fe Institute
1399 Hyde Park Road
Santa Fe, NM 875016188 505/984-8800

This is a 36-month AWARE project submitted by Dr. Jeffery Brantingham, Santa Fe Institute with Professor MA Haizhou, Qinghai Institute of Salt Lakes, Xinning, China, to study the Pleistocene hunter-gatherers of the Tibetan Plateau, and to provide an REU training opportunity for six "exceptional" U.S. undergraduate students. This is an excellent proposal to understand late Pleistocene human colonization and adaptation to the Qinghai-Tibet Plateau region. This study nicely integrates archeological, paleo-environmental, and geochronological research strategies to answer questions of broad importance in the study of evolution of behaviorally modern humans. This project provides excellent opportunities for U.S. undergraduate students to be trained in archeology and to learn to carry out field research in the western part of China. It also develops paleoclimatic proxy records that can be integrated into regional and global models of climate variability and change. The NSF and the Chinese Academy of Sciences jointly support this project.

Interdisciplinary Workshop Introducing Physicists and Chemists to Ions in Protein Channels

Award Number: 0221738
Start Date : August 1, 2002
Expires : July 31, 2003
Total Amt. : $26000
Investigator: Robert S. Eisenberg beisenbe@rush.edu (Principal Investigator current)
Sponsor : Rush-Pres St Luke Med Ctr
1653 West Congress Parkway
Chicago, IL 606123809 312/942-5479

This is a 12 month project submitted by Dr. Robert Eisenberg, Rush-Presbyterian St. Luke's Medical Center to request funds for 12 U.S. participants to attend a five-day U.S.-China workshop on introduction of physicists and chemists to ions in protein channels, to be held in Nanjing and Chongqing October 12-18, 2002. This is an interdisciplinary

workshop to introduce physicists and chemists to relevant problems in biology. Bringing these scientists together to focus on problems in a different discipline, with their counterpart researchers from East Asia is a laudable goal. The NSF provides partial support to the U.S. participants to attend this conference. The National Science Foundation of China, Nanjing University of Chemical Technology, the Hong Kong University, and the University of Utah also provide support to this workshop.

Us-China Collaboration Research: Developing True-Cmos Miniature Inductors With Stacked-Via Magnetic Cores For Rf Soc

Award Number: 0302449
Start Date : August 1, 2003
Expires : July 31, 2006
Total Amt. : $87960
Investigator: Albert Z. Wang awang@ece.iit.edu (Principal Investigator current)
Sponsor : Illinois Inst of Tech
3300 South Federal Street,
Chicago, IL 606163793 312/567-3035

This is a cooperative project between Dr. Albert Wang, Illinois Institute of Technology, and Professor Feng Zhenghe, Tsinghua University, proposing to develop miniature inductors for RF System-on-Chip using innovative techniques. The research has potential application to wireless communication technologies and can significantly impact on the semiconductor IC industry. The project provides opportunities to train U.S. Stdents. The project is jointly supported by the National Science Foundation and the National Science Foundation of China.

Dissertation Enhancement: Dialectical Thinking, Stereotyping, and Intergroup Relations

Award Number: 0242474
Start Date : April 15, 2003
Expires : March 31, 2005
Total Amt. : $12935
Investigator: Kaiping Peng kppeng@socrates.berkeley.edu (Principal Investigator current)
Sponsor : U of Cal Berkeley
Berkeley, CA 94720 415/642-6000

This is a two-year dissertation enhancement project submitted by Dr. Kaiping Peng, and Julie Rodgers, Ph.D. student, University of California at Berkeley, in collaboration with Professors Lei Wang and Yubo Hou, Beijing University, to conduct three experiments on dialectical thinking, stereotyping and inter-group relations. The proposed work addresses an

important question on cultural differences in cognition science. The award would support the career development of a Ph.D. student of promise and would support international collaborations that benefit research on culture and cognition. This project is jointly supported by the National Science Foundation of China and NSF.

International Collaboration on NIRT Grant: Electrodesposition of Nanostructured Multilayers

Award Number: 0231279
Start Date : February 15, 2003
Expires : January 31, 2004
Total Amt. : $9957
Investigator: Elizabeth J. Podlaha podlaha@che.lsu.edu (Principal Investigator current)
Wanjun Wang (Co-Principal Investigator current)
Sponsor : La St U & A&M Coll
330 Thomas Boyd Hall
Baton Rouge, LA 70803 225/578-3386

This award supports collaborative research between Drs. Elizabeth Podlaha and Wanjun Wang of Louisiana State University, Dr. Henrikas Cesiulis of Vilnius University in Lithuania, and Dr. Jinhui Lan of Tsinghua University in China, in connection with Drs. Podlaha and Wang's Nanoscale Science and Engineering NIRT grant (0210832) for development of novel electrodeposited nanostructured multilayered alloys for microelectromechanical systems (MEMS). The U.S. researchers will benefit from Dr. Cesiulis' expertise in the area of electrodeposition and from Dr. Lan's expertise in the area of sensor development.

BE/CNH: Complex Interactions Among Policies, People, and Panda Habitat in the Wolong Nature Reserve Landscape

Award Number: 0216450
Start Date : September 1, 2002
Expires : February 28, 2006
Total Amt. : $1099999
Investigator: Jianguo Liu jliu@perm3.fw.msu.edu (Principal Investigator current)
Sponsor : Michigan State University
East Lansing, MI 48824 517/355-1855

Human activities are widely recognized as a major force behind rapid landscape changes and loss of biodiversity around the world, including those in numerous nature reserves. Many studies have found that government policies can significantly shape human activities, but most of those studies have focused on a single policy at a time and ignored the interactive effects among various policies. Little is known about the complex interactions among the effects of multiple policies on the spatial-temporal dynamics of biodiversity such as wildlife habitat. Studying the interrelationships of various policies for

biodiversity conservation is critical and urgent because multiple policies often are implemented simultaneously. These policies may be nonlinearly complementary or counterproductive. An excellent site for studying such interactions is Wolong Nature Reserve in Sichuan Province in southwestern China. The reserve, which is 200,000 hectares in size, is one of the largest homes to world-famous endangered giant pandas and several thousand other animal and plant species. There are also more than 4,000 local residents and a variety of human activities in the reserve, such as farming and fuelwood collection. Since the establishment of the reserve in 1975, human population size has increased by more than 70 percent. This rapidly increasing human population plays a novel and unique role in degrading the pandas' habitat. To prevent further degradation of panda habitat and promote habitat restoration, the Chinese government is implementing three conservation policies in the reserve: an eco-hydropower plant program (to eliminate fuelwood consumption), a natural forest conservation program (to prevent illegal forest harvesting), and a grain-to-green program (to return cropland to forest). The interactive effects of these policies on local people and panda habitat are uncertain, however. The objectives of this research project are (1) to assess the interactions among the three policies and local residents; (2) to evaluate the interrelationships between local residents and panda habitat; (3) to examine the need for and feasibility of policy modification and improvement; and (4) to model and simulate multi-scale interactions among policies, people, and panda habitat across space and time. The methods to be used in this study include field observations, face-to-face interviews with stakeholders, geographical information systems, remote sensing, global positioning systems, statistical tools, systems modeling and simulation, and advanced computer visualization techniques. In addition to addressing many fundamental ecological and socioeconomic questions, the research will be tightly integrated with the education of students from elementary school to graduate school as well as outreach to various stakeholders from local to international levels.

The project will have significant implications for biocomplexity theory, methodology, and application. In terms of theory, this project will shed light on complex patterns and interrelated processes (e.g., nonlinearity, thresholds, feedback, uncertainty) among multiple policies, humans, and wildlife habitat at multiple spatial and temporal scales. Regarding methodology, the research will take a systems approach by integrating multidisciplinary methods and advanced technologies to investigate the complexity of the study system. With respect to application, the project will provide practical information for conserving panda habitat in Wolong, and it will provide useful insights for designing and improving policies that attempt to balance the needs of biodiversity conservation and economic development in the world's most populous nation. The findings also will be of general interest to many other parts of the world because of escalating human pressures and increasingly complicated human-nature interactions. This project is supported by an award resulting from the FY 2002 special competition in Biocomplexity in the Environment focusing on the

Dynamics of Coupled Natural and Human Systems.

Collaborative Research: AWARE -- International Linkages of Center for Intelligent Maintenance Systems on Web-Enabled and Tether-free Technologies
Award Number: 0220488
Start Date : August 1, 2002
Expires : July 31, 2005
Total Amt. : $100000
Investigator: Jun Ni junni@engin.umich.edu (Principal Investigator current)
Sponsor : University of Michigan
3003 S State St. RM 1062
Ann Arbor, MI 481091274 734/764-1817

This award supports a three-year collaborative research and education program between the Center for Intelligent Maintenance Systems (IMS) and counterpart centers/laboratories in China, Hong Kong, Japan, Korea and Australia. IMS is an NSF multi-campus Industry/University Cooperative Research Center between the University of Wisconsin-Milwaukee and the University of Michigan-Ann Arbor. The Center is focused on web-enabled technologies and predictive intelligence to enable products and manufacturing systems to achieve near-zero-downtime performance. IMS is developing a Web-enabled Manufacturing, Maintenance and Service Education, Training and Research Program in partnership with government, industry, and international institutions. Through the international center-to-center projects supported by this award, IMS will advance a) a comprehensive, multidisciplinary and highly collaborative research agenda, b) a cross-university educational curricula, c) virtual student research teams, and d) global educational experiences for American students. A critical element of the program will be the placement of U.S. undergraduate and graduate students in internships in the foreign partner laboratories to collaborate on research projects that are an integral part of the IMS research agenda.

Collaborative Research: AWARE -- International Linkages of Center for Intelligent Maintenance Systems on Web-Enabled and Tether-free Technologies
Award Number: 0219792
Start Date : August 1, 2002
Expires : July 31, 2005
Total Amt. : $150000
Investigator: Jay Lee jaylee@uwm.edu (Principal Investigator current)
Muammer Koc (Co-Principal Investigator current)
Sponsor : U of Wisconsin Milwaukee
P O BOX 340
Milwaukee, WI 532010340 414/963-4444

This award supports a three-year collaborative research and education program between the Center for Intelligent Maintenance Systems

(IMS) and counterpart centers/laboratories in China, Hong Kong, Japan, Korea and Australia. IMS is an NSF multi-campus Industry/University Cooperative Research Center between the University of Wisconsin-Milwaukee and the University of Michigan-Ann Arbor. The Center is focused on web-enabled technologies and predictive intelligence to enable products and manufacturing systems to achieve near-zero-downtime performance. IMS is developing a Web-enabled Manufacturing, Maintenance and Service Education, Training and Research Program in partnership with government, industry, and international institutions. Through the international center-to-center projects supported by this award, IMS will advance a) a comprehensive, multidisciplinary and highly collaborative research agenda, b) a cross-university educational curricula, c) virtual student research teams, and d) global educational experiences for American students. A critical element of the program will be the placement of U.S. undergraduate and graduate students in internships in the foreign partner laboratories to collaborate on research projects that are an integral part of the IMS research agenda.

The new benchmark for competitive manufacturing companies is a paradigm shift to web-enabled engineering focused on e-intelligence for integrated product design, manufacturing and service. These transformations require a new breed of leaders, engineers and scientists who are internationally astute and knowledgeable in technical, social, economical and cultural issues in a global environment.

Proposed Establishment of Pacific Rim Application and Grid Middleware Assembly (PRAGMA), 2002-2003 Workshop series

Award Number: 0216895
Start Date : March 1, 2002
Expires : February 29, 2004
Total Amt. : $104944
Investigator: Peter W. Arzberger parzberger@sdsc.edu (Principal Investigator current)
Philip M. Papadopoulos (Co-Principal Investigator current)
Sponsor : U of Cal San Diego
9500 Gilman Drive, Dept. 0934
La Jolla, CA 920930934 858/534-0246

This is a proposal submitted by Dr. Peter Arzberger requesting funds to establish a Pacific Rim and Grid Middleware Assembly (Network). To accomplish this, he requests the involvement of domain scientists and technologies in the Pacific Rim countries through a series of working meetings (3 in 2002, 1 in 2003, and 1 in 2004) to accelerate daily use of the GRID for advancing science. The development and deployment of the East Asia GRID middleware and application network is critical for the cooperation in information technology between the U.S. and East Asia. This effort will promote a regional collaboration in software development and form a partnership between the U.S. and key western Pacific Rim countries, such as Australia, China, Japan, Korea, Singapore, Taiwan, and Thailand. Efforts to promote this

technology throughout Asia and the world could enhance the development of worldwide standards to make grid-enabled computing and resource sharing a reality. The initial efforts will be supported jointly by the Chinese Academy of Science, Korea Institute of Science and Technology Information, the Taiwan National Science Council and NSF.

NSF AWARDS FOR U.S.-CHINA COLLABORATION IN EARTH SCIENCES UNDER THE EARTHQUAKE STUDIES PROTOCOL
January 1, 2002-December 31, 2003

Investigation of Archean Ophiolites and Oceanic Crust and Mantle Fragments in Melange, North China Craton: Implications for Archean Tectonics

Award Number: 0207886
Award Instr.: Continuing grant
Start Date : June 1, 2002 Expires : April 30, 2005
Total Amt. : $99907
2002: $33,515
2003: $32,691
2004: $33,701
Investigator: Timothy M. Kusky kusky@eas.slu.edu (Principal Investigator current)
Sponsor : Saint Louis University
3634 Lindell Blvd, 3rd Floor
St. Louis, MO 631083395 314/997-2241

Understanding Archean crustal and mantle evolution hinges upon proper identification and characterization of oceanic lithosphere. The PI has discovered and reported a complete, albeit slightly dismembered and metamorphosed, Archean ophiolite sequence in the North China Craton. The top of the ophiolitic succession is marked by sulfide-rich chert and banded iron fon-nation overlying several tens-to one hundred meters of variably deformed pillow lavas. These grade down through a mixed dike/pillow lava section into a 2 km thick I 00% sheeted dike complex mapped continuously for more than 5 km along strike; reconnaissance mapping suggests that the dike complex may extend for more than 20 km. The dikes consist of diabase, basalt and hb-pyx-gabbro. Most have chilled margins developed on their NE sides, but not their SW sides, indicating one-way chilling. The sheeted dike complex is underlain by several km of mixed isotropic and foliated gabbro, which develop compositional layering approximately 2 km below the sheeted dikes, and then over several hundred meters merge into strongly compositionally layered gabbro and olivine-gabbro. The layered gabbro becomes mixed with layered pyroxenite/gabbro marking a transition zone that grades into cumulate ultramafic rocks including dunite, pyroxenite and wehrlite, and finally into strongly defon-fied and serpentinized olivine and orthopyroxene-bearing ultramafic rocks that may be depleted mantle harzburgite tectonites. The PI has obtained a U/Pb zircon age of 2.505 Ga from gabbro of the Dongwanzi ophiolite, making it the world s oldest recognized, laterally- extensive complete ophiolite sequence. Study of this remarkable ophiolite may offer the best constraints yet on the nature of the Archean oceanic crust and mantle, and offer insights to the style of Archean plate tectonics and global heat loss mechanisms. The Dongwanzi ophiolite is one of the largest well-preserved greenstone belts in the Zunhua structural belt (part of the Central orogenic belt),that divides the North China craton into eastern

and western blocks. More than I 000 other fragments of gabbro, pillow lava, sheeted dikes, harzburgite, and podifonn-chromite bearing dunite occur as tectonic blocks in a blotite- gneiss matrix in the Zunhua structural belt. The PI interprets these rocks as an Archean ophiolitic melange and recognize that some of the blocks preserve deeper levels of oceanic mantle than the Dongwanzi ophiolite. The PI and co-workers have designed a comprehensive series of studies to fully document the field, structural, geochronological, mineralogical, and chemical characteristics of this ophiolite and related melange. They will assess what these data mean in ten-ns of Archean crustal and mantle evolution, thermal state of the early Earth, and ideas about Precambrian plate tectonics. They regard this as an unsurpassed opportunity to evaluate fundamental properties of Archean crust and mantle, and to understand processes critical for evaluating Archean oceanic crustal and mantle evolution. Understanding Archean oceanic processes in the North China craton will provide a valuable contrast with similar processes recorded in younger ophiolites, indicating how mid-ocean ridge processes may have evolved from a period of high heat production to one of lower heat production. Detailed mapping will accurately delineate the extent, thickness, and relationships between individual units, which is important for understanding mechanisms of Archean sea floor spreading and heat loss. Structural analysis of mantle tectonites will reveal deformation conditions in the Archean oceanic mantle. U/Pb geochronology will be used to establish the age and duration of magmatism represented in the ophiolite and document the structural chronology by dating igneous dikes and plutons that intruded between different events, as deten-nined by mapping. Geochemical analyses will be aimed at determining relationships between the crustal and depleted mantle components of the ophiolite, and comparing these data with younger ophiolites from different tectonic settings, and also from Archean greenstone belts, some of which may include severely dismembered Archean ophiolite fragments. Analyses will include major, minor, trace, REE, and several isotopic systems (in collaboration with geochemists from several cooperating institutions)and will be used to assess crustal and mantle evolution. Archean oceanic lithospheric structure is likely to have been as complex and variable as that in the present-day plate mosaic. Documentation of the characteristics of the Dongwanzi ophiolite and related rocks may serve as the first reference column for Archean oceanic lithosphere, since it is the most complete Archean ophiolite known on the planet.

GPS Study of the Kinematics of the Intersection of the Tarim, Tien Shan, and Pamir

Award Number: 0208303
Start Date : June 1, 2002 Expires : May 31, 2003
Total Amt. : $100000
Investigator: Bradford H. Hager brad@chandler.mit.edu (Principal Investigator current)
Thomas A. Herring (Co-Principal Investigator current)
Sponsor : MIT

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Cambridge, MA 021394307 617/253-1000

High quality results from a dense GPS network spanning the Central Tien Shan, from Kazakhstan, through Kyrgyzstan, and into China, reveal a relatively simple kinematic picture to the east of the Talas-Ferghana fault. GPS velocities from several independent studies agree that there is ~20 mm/yr convergence between the Tarim Basin and the Kazakh platform, about half the total convergence between the Indian and Eurasian plates. GPS velocities from the PI's dense network show that convergence is localized on a handful of structures. Slip rates on these structures inferred from both geologic studies and geodetic studies agree remarkably well. The PI's have used this new geodetic data, in conjunction with a simple block model that accounts for elastic strain accumulation, to invert for the motions of crustal blocks in the region. Notable results include much less right-lateral motion on the Talas-Ferghana fault than the previous geological estimate, rotation of the Ferghana Valley at ~0.8 degree/myr (a fraction of the long-term geologic rate from paleomag), and convergence across the Alay valley between the Pamir and Southern Tien Shan of ~20 mm/yr, comparable to previous estimates. However, existing geodetic coverage in the west, across the Talas-Ferghana fault into the Ferghana basin, and south across the Alay valley and South Tien Shan and into the Pamir, is both more sparse and less accurate than that in the Central Tien Shan. These rates of strike-slip motion on the Talas Ferghana fault, rotation of the Ferghana basin,and convergence across the Alay valley are not well constrained. For example, the inferred rate of rotation of the Ferghana basin differs by a factor of two depending upon which GPS results are used to constrain the model. Clearly, more observations are needed to obtain results in this area comparable in usefulness to those obtained to the east. In addition, the proposed joint analysis of the PI's raw GPS data with that taken by others (GFZ and CSB) will provide a combined solution with improved accuracy. In collaboration with colleagues at the Russian Institute for High Temperature Physics (known as IVTRAN)in Kyrgyzstan, the PI's propose to install 20 new sites in western Kyrgyzstan and Uzbekistan. The Chinese Seismological Bureau (CSB)in Wuhan, China, will work with us to install additional sites in northwestern Xinjiang Province in China (exact number and locations to be determined after a visit to the field). The PI's collaborators will survey these sites, as well as existing sites that GFZ, IVTRAN, and CSB previously installed in the region, in order to unravel the kinematics of the area where the Tien Shan, Ferghana Basin, Pamir, and Tarim Basin intersect. In addition to analyzing the GPS data, they will also use simple continuum mechanics-based models to interpret the GPS velocities that they obtain in terms of geologic motions.

Paleomagnetic Study of Indo-Asian Convergence and the Central Asian Shallow-Inclination Problem Using 33-45 Ma Volcanic Rocks Newly Discovered in Northern Tibet

Award Number: 0310309
Award Instr.: Continuing grant
Start Date : July 1, 2003
Expires : June 30, 2005
Total Amt. : $286757
2003: $139,598
2004: $147,059
Investigator: Xixi Zhao xzhao@earthsci.ucsc.edu (Principal Investigator current)
Robert S. Coe (Co-Principal Investigator current)
Sponsor : U of Cal Santa Cruz
1156 High Street
Santa Cruz, CA 950641077 408/429-0111

The PI's will carry on a paleomagnetic research program on newly discovered volcanic rocks in central Qiangtang of northern Tibet, where Ar-Ar dates on lava flows, dykes, and volcanic cones have recently been obtained. As part of the intellectual merit of the proposed activity, they seek answers to the following two leading questions: (1) The first is the consistent pattern of disturbingly low paleolatitudes derived from a large number of high-quality paleomagnetic studies of Tertiary rocks from sites that reach all the way from eastern China to Kyrgyzstan, 3,000 km to the west. The difference between these paleolatitudes and those expected from paleomagnetic reference poles for Eurasia averages 18 degrees in western China and Kyrgystan, implying northward displacements relative to Siberia in the Tertiary that are much larger than geological estimates of shortening across intervening mountain belts. The reliability of these mainly sedimentary paleomagnetic data must be tested before we can evaluate how much of the discrepancy is tectonic, geomagnetic, and rock magnetic. (2) The second problem is the history of Indo-Asian convergence and terrane accretion in Tibet. The existing evidence concerning this subject is interpreted in a wide variety of ways, resulting in controversy over the timing and geometry of terrane accretion both within Tibet and between Tibet and Eurasia. In particular, the PI's seek answers to the solution of two important tectonic problems in the tectonic evolution of the region: namely, the apparent dilemma in paleolatitudes for Lhasa, west Qiangtang, Tarim, and Junggar blocks in late Cretaceous and early Tertiary, and terrane accretion history between east and west Qiangtang block.

Reliable paleomagnetic data are needed to answer these questions. The approach is framed by these debates. The PI's will concentrate their sampling in volcanic rocks wherever promising sections are available, to avoid the risk of our being misled by the spurious inclination shallowing that often affects sedimentary rocks. They will also make a representative sampling of red beds that are associated with the volcanics and with fold tests. In this way they will be able to assess the magnetic fidelity of redbeds. Successful completion of the paleomagnetic program proposed here will, for the first time, produce reliable paleomagnetic results from Cenozoic volcanic rocks and red beds in northern

Tibet, which are directly involved in the debate over Cenozoic inclination shallowing in central Asia. The new paleomagnetic results will also provide pole positions and paleolatitudes to constrain the rate calculation for Indo-Asian convergence. The expertise in paleontology, geochronology, petrology, rock magnetism, and structural and field geology of Chinese colleagues, who hail from three universities in China, ensures the necessary support for this research and argues strongly for the chances of success. The PI's anticipate the following broader impacts of the proposed activity: (1) results will be presented at national meetings, reported to the NSF, and published in international peer- reviewed journals; (2) some of the results of the research will also be introduced into both undergraduate and graduate classrooms; (3) graduate and undergraduate student researchers will be directly involved in both field and laboratory work; and (4) findings on the extent of Indo- Asian convergence and the timing of Tibetan uplift may help lead to a better understanding of the effects of the Tibetan Plateau on global climate.

Petrology and Mineral Chemistry of Crust and Mantle Fragments in an Archean Ophiolite from the North China Craton

Award Number: 0228592
Start Date : January 1, 2003
Expires : December 31, 2003
Total Amt. : $74562
Investigator: Claude T. Herzberg herzberg@rci.rutgers.edu (Principal Investigator current)
Sponsor : Rutgers Univ New Brunswick
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New Brunswick, NJ 08901 732/932-0150

Theories on the FeO content of the Archean
mantle are difficult to test because direct rock samples that were melted to produce basaltic crust have never been identified and described. Uncertainties in mantle FeO content have profound consequences on understanding mantle dynamics because Fe is much heavier than all other rock-forming elements, and even a modest iron-enrichment must be compensated by large temperature increases in order to maintain neutral buoyancy. Therefore, the recent discovery of a complete ophiolite with tectonized mantle peridotite from the North China Craton (Kusky et al., 2001; Science 292, 1142-1145) is of monumental importance because it has created an unprecedented opportunity for constraining the FeO content of the Archean mantle.

Unfortunately, the
mantle samples from the North China Craton have been metamorphosed, and the extent to which the original Archean geochemistry has been modified is not presently known. We plan on evaluating whether it is feasible to extract from these samples the original mantle FeO content in a 1-year exploratory pilot

project. We will use the JEOL-8600 Superprobe with Advanced Microbeam upgrade at Rutgers University to obtain chemistry data on metamorphic and possible relect igneous minerals. Microimage software will be used to obtain modal analyses of 1-4 million points per thin section, and this will permit a mass balance calculation to be made of whole rock major element geochemistry. Mineral and whole rock chemistry obtained at Rutgers University will be crosschecked with whole rock major element geochemistry obtained by collaborator A. Polat at Windsor University (Canada) using XRFS. These data will be compared with the composition of mantle peridotite from abyssal peridotites and ophiolites of Phanerozoic ages. Any differences in composition will be evaluated in terms of possible: 1) different igneous T-P histories, 2) metamorphric alteration effects, or 3) secular variations in mantle composition.

Career: Geochemistry of Redox-Sensitive Elements and Osmium and Uranium Isotopes in Large Pristine Rivers

Award Number: 0134966
Start Date : April 15, 2002
Expires : March 31, 2007
Total Amt. : $374995
Investigator: Youngsook Huh huh@earth.northwestern.edu (Principal Investigator current)
Sponsor : Northwestern University
633 Clark Street
Evanston, IL 602081110 847/491-3003

Continental weathering is an important component of global geochemical cycles and is one of the most significant determinants of the atmospheric CO2 levels, and hence climate, on geologic time scales. Weathering of organic carbon is an important source of CO2; weathering of silicates a sink. The long-term goal of the PI's research is to understand the mechanisms and magnitudes of continental weathering in various pristine environments at present and to then project the results into the geologic past using suitable proxies. In this endeavor, characterizing the behavior of different chemical elements as a function of weathering environment is important. The PI proposes to study weathering of organic carbon rich reducing sediments as manifested in large pristine rivers. This proposal describes an integrative approach using redox-sensitive, oxyanion-forming elements (Re, Mo, V, U) and the Os isotopic system (187Os/188Os) intimately related to them. These elements are enriched in reducing sediments and are released as soluble oxyanions when they undergo fast oxidative weathering.

The proposed research activities consist of three parts: field work, instrumental analyses and data interpretation. Field work will be carried out in western China,

eastern Tibet, and northern Vietnam, areas affected by the Himalayan collision but whose fluvial geochemistry is poorly understood. This will be a continuation of the successful collaboration with scientists in China and Vietnam. A graduate student at Northwestern University and visiting scholars from China/Vietnam will be involved in all three activities. At undergraduate students level, this research will be integrated into the Analytical Methods in Geochemistry course that the PI is developing to strengthen the interdisciplinary Environmental Science Program at Northwestern University.

This work will provide fundamental understanding of the behavior of redox-sensitive elements and Os isotopes, which is in turn important in deciphering the paleo-environments of the Earth. Additional benefit is documenting the present weathering regime of the Upper Yangtze, which is important for the Chinese scientists in their attempt to monitor the effect of the Three Gorges Dam and erosion of top soil that is becoming a serious problem. Also, a clear comparison can be made between the undeveloped headwaters and the agriculturally impacted lower reaches of the Chinese and Vietnamese rivers.

Early Salamanders from Northern China
Award Number: 0126451
Start Date : February 1, 2002
Expires : January 31, 2005
Total Amt. : $174977
Investigator: Neil H. Shubin nshubin@uchicago.edu (Principal Investigator current)
Keqin Gao (Co-Principal Investigator current)
Sponsor : University of Chicago
5801 South Ellis Avenue
Chicago, IL 606371404 773/702-8602

Salamanders are one of the major groups of living amphibians. Unfortunately, very little is known about their early evolution because early salamander fossils have not been recovered. Indeed until now, only two species from the relevant time was known. We are now presented with an unusual opportunity to investigate major questions of salamander evolution and diversity. Over the past three years, we have recovered more than 800 superbly preserved salamander specimens from the earliest parts of salamander history. These sites, from northern China, contain a highly diverse and well preserved fauna of salamanders. Access to these sites has been granted and they can readily be quarried in an effort to recover even more specimens. The importance of these sites and this material lies in its age (these are among the earliest known salamanders), its abundance (hundreds of articulated skeletons can be collected from each site), its taxonomic diversity (several different families are present), its life-history diversity (many different parts of the life cycle are are all preserved), and its exceptional

preservation (soft-tissue impressions are often present). Major goals of this project include: 1. to collect new fossils from and assess the relative age of the exceptional fossil-bearing units northern China, 2. to describe new fossil salamanders and revise known taxa, 3. to access the evolutionary and geographic history of fossil and Recent salamanders, and 4. to use the exquisite preservation of the new salamander material to address how morphological variation has evolved.

Travel to Assess Soil Erosion and Environmental Problems in Western China
Award Number: 0224491
Start Date : May 15, 2002
Expires : April 30, 2003
Total Amt. : $20000
Investigator: William A. Sprigg wsprigg@u.arizona.edu (Principal Investigator current)
Sponsor : U of Arizona
601 Administration Building
Tucson, AZ 85721 602/621-2211

Funds are requested ($22,721) to allow three U.S. scientists to participate in the 12th Conference of the International Soil Conservation Organization in Beijing, to help launch research under the Sino-U.S. Centers for Soil and Water Conservation and Environmental Protection, and to participate in, and report on, the opening ceremonies of the joint Centers in Yangling, China. The principal investigator, the director of the U.S. arm of the joint Centers, will also coordinate Centers' research plans with personnel in other Chinese ministries and the U.S. Embassy, all of whom potentially play important roles in determining the success of the Centers. The facilitator for the Centers' Joint Organizing Committee and a remote sensing specialist complete the trio. These funds will ensure participation of non-federal representatives among a larger delegation of Federal agency staff representing the Centers.

Small Grants for Exploratory Research: Collaborative Project: Rapid Response to the November 14, 2001 Kunlun Fault Earthquake
Award Number: 0209434
Start Date : March 1, 2002
Expires : February 28, 2003
Total Amt. : $51975
Investigator: Zheng-Kang Shen zshen@hercules.ess.ucla.edu (Principal Investigator current)
David D. Jackson (Co-Principal Investigator current)
Sponsor : U of Cal Los Angeles
10920 Wilshire Blvd.
Los Angeles, CA 900241406 310/794-0102

Scientist from
the University of Alaska, University of California Los Angeles, and the China Seismological Bureau are carrying out a a rapid response to the November 14, 2001 Mw~7.9 Kunlun fault earthquake in Tibet. This earthquake provides a unique opportunity to measure the postseismic deformation of an M~8 earthquake that occurred within a pre-existing geodetic network in which relative site velocities are known to about 1 mm/yr., Three continuously recording GPS sites near the rupture and a fourth about 150 km away were established one week after the event by the China Seismological Bureau. Also, 17 existing and new GPS sites along the Qinghai-Tibet highway were surveyed in December, 2001. A second field campaign is extending GPS network westward from the Qinghai-Tibet highway, adding new sites along the fault on either side of surface rupture in the near field. This survey is repeating measurements at all of the sites surveyed in November-December, providing the initial postseismic results. These measurements will lead to a better understanding of the rheological structure of the exceptionally thick northern Tibetan crust as well as the postseismic processes triggered by such a large event.

The Middle to Late Jurassic Terrestrial Vertebrate Faunal Transition in Northwestern China: A Paleontologic, Stratigraphic, and Geochronologic Study
Award Number: 0310217
Award Instr.: Continuing grant
Start Date : October 1, 2003
Expires : September 30, 2007
Total Amt. : $302999
2003: $85,592
2004: $119,108
2005: $73,026
2006: $25,273
Investigator: James M. Clark jclark@gwu.edu (Principal Investigator current)
Xing Xu (Co-Principal Investigator current)
David Eberth (Co-Principal Investigator current)
Sidney R. Hemming (Co-Principal Investigator current)
Sponsor : George Washington Univ
2121 Eye Street NW
Washington, DC 200372353 202/994-6255

The late Middle through early late Jurassic (Callovian through Oxfordian) is one of the most poorly known intervals in the terrestrial vertebrate fossil record. The Shishuqou Formation of the Xinjiang Autonomous Region of northwestern China preserves a rich sequence of fossils spanning this period. This is an important time in the history of modern terrestrial vertebrates because many group (mammals, birds, crocodilians, squamates, frogs, salamanders) were just beginning to diversify and the single supercontient of Pangea with its cosmopolitan fauna was just beginning to divide. Furthermore, several groups of dinosaurs that would diversify and dominate the Cretaceous

(i.e., sauropods, ornithopods, stegosaurs, ankylosaurs, and coelurosaurs) first appeared and radiated during Middle and Late Jurassic. Thus, fossils from the Shishugou Formation can contribute to an understanding of the most basic relationships and early evolution within the major groups of modern tetrapods and dinosaurs and the beginning of modern faunal provinciality. The four year project proposed here combines palentological studies of the fossils with stratigraphic, peleoenvironmental, and geochronological studies of the sediments and volcanic deposits to document the fauna and establish a calibrated stratigraphic framework for faunal change within the formation.

Support is requested for 1) further field work to collect more vertebrate fossils, including a program of screenwashing for microvertabates; 2) field work establishing the stratigraphic and palenivornment distributions of taxa in the formation and any correlations between them 3) museum studies documenting these in the and related fossils and laboratory studies dating the tuffs and bentonites and determining their geochemical composition. These separate lines of research will be synthesized into a calibrated model for fanual and environmental change in the formation that is integrated with existing regional tectonics and paleoclimatic interpretations.

SGER Proposal: Fluvial Incision Rates in the Three Gorges of the Yangtze River

Award Number: 0329404
Start Date : May 15, 2003
Expires : April 30, 2004
Total Amt. : $14400
Investigator: Eric Kirby ekirby@geosc.psu.edu (Principal Investigator current)
Sponsor : PA St U University Park
110 Technology Center
University Park, PA 168021503 814/865-4700

One of the most striking aspects of the landscape east of the Tibetan Plateau, in China's Sichuan Province, is that tributaries of the Yangtze river are actively incising through Mesozoic bedrock of the Sichuan basin and the Eastern Sichuan Fold Belt (a Triassic-Jurassic fold belt related to the collision between the North and South China cratons). This incision is recorded by flights of strath (bedrock) terraces hundreds of meters above all of the major tributaries and the main stem of the Yangtze that extend nearly 500 km outboard of the plateau. Preliminary Chinese data suggest that all of these terrace sequences are Quaternary in age, implying relatively rapid, recent incision (hundreds of meters/m.y.). The question of what is driving this incision - whether it reflects a base-level change on the Yangtze or whether it is the result of active rock uplift beneath the fold belt and Sichuan basin - is essentially unknown. If regional terrace correlations are to be believed, the highest terraces in the landscape increase in elevation downstream, toward the fold belt. Clearly something interesting is going on -

either the river has reversed course, the terrace profiles have been warped by regional deformation, or the terraces are miscorrelated. The PI proposes to examine the timing and rates of fluvial incision along the Yangtze River through the Three Gorges region in an effort to begin to test these hypotheses. The Three Gorges region (located in the fold belt, east of the Sichuan basin) represents the key locality for the following reasons: o East of the Three Gorges, the Yangtze transitions to a depositional system on the coastal floodplain. Bedrock incision is confined to the reaches upstream of this point.

The reach through the Gorges effectively sets the local base-level for the entire upstream basin. o The Gorges region contains the highest flights of fluvial terraces, presumably reflecting the greatest rates of incision. o The Three Gorges themselves are developed in limestone-cored anticlines. Numerous cave systems are developed adjacent to the river, affording the opportunity to trap fluvial sediment. The PI proposes to establish a chronology of river incision by exploiting a technique for determining the age of fluvial sediment in caves adjacent to the river from the radioactive decay of cosmogenically produced isotopes (Granger et al., 1997). Broader Impacts This proposal will support a joint American - Chinese field expedition to the region, fostering intellectual exchange between the two groups. In particular, this research will expose Chinese colleagues to a new and developing technique for dating fluvial sediments in caves. In addition, the results of this work will be the first radiometrically-determined estimates of the timing and rates of development of the Three Gorges.

Small Grants for Exploratory Research: Collaborative Proposal Rapid Response to the November 14, 2001 Kunlun Fault Earthquake

Award Number: 0209892
Start Date : March 1, 2002
Expires : February 29, 2004
Total Amt. : $5722
Investigator: Jeffrey T. Freymueller (Principal Investigator current)
Sponsor : U of Alaska Fairbanks
109 ASC
Fairbanks, AK 99775 907/474-7314

Scientists from the University of Alaska, University of California Los Angeles, and the China Seismological Bureau are carrying out a a rapid response to the November 14, 2001 Mw~7.9 Kunlun fault earthquake in Tibet. This earthquake provides a unique opportunity to measure the postseismic deformation of an M~8 earthquake that occurred within a pre-existing geodetic network in which relative site velocities are known to about 1 mm/yr., Three continuously recording GPS sites near the rupture and a fourth about 150 km away were established one week after

the event by the China Seismological Bureau. Also, 17 existing and new GPS sites along the Qinghai-Tibet highway were surveyed in December, 2001. A second field campaign is extending GPS network westward from the Qinghai-Tibet highway, adding new sites along the fault on either side of surface rupture in the near field. This survey is repeating measurements at all of the sites surveyed in November-December, providing the initial postseismic results. These measurements will lead to a better understanding of the rheological structure of the exceptionally thick northern Tibetan crust as well as the postseismic processes triggered by such a large event.

Paleobiology of the Doushantuo Formation: Multiple Taphonomic Windows into the Late Neoproterozoic Biosphere

Award Number: 0207555
Start Date : August 15, 2002
Expires : October 31, 2003
Total Amt. : $159904
Investigator: Shuhai Xiao (Principal Investigator current)
Sponsor : Tulane University
6823 St. Charles Avenue
New Orleans, LA 701185665 504/865-4000

This study will focus on the Neoproterozoic Doushantuo Formation (550 - 600 Ma) in South China. The Doushantuo Formation was deposited across the Yangtze Platform in South China during a critical geological time interval, - probably after the Neoproterozoic climatic crises but before the Ediacaran radiation of macroscopic animals. The Doushantuo Formation is also known to contain three extraordinarily clear taphonomic windows preserved in phosphorites, cherts, and carbonaceous shales. These complementary taphonomic windows allow us to understand the taphonomic bias associated with each taphonomic pathway and, in combination, they provide a more complete picture of the Neoproterozoic biosphere. The goals of this study is to improve our knowledge about the early evolution of multicellular organisms by further documenting phosphatized, silicified, and carbonaceous biotas in the Doushantuo Formation, to understand the constraints imposed by these different taphonomic pathways by comparing and contrast these taphonomic windows, and to expand the investigation of Doushantuo paleobiology into deep-water facies. The PI and his colleagues will conduct extensive fieldwork on the Doushantuo Formation in the next three years in order to understand its distribution, sedimentary environment, and paleobiology.

SGER: Primitive Cambrian Echinoderms of the Kaili Fauna from Taijaing County, Guizhou Province, Peoples Republic of China

Award Number: 0207292
Start Date : August 1, 2002

Expires : July 31, 2003
Total Amt. : $9461
Investigator: Ronald Parsley parsley@tulane.edu (Principal Investigator current)
Sponsor : Tulane University
6823 St. Charles Avenue
New Orleans, LA 701185665 504/865-4000

PI will spend a month (August, 2002) in China studying primitive Middle Cambrian echinoderms from the Kaili Fauna at the Guizhou University of Technology in Guiyang as well as at the Nanjing Institute of Geology and Paleontology in Nanjing. There are very good possibilities that primary symmetry in echinoderms (based on the symmetry of the ambulacral system), early evolutionary development of columnar structures and their holdfasts can be deduced from some of the material. Most specimens are preserved as molds and extensive latex casting will be an important part of the data gathering. At present there is good evidence that the sediments associated with the fossils are not extensively bioturbated, which makes the mode/mechanism of attachment to the bottom very important: it will be extensively investigated. Study of this material may well open up a whole new understanding of the early evolution of this important biotic group and the collections are available at this time for joint investigation with Chinese colleagues.

Geologic Versus Geodetic Rates of Convergence in the Southwestern Tien Shan, China
Award Number: 0230403
Award Instr.: Continuing grant
Start Date : March 1, 2003
Expires : December 31, 2005
Total Amt. : $272212
2003: $90,271
2004: $85,187
2005: $96,754
Investigator: Douglas W. Burbank burbank@crustal.ucsb.edu (Principal Investigator current)
Sponsor : U of Cal Santa Barbara
Office of Research
Santa Barbara, CA 93106 805/893-4188

Research in the southern Tien Shan is defining geologic strain gradients, actual patterns and rates of long-term deformation at time scales ranging from 10,000 -10,000,000 yr, and changes in those rates through time. The research area is characterized by two contrasting styles of structural deformation within an existing geodetic network. In the northern Tarim basin, north-vergent detachment folds presently deform the >9 km of Cenozoic basin fill. In a more

proximal position farther north, south-vergent thrust faults cut purported Quaternary conglomerates and have carried their bedrock hangingwalls >15 km southward along very low-angle (perhaps at the surface) detachments. Field data being gathered in this region permit tests of the following hypotheses:

1. Geodetic strain rates in the southern Tien Shan are matched by Quaternary rates of shortening in the southernmost detachment folds (northern Tarim basin). 2. Despite striking changes in both style and vergence of Late Cenozoic deform-ation across the Tien Shan margin, rates of shortening since approximately 5 My have remained steady. 3. Even though the detachment folds are north-vergent, the more northerly ones formed earliest.

If the first
hypothesis is true, it suggests that geodetic shortening may be accommodated by large (approximately magnitude 8) earthquakes on low-angle detachments analogous to those in the Lesser Himalaya. Structural and chronologic data are being collected using four primary approaches: geologic mapping across the southern margin of the Tien Shan, chronologies of syn- and pre-tectonic, Upper Cenozoic strata via magnetostratigraphy, surveying and dating of deformed Late Quaternary fluvial terraces, and analysis of reflection seismic profiles. The end product will provide: a test of geologic versus geodetic rates in a contractional fold-and-thrust belt; a reconstruction of the pattern, style, and rates of deformation across the SW Tien Shan; insights into why contrasting deformation patterns developed here; a new model for propagating deformation during intracontinental mountain building; and an estimate of earthquake hazards.

High Resolution Chronostratigraphic Constraints on Terminal Paleozoic Crises and Recovery in the Circum-Tethys Region
Award Number: 0125799
Award Instr.: Continuing grant
Start Date : January 1, 2002
Expires : December 31, 2004
Total Amt. : $285134
2002: $93,110
2003: $99,021
2004: $ 93,003
Investigator: Roland Mundil rmundil@bgc.org (Principal Investigator current)
Paul R. Renne (Co-Principal Investigator current)
Kenneth Ludwig (Co-Principal Investigator current)
Sponsor : Berkeley Geochronology Cen
2455 Ridge Road
Berkeley, CA 947091211 510/644-9200

This research program is intended to improve the calibration of late Permian through Triassic biostratigraphic and magnetostratigraphic time scales towards an enhanced understanding of the terminal Paleozoic environmental and biotic crisis and subsequent Mesozoic recovery. Improved time scales are critical to realistic evaluation of the causes of, and interrelationships between, the various observed biotic and paleoenvironmental anomalies that characterize this transition. Our initial radio-isotopic age data (both U/Pb and Ar/Ar) are at variance with recent studies, many of which favor a rapid extinction caused by a bolide impact. Although an impact at or near the P-T boundary cannot be excluded a priori, a more gradual scenario and a causal relation between the massive continental basalt volcanism in South China at the end of the Permian and Siberia at the Permian-Triassic boundary - possibly in combination with other factors - and the biotic crisis must be considered. Despite the dramatic increase in available geochronologic data for the Late Permian through Early Triassic interval, crucial questions remain unanswered and will be addressed: 1) How synchronous are global biostratigraphic correlations across the Permo-Triassic boundary, and how precisely can biostratigraphic, geochemical, lithostratigraphic, and other records be correlated? 2) What are the temporal relations between terrestrial and marine records across the Permo-Triassic boundary? 3) What was the rate of the biotic recovery in the Early Triassic? 4) Do interlaboratory discrepancies (either physical or by interpretation) between high-precision U/Pb zircon ages for the Permo-Triassic boundary undermine the inferred extremely rapid chronology of extinction events? Indeed, how reliable is U/Pb zircon geochronology as a Phanerozoic time scale method?

Monazite as a Sensitive Indicator of the Timing and Type of Fluid Activity During Metamorphism

Award Number: 0126020
Award Instr.: Continuing grant
Start Date : January 1, 2002
Expires : December 31, 2004
Total Amt. : $195459
2002: $75,324
2003: $67,486
2004: $52,649
Investigator: John C. Ayers john.c.ayers@vanderbilt.edu (Principal Investigator current)
Calvin F. Miller (Co-Principal Investigator current)
Sponsor : Vanderbilt University
Station B Box 7749
Nashville, TN 372357749 615/322-2631

The susceptibility of monazite to fluid-induced recrystallization has important implications for interpretation of ages measured in-situ by electron or ion microprobe. To refine

interpretations, complementary laboratory and field experiments have been designed to identify and characterize monazite recrystallization and alteration in granitoids and associated rocks. The solubility of monazite will be measured as a function of pressure, temperature and fluid composition using the double-capsule method to identify the conditions and fluid compositions that lead to enhanced solubility and recrystallization. Experiments run in cold-seal pressure vessels at 400-600 degrees C and 0.1-0.2 GPa will characterize the effects of varying concentrations of potential complexing ligands F, Cl and OH. Large natural crystals will then be run in fluid at identified conditions of high solubility to characterize the rate of recrystallization and the effect of alteration on intracrystalline zoning and elemental and oxygen isotopic composition. Duplication of zoning styles and oxygen isotope systematics observed in natural monazites will create a firm link between monazite alteration and fluids, establish the conditions under which alteration occurs, and greatly increase confidence in interpretations of monazite ages.

Field studies are designed to test the hypothesis that the ages of altered zones in monazites correspond to the timing of fluid influx, and to test important hypotheses specific to those field areas. The effects of changing temperature, fluid composition, and fluid/rock ratio on preexisting monazite will be examined in contact metamorphic aureoles in which magmatic fluids infiltrate monazite-bearing country rocks: the Ireteba pluton in southern Nevada, the Birch Creek pluton in the White Mts. of east-central California, and the Red Hill W-Sn deposit in northern Guangdong Province, Southeast China. Fruitful geochronological studies of monazite and zircon in the Dabie Shan central UHP (ultra-high pressure) zone will be extended to the enigmatic northern Dabie complex to determine the areal extent of UHP metamorphism and the assignment of the northern Dabie to the Yangtze or Sino-Korean blocks.

SGER: An Exploratory Study of Surface Wave Dispersion in the Indian Ocean, Indian Subcontinent and Western China

Award Number: 0342931
Start Date : September 15, 2003
Expires : August 31, 2004
Total Amt. : $26428
Investigator: Francis T. Wu wu@binghamton.edu (Principal Investigator current)
Sponsor : SUNY Binghamton
Vestal Parkway East
Binghamton, NY 13901 607/777-2000

Two of the world's first order geophysical features are found in India and its surrounding areas. First, the Himalaya and the Tibetan plateau are by far the most outstanding topography of the Earth; based on all available evidence it is known that the northward motion of the Indian subcontinent is the root

cause that led to its formation. But what were the geological processes in the interior of the Earth in this area as the subcontinent plowed northward? Furthermore, in the geoidal map of the world, the Indian Ocean basin and southern India area is marked by the largest low anomaly. This geoidal low implies that there is a relative mass deficiency under the area, but at what depth and how much? Why did it form? The mechanisms that led to their formation most probably left traces in the crust and mantle under this area. A detailed mapping of the crust and upper mantle is therefore the first step toward understanding the processes. Only recently data from high quality portable seismic stations and a permanent network came into existence and data from these networks have accumulated to a degree when significant analyses can be preformed. The proposed work here will be performed in cooperation with Dr. S.S. Rai of National Geophysical Research Institute (NGRI), Hyderabad, India. We plan in the short term to use surface waves to image the lateral variations as well as resolution of upper mantle (down to ~300 km) structures. Our longer-range plan is to conduct a comprehensive surface wave tomographic study of the area.

Collaborative Research: Initiation and Long-Term Slip History of the Altyn Tagh Fault System, Northern Tibetan Plateau, NW China: A Tertiary Basin Piercing Point Study

Award Number: 0207364
Start Date : July 1, 2002
Expires : June 30, 2004
Total Amt. : $164606
Investigator: Stephan A. Graham graham@pangea.stanford.edu (Principal Investigator current)
Sponsor : Stanford University
651 Serra Street
Stanford, CA 94305 650/723-2300

The Altyn Tagh fault system, which delineates the northern edge of the Tibetan Plateau, is one of the largest and most striking, yet also most enigmatic features attributed to collision between India and Eurasia. In spite of a generally poor understanding of the structural geology and slip history of the Altyn Tagh fault, its tectonic significance has been the subject of much speculation, and the fault figures prominently in models of the Himalayan-Tibetan orogen. Recent attempts to gain better knowledge about the Altyn Tagh fault have primarily used indirect methods to interpret age of fault initiation and magnitude of displacement, or geodetic techniques to interpret slip rate. Direct investigation of fault displacement using geologic piercing points has not been widely attempted. As a result three critical questions remain concerning the offset history of the Altyn Tagh fault: (1) What is the age of initiation of the Altyn Tagh fault? (2) How has the slip-rate on the Altyn Tagh fault varied over geologic time? (3) How does the magnitude of slip

vary along the length of the Altyn Tagh fault? In order to answer these three questions it is essential to identify pre-slip and multiple syn-slip piercing points on each segment of the fault. These piercing points will allow the history of offset on the fault to be determined for each segment of the fault (western, central, and eastern) and thus demonstrate slip magnitude, slip rate, and variation in these parameters along the length of the fault. The proposed study will directly address the Tertiary slip history of the Altyn Tagh fault and the distribution of slip on the fault, by identifying multiple Eocene-Upper Pliocene sediment-source matches across the fault for ten Tertiary basins that are truncated by the Altyn Tagh fault. By identifying multiple piercing points of various ages from a single basin, the slip history for that segment of the fault ca be reconstructed throughout the Tertiary. Furthermore, by examining a series of basins along the length of the fault, along-strike changes in displacement can be documented. These results will provide a robust and unambiguous data set from which the timing and rate of faulting can be directly determined, and that will also allow ideas about systematic changes in slip magnitude along the fault to be tested. The PI's prior work on the Altyn Tagh fault (Ritts, 1998; Yue and Liou, 1999; Ritts and Biffi, 2000; Sobel et al., 2001; Yue et al., in review) has demonstrated their ability to identify and document piercing points of a variety of ages and a variety of types on the Altyn Tagh fault. The proposed research includes documentation of lithostratigraphy and chronostratigraphy, physical sedimentology and lithofacies, provenance, and paleocurrents of ten Tertiary sedimentary basins that are truncated by the Altyn Tagh fault. Two major field seasons will focus on the characterization of sedimentary basins as well as potential sediment source terranes on the opposite side of the fault. Fieldwork in the Tertiary basins will include description of measured sections, collection of paleocurrent and conglomerate composition data, and geological mapping. Fieldwork in potential sediment source areas will focus on lithologic description and verification of Chinese mapping, as well as collection of potential source units for analytical work. Analytical techniques will be applied to conglomerate clasts and potential source units in order to test sediment-source correlations that are proposed based on field data. These techniques will include petrographic examination, trace and major element geochemistry, and U-Pb and 40 Ar/ 39 Ar geochronology. Biostratigraphic analysis of mudstones will be used to confirm the ages of the Tertiary units. This study will constrain the geology of Tertiary basins in order to construct a series of time- displacement curves to characterize the history and along-strike variability of the Altyn Tagh fault. The resulting data will better define the role that the Altyn Tagh fault plays in accommodating Cenozoic convergence between India and Asia, and thereby distinguish the relative importance of mechanisms such as extrusion tectonics in continental deformation.

Collaborative Research: Initiation and Long Term Slip History of the Altyn Tagh Fault System, Northern Tibetan Plateau, NW China: A Tertiary Basin Piercing

Point Study
Award Number: 0207115
Start Date : July 1, 2002
Expires : June 30, 2004
Total Amt. : $85334
Investigator: Bradley D. Ritts ritts@cc.usu.edu (Principal Investigator current)
Sponsor : Utah State University
Sponsored Programs Office
Logan, UT 843221415 435/797-1226

The Altyn Tagh fault system, which delineates the northern edge of the Tibetan Plateau, is one of the largest and most striking, yet also most enigmatic features attributed to collision between India and Eurasia. In spite of a generally poor understanding of the structural geology and slip history of the Altyn Tagh fault, its tectonic significance has been the subject of much speculation, and the fault figures prominently in models of the Himalayan-Tibetan orogen. Recent attempts to gain better knowledge about the Altyn Tagh fault have primarily used indirect methods to interpret age of fault initiation and magnitude of displacement, or geodetic techniques to interpret slip rate. Direct investigation of fault displacement using geologic piercing points has not been widely attempted. As a result three critical questions remain concerning the offset history of the Altyn Tagh fault: (1) What is the age of initiation of the Altyn Tagh fault? (2) How has the slip-rate on the Altyn Tagh fault varied over geologic time? (3) How does the magnitude of slip vary along the length of the Altyn Tagh fault? In order to answer these three questions it is essential to identify pre-slip and multiple syn-slip piercing points on each segment of the fault. These piercing points will allow the history of offset on the fault to be determined for each segment of the fault (western, central, and eastern) and thus demonstrate slip magnitude, slip rate, and variation in these parameters along the length of the fault. The proposed study will directly address the Tertiary slip history of the Altyn Tagh fault and the distribution of slip on the fault, by identifying multiple Eocene-Upper Pliocene sediment-source matches across the fault for ten Tertiary basins that are truncated by the Altyn Tagh fault. By identifying multiple piercing points of various ages from a single basin, the slip history for that segment of the fault ca be reconstructed throughout the Tertiary. Furthermore, by examining a series of basins along the length of the fault, along-strike changes in displacement can be documented. These results will provide a robust and unambiguous data set from which the timing and rate of faulting can be directly determined, and that will also allow ideas about systematic changes in slip magnitude along the fault to be tested. The PI's prior work on the Altyn Tagh fault (Ritts, 1998; Yue and Liou, 1999; Ritts and Biffi, 2000; Sobel et al., 2001; Yue et al., in review) has demonstrated their ability to identify and document piercing points of a variety of ages and a variety of types on the Altyn Tagh fault. The proposed research includes documentation of lithostratigraphy and chronostratigraphy, physical sedimentology and

lithofacies, provenance, and paleocurrents of ten Tertiary sedimentary basins that are truncated by the Altyn Tagh fault. Two major field seasons will focus on the characterization of sedimentary basins as well as potential sediment source terranes on the opposite side of the fault. Fieldwork in the Tertiary basins will include description of measured sections, collection of paleocurrent and conglomerate composition data, and geological mapping. Fieldwork in potential sediment source areas will focus on lithologic description and verification of Chinese mapping, as well as collection of potential source units for analytical work. Analytical techniques will be applied to conglomerate clasts and potential source units in order to test sediment-source correlations that are proposed based on field data. These techniques will include petrographic examination, trace and major element geochemistry, and U-Pb and 40 Ar/ 39 Ar geochronology. Biostratigraphic analysis of mudstones will be used to confirm the ages of the Tertiary units. This study will constrain the geology of Tertiary basins in order to construct a series of time- displacement curves to characterize the history and along-strike variability of the Altyn Tagh fault. The resulting data will better define the role that the Altyn Tagh fault plays in accommodating Cenozoic convergence between India and Asia, and thereby distinguish the relative importance of mechanisms such as extrusion tectonics in continental deformation.

Collaborative Proposal: Active Faulting Within the Eastern Tibetan Margin and Western Sichuan Basin, P. R. China

Award Number: 0125565
Start Date : February 1, 2002
Expires : January 31, 2005
Total Amt. : $198125
Investigator: Michael A. Ellis ellis@ceri.memphis.edu (Principal Investigator current)
Alexander L. Densmore (Co-Principal Investigator current)
Sponsor : University of Memphis
Administration 315
Memphis, TN 38152 901/678-2533

The eastern margin of Tibet is one of the most enigmatic plateau margins in the world. Elevations rise from less than 500 m within the Sichuan Basin to more than 6.5 km over a distance of about 30 to 50 km. This is steeper than the Himalayan front, which owes its origin to the active thrusting of the Indian subcontinent under Tibet. In stark contrast to the Himalaya, however, the eastern margin of Tibet shows insignificant evidence of active thrusting. Moreover, the lack of a significant sedimentary basin adjacent to the margin and the absence of geodetic shortening further testify to the insignificance of active thrusting.

New field investigations indicate that while active thrusting is indeed scarce, there is ample evidence for significant active

strike-slip faulting. Initial reconnaissance field investigation reveals three and possibly four significant right-lateral strike-slip faults that trend NE, and two major left-lateral strike-slip faults that trend ~N-S. Research is now focused on determining the rates and detailed geometry of these faults, each of which are critical components in planned attempts at constraining relative crustal motions in the region. These observations are able to constrain the various proposed hypotheses and therefore enable us to understand the evolution of this part of the Tibetan margin.

Early investigation has also revealed the likelihood of significant active faulting within the Sichuan Basin. This is of particular concern, because the suspect faults may represent significant strong ground motions and the Sichuan Basin is home to about 60 million people.

Rates of fault slip are being determined by a careful sampling strategy whereby the ages of landforms that have been offset by faulting are being estimated by cosmogenic radionuclide analyses. The style and pattern of active faulting is being determined by a combination of imagery analysis, topographic analyses, and detailed field mapping in regions previously identified during reconnaissance field work. The combination of slip rates and fault geometry yields a set of kinematics that discriminate among the competing models.

NSF AWARDS FOR U.S.- CHINA COLLABORATION IN EARTHQUAKE ENGINEERING AND HAZARDS MITIGATION

UNDER ANNEX 3 OF THE
EARTHQUAKE STUDIES PROTOCOL
January 1, 2002-December 31, 2003

4th US-China-Japan Symposium on Lifeline Earthquake Engineering
Award Number: 0237444
Start Date : October 1, 2002
Expires : March 31, 2004
Total Amt. : $6300
Investigator: Anne S. Kiremidjian ask@stanford.edu (Principal Investigator current)
Sponsor : Stanford University
651 Serra Street
Stanford, CA 94305 650/723-2300

The objective of this proposal is to support the travel of several of the US participants to Qingdao, China, to participate in the 4th US-Japan-China Symposium on Lifeline Earthquake Engineering on October 28-31, 2002. Twelve papers are presented from US participants who have submitted papers to the symposium. Of those, three participants are supported by the Pacific Earthquake Engineering Center (PEER), three are supported by the Mid-America Earthquake Center (MAE) and three are supported by the Multidisciplinary Center on Earthquake Engineering Research (MCEER). This project supports the travel funds for the remaining three participants plus partial publications costs for the conference material.

A joint agenda for research in lifeline earthquake engineering is developed as a result of the symposium. The research agenda is agreed upon by the representatives from the three participating countries. The challenges in lifeline earthquake engineering are identified and specific approaches are proposed. Use of innovative technologies and the new laboratory/instrumentation at the NEES sites will be a particular new focus for the research agenda to be discussed at the symposium. The broad impact of the symposium are (1) the identification of specific research needs that are relevant to the US; (2) research areas where collaboration between the US, China and Japan are particularly suitable and desirable; and (3) mechanisms for developing joint research programs between specific institutions in the US and respective organizations in China and Japan. Findings from the symposium are included in the symposium proceedings volume, which will be made public and will be used in subsequent activities.

Four women are included in the US delegation one of which is a starting assistant professor and one is a young research scientist. Results of the symposium will enable the development of a concrete plan for lifeline earthquake engineering research with a specific

focus on the development of advanced technologies that will take the field to the next level of advancement.

Lifelines, which include transportation,
water, sewage, power, and communications systems are key to for any civilized nation's survival, particularly after major disasters. This area of earthquake engineering has received little attention in the past decade. Events of the September 11, 2001, have demonstrated, as all other prior major earthquake events and natural disasters, that the ability of a community to recover from a major disaster depends extensively on the availability and rapid recovery of the infrastructure of the region. Thus, it is important that this research be pursued. Research results will continue to make significant changes in the design and performance of civil infrastructures.

Innovative Signal Analysis Techinques for Health Monitoring Systems and Sensing Materials

Award Number: 0140710
Award Instr.: Continuing grant
Start Date : April 1, 2002
Expires : February 28, 2005
Total Amt. : $265695
2002 amount:: $84,421
2003 amount: $88,524
2004 amount: $92,750
Investigator: Jann N. Yang jnyang@uci.edu (Principal Investigator current)
Sponsor : U of Cal Irvine
300 University Tower
Irvine, CA 926977600 949/824-4768

One important link in the health monitoring system is the data processing techniques, including the corresponding theory and algorithms, to extract relevant information for a rapid assessment of the state of the structure from a large amount of measured data. Such a link has been pointed out during many conferences as one of the weakest link in the sensor-based health monitoring system of civil infrastructures. This project is aiming at the development of innovative and efficient data processing techniques, based on the Hilbert-Huang spectral analysis, for the damage detection, condition assessment and integrity evaluation of civil infrastructures. New and efficient methodologies will be developed for: (i) damage detection and system identification of linear structures, (ii) determination of the optimal placement of sensors, (iii) damage detection and system identification of nonlinear structures, including conservative (elastic) and nonconservative (hysteretic) nonlinear structures, and (iv) preliminary assessment of structural damages after an extreme event, such as strong earthquakes, all based on the Hilbert-Huang spectral analysis. Further, Hilbert-Huang spectral analysis computer software modules for incorporating into the sensor-based monitoring systems of civil infrastructures

will be developed. This proposal is a part of an integrated collaborative research effort among U.S.A., Hong Kong and P.R.C., under the US-China Protocol for Scientific and Technical Cooperative Research on Earthquake Engineering and Hazard Mitigation. Basically, advanced health monitoring system research for civil infrastructure systems will be conducted at Hong Kong Polytechnic University (HPU); advanced sensor technology will be developed at Harbin Institute of Technology (HIT), China; sensing materials for sensors will be investigated at Institute of Engineering Mechanics (IEM), China; advanced and smart damping and devices will be developed at University of Notre Dame (UND); and novel data processing techniques will be developed at the University of California, Irvine (UCI). In addition, Dr. N. E. Huang of NASA Goddard Flight Center, who is the pioneer of the Hilbert-Huang spectral analysis, will collaborate with us in the proposed research efforts to develop novel data processing techniques for sensor-based monitoring systems for civil infrastructures. The research proposed herein is unique, which is different from all the data analysis techniques currently available. The Hilbert-Huang spectral analysis can be used to develop powerful techniques with which intrinsic nonstationary and nonlinear characteristics of the measured response signals can be extracted. The results of this research are expected to have a significant impact not only on the state-of-the-technology in data analyses for the sensor-based health monitoring systems of structures but also on the sensor technologies to be developed by the collaborative research institutions in U.S.A., Hong Kong and China.

Travel Support for Fifth International Conference on Stochastic Structural Dynamics (SSD'03)

Award Number: 0301279
Start Date : March 1, 2003
Expires : February 29, 2004
Total Amt. : $20000
Investigator: Ruichong Zhang rzhang@mines.edu (Principal Investigator current)
Y.K. Lin (Co-Principal Investigator current)
Sponsor : Colorado School of Mines
1500 Illinois
Golden, CO 804011887 303/273-3200

Stochastic structural dynamics (SSD) is a broad technical field, and is concerned with random variabilities of structural behaviors under dynamic loads. The random variabilities may be caused by the uncertainties in loads, material properties, construction processes, and others. The most well known random loads include earthquake, winds, ocean waves, as well as man-produced forces, vehicles and machines. Randomness in material properties is inherent in the distributions of grain sizes and orientations at the micro- or even nano-scales. The imprecisions in construction or manufacturing processes are unavoidable. All these uncertainties must be considered at the design and

retrofit levels, from the point of view of possible structural failure, motion instability, and other unacceptable performance standards, as well as control strategies to avoid them. Following the successes of the previous four SSD conferences, all held within the US, the Fifth International Conference on Stochastic Structural Dynamics (SSD'03) will be held in Hangzhou, China on May 26-28, 2003. The objective is to bring together researchers and engineers involved in SSD and related fields throughout the world to exchange information on state-of-the-art research and state-of-the-practice. After a decade-long economic development, including construction of a large number of new structures with new materials, China provides a unique opportunity for the US participation of SSD'03 to identify the frontier research areas in structures and materials, especially for SSD applications. To date, more than 80 abstracts have been accepted, including 25 abstracts from the US, 30 from mainland China, and over 25 from other countries around the world. Partial travel support for US participants is requested.

BE: MUSES: Sustainable Concrete Infrastructure Materials and Systems: Developing an Integrated Life Cycle Design Framework

Award Number: 0329416
Start Date : September 1, 2003
Expires : August 31, 2008
Total Amt. : $1670000 (divided half, or $835,000, for collaboration with China and half for collaboration with Japan)
Investigator: Gregory A. Keoleian gregak@umich.edu (Principal Investigator current)
Victor C. Li (Co-Principal Investigator current)
Gloria Helfand (Co-Principal Investigator current)
Stephen E. Kesler (Co-Principal Investigator current)
Stuart A. Batterman (Co-Principal Investigator current)
Sponsor : University of Michigan
3003 S State St. RM 1062
Ann Arbor, MI 481091274 734/764-1817

This Biocomplexity in the Environment - Materials Use: Science, Engineering and Society (MUSES) project brings together researchers from three countries and seven disciplines to create models and evaluate new materials aimed at reducing the environmental impact of concrete used in large civil infrastructures. Global production of concrete drives huge flows of material between natural and human systems. The shear magnitude of this material flow, which exceeds 12 billion tons each year, causes significant societal impacts. For example, concrete-based infrastructure projects require major investments of public capital, trigger enormous greenhouse gas emissions from cement production, and lead to construction-related traffic congestion resulting in pollution and lost productivity. Developments of new materials to supplement or replace concrete to improve the performance characteristics typically do not address the broad economic, environmental, and social consequences. This

project will address this shortcoming by developing a novel framework for sustainable design that integrates microstructure tailoring with life cycle analysis. The project explores engineered cementitious composites (ECC) both from a technical design standpoint and from the health, economics, and policy perspectives. The project includes micro-scale research on the development of ECC, macro-scale application of ECC to bridge decks, roadways, and pipes, incorporation of recycled materials, measurement of life-cycle impacts, and investigation at different geographic scopes. This work encompasses multi-disciplinary perspectives including civil and materials engineering, geology, environmental health sciences, industrial ecology, environmental economics, and public policy. Among the issues to be explored are the impacts of sourcing alternatives (superquarries vs. smaller mines) and location of infrastructure projects (urban vs. rural, and U.S. vs. China). Given the inherent design complexity, researchers will incorporate uncertainty and sensitivity analysis in their quantitative models to ensure that results are sufficiently robust to support effective decision-making in the adoption of new materials. The University of Michigan team will collaborate with researchers at the Tohoku University in Japan, who will investigate the use of CO2 hardening process on the ECC mixes; researchers at Tsinghua University in China who will use the life cycle model to assess sustainability performance of infrastructure systems in China, and Stanford University. Educational outreach will be facilitated through a web-based educational resource compendium, as well as through a series of workshops involving the global partners. It is expected that this MUSES research will have a significant impact on materials use in large, civil infrastructures and will provide tools that will accelerate the adoption of new materials and material substitutions that lower the environmental impact over their whole life cycle.

Conducting an International Workshop on Sustainable Development and Concrete Technology

Award Number: 0307261
Award Instr.: Standard Grant
Start Date : March 15, 2003
Expires : February 28, 2005
Total Amt. : $20000
Investigator: Kejin Wang kejinw@iastate.edu (Principal Investigator current)
Sponsor : Iowa State University
2207 Pearson Hall, Room 15
Ames, IA 500112207 515/294-5225

Conducting an International Workshop on Sustainable Development and Concrete Technology

There is increasing concern about the issues such as
global warming and other ecological changes that have drastically influenced

the existence of life. Concrete industry is considered as one of the significant contributors to these changes. With the exponential growth of human population and industrialization, concrete is now used not only for buildings and roads but also for other civil infrastructure facilities such as underground mass transit facilities, wastewater treatment systems, and marine structures. Every year, approximately 1.6 billion tons of portland cement is produced worldwide, generating 5% of global carbon dioxide (CO2) emission. Annually, the concrete industry consumes 10 billion tons of sand and rock and 1 billion tons of water. Concrete greatly impacts the ecology of the planet Earth.

This proposal is to conduct an international workshop to address the above issues. The workshop will be hosted by Tsinghua University, in collaboration with other organizations. The goals of the workshop are to promote global interaction and foster research collaboration so as to develop a better understanding towards sustainable development using concrete technology. A steering committee, consisting of members from both US and China, will be formed for the workshop organization and implementation. US experts, especially women or minorities, on cement and concrete materials will be invited to the workshop, eight to ten of whom will be selected by the workshop committee and partially be supported by the proposed NSF travel grant.

The China
Building Material Academy (CBMA) will sponsor and jointly host the workshop with Tsinghua University. The Yangtze Survey, Planning, and Design Research Institute will co-sponsor the workshop. China Yangtze Power Corporation Ltd. will host and sponsor a field trip to Three Gorges. A proceeding of the workshop will be produced.

Workshop On Strong Motion Data Needs
Award Number: 0403755
Start Date : December 1, 2003
Expires : November 30, 2004
Expected
Total Amt. : $58016
Investigator: Wilfred D. Iwan (Principal Investigator current)
Robert K. Reitherman (Co-Principal Investigator current)
Sponsor : CUREE
1301 South 46th Street
Richmond, CA 948044698 510/231-9557

Abstract CMS-0403755, Wilfred D. Iwan, Consortium of Universities for Research in Earthquake Engineering Title: "Workshop On Strong Motion Data Needs"

This action is to support a workshop to review the existing

database of earthquake strong motion records, identify gaps that may exist in this data, determine and prioritize the needs for additional data, and make recommendations regarding future needs in strong motion research.

This workshop builds on previous influential workshops in the field of strong motion earthquake instrumentation, workshops that led to the successful installation of strong motion arrays in the United States, Taiwan, India, China, and Japan. These arrays have provided important data that have improved the understanding of strong earthquake ground motion and the effects of this motion on the built environment. Much has happened in the past few years, such as the current formation of the George E. Brown Jr Network for Earthquake Engineering Simulation. It is now time to take a fresh look at strong motion earthquake instrument deployment in light of new instrument technologies and significant new government monitoring and experimentation initiatives; to reassess the status of strong motion instrumentation in the United States; and to develop a new strategy to insure continued coordinated progress in this field.

In order to achieve this, the workshop will undertake the following tasks: 1) determine the status of strong motion instrumentation programs in the US and Mexico and the availability of data to the user community, 2) gather information on the status of strong motion instrumentation programs outside the US, and the extent to which critical data needed by US researchers and practitioners may be obtained from foreign sources, 3) identify the highest priority strong motion data needs for US programs, 4) develop possible strategies for obtaining needed strong motion data for research and application, including consideration of existing and planned strong motion programs of different Federal and State agencies, seismo-tectonic and geo-political factors, mobile versus fixed installations, and other issues, and 5) identify factors that need to be considered in cost/benefit analysis for strong motion instrumentation deployment. The primary focus of this Workshop will be on the engineering uses of strong motion data.

The workshop will
bring together leading experts on the subject of the collection and use of ground motion data and develop new concepts on priorities and needed developments.

Ground motion data have a pervasive influence. The
programs that collect and provide this data are a key research infrastructure in earthquake engineering. Modernizing strong motion databases and instrumentation programs will provide benefits that will accrue to many investigators in the field. Increasingly, accessibility to ground motion data repositories is providing opportunities for researchers and educators who are new to the earthquake engineering field.

Virtual Tribology Symposium
Award Number: 0343602
Award Instr.: Standard Grant
Start Date : October 1, 2003
Expires : September 30, 2004
Expected
Total Amt. : $10000
Investigator: Jane Q. Wang qwang@nwu.edu (Principal Investigator current)
Sponsor : Northwestern University
633 Clark Street
Evanston, IL 602081110 847/491-3003

Wang Partial support is provided for travel to The Sixth World Congress on Computational Mechanics, to be held in Beijing, China, during September 2-6, 2004. The support will be for about 15 graduate students, who will participate in a Symposium on Virtual Tribology at the Congress, and for about five faculty organizers of that symposium. The students will be selected from the PI's own institutions and from other institutions with active programs in tribology. Visits to the State Key Laboratory of Tribology at Tsinghua University will be included in the trip.

SENSORS: Novel Optical Fiber Sensors for Civil Engineering Structures
Award Number: 0329572
Award Instr.: Continuing grant
Start Date : September 1, 2003
Expires : August 31, 2006
Expected
Total Amt. : $270000
2003 amount: $90,000
2004: $90,425
2005: $89,575
Investigator: Maria Q. Feng mfeng@uci.edu (Principal Investigator current)
Sponsor : U of Cal Irvine
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Recent collapses of bridges and buildings due to earthquakes, accidents, and terrorist attacks have highlighted the urgent needs to monitor the condition of the nation's civil infrastructure systems. However, one of the major obstacles preventing sensor-based monitoring is the lack of reliable, easy-to-install, and cost-effective sensors that are suited for and can be densely deployed on large-scale civil infrastructure systems. This research focuses on development of a distributed optical fiber accelerometer system recently conceptualized by this PI. The sensor system represents a novel integration of the moir phenomena and fiber optics to achieve a robust

performance in addition to its immunity to EM interference, easy cabling, and multiplexing capability. All of these, impossible to achieve by the conventional sensors, make the proposed sensor system ideal for applications in civil infrastructure monitoring. The objective of this research is to investigate whether it is technically feasible to engineer the sensor concept into a high-performance and low-cost multiplexible optical fiber sensor system. Major research tasks include (1) development of a prototype accelerometer with optimal tradeoff between resolution and bandwidth, (2) development of software that further increases the sensor resolution through innovative measurement and signal processing, and (3) field test in the world largest Three Gorges Power Plant in China, where the conventional sensors are rendered inoperable due to strong EM interference, high moisture, and huge scale. The highly interdisciplinary nature and the international collaboration component of this project provide unique educational opportunities to undergraduate and graduate (including underrepresented) students. This research will advance scientific knowledge in the areas of innovative sensing concepts, signal processing, and field implementation. The proposed high-performance optical fiber sensors will have a positive impact on the safety and reliability of the nation's civil infrastructure.

Travel Support for International Conference on Heterogeneous Material Mechanics (ICHMM 2003)

Award Number: 0243682
Expires : February 28, 2005
Total Amt. : $15000
Investigator: David L. McDowell david.mcdowell@me.gatech.edu (Principal Investigator current)
Sponsor : GA Tech Res Corp - GIT
Office of Sponsored Programs
Atlanta, GA 303320420 404/385-0866

ICHMM 2003 Participant Support Program Abstract D.L. McDowell, Georgia Tech, Co-Chair of ICHMM 2003 The International Conference on Heterogeneous Material Mechanics (ICHMM 2003), to be held June 24-29, 2003 in China (http://www.ichmm.org), will highlight contemporary and emerging research directions of Asian, North American and European solid mechanics communities. It will provide both a traditional format in ChongQing (2.5 days), followed by working workshop-format sessions aimed at emergent research issues (2.5 days) on a cruise down the YangTze River. It is proposed that the US NSF provide $15,000 in participant support costs to foster attendance of key western participants. Tremendous cultural and technical diversity are major themes of the ICHMM 2003; we will encourage participation of underrepresented groups. The final report will include the list of participants and conference schedule, summary of panel discussions, and extended abstracts. ICHMM 2003 will have profound impact on scientific and cultural exchange of leading international segments of the solid mechanics community. The novel format of this meeting

will illuminate issues in emerging areas of common research emphasis (materials by design, nanomechanics, biomaterials, etc.) through both panel discussions and informal exchanges during the YangTze River segment.

Investigation of Large Coastal Bridge Performance in Hurricane Environment
Award Number: 0301696
Start Date : July 1, 2003
Expires : June 30, 2006
Total Amt. : $311565
Investigator: Chunsheng Cai cscai@Lsu.edu (Principal Investigator current)
Marc L. Levitan (Co-Principal Investigator current)
Dimitris E. Nikitopoulos (Co-Principal Investigator current)
Sponsor : La St U & A&M Coll
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When a hurricane strikes the coast, the results are often devastating. Even as storm prediction and tracking technologies improve, providing greater warning times, our nation is still becoming ever more susceptible to the effects of hurricanes due to the massive population growth in the south and southeast along the hurricane coast from Texas to Florida to the Carolinas. As backbones of transportation lines, coastal bridges are extremely important in supporting evacuations. In addition to the general wind- induced problems, long-span large coastal bridges on hurricane evacuation routes face the threats from the combination of hurricane-induced winds, heavy traffic, and their interactions. The objectives of the proposed study are: (1) to study the performance of large coastal bridges under the action of strong winds as well as heavy traffic. This situation happens in a scenario of hurricane evacuation; (2) to investigate the effect of temporary mass dampers in ensuring bridge safety and/or reducing bridge vibration. The temporary mass dampers can conveniently be driven on the bridge when needed and be removed otherwise; and (3) to advance the state-of-the-art of aerodynamic analysis of large bridges under strong winds.

In a typical aerodynamic analysis of long-span bridges, no traffic load is considered by assuming that bridges will be closed to traffic at high wind speeds. Therefore, bridges have been tested in the wind tunnel or analyzed numerically based on the pure bridge section without vehicles on it. However, during a hurricane evacuation, the bridges may be occupied by slowly moving traffic. On one hand, vehicles affect the modal characteristics and section shape of the bridge, which affects the aerodynamic behavior. On the other hand, the same vehicles may act like mass dampers that may help damp out some vibrations. The total effects of the traffic on bridge performance and also bridge vibrations on vehicles are not clear and no studies have been reported. While it is generally assumed (but still controversial) that

turbulence helps enhance bridge flutter velocity, the effects of hurricane-induced high turbulence on bridge stability haven't been adequately studied. These issues need to be addressed to ensure the safety of both bridge and vehicles during hurricanes and evacuations. While the developed procedures are intended for general coastal bridges, the Luling Bridge near New Orleans will be used as the primary subject of study. Both wind tunnel testing and numerical simulations will be conducted. The bridge performance will be investigated by arranging different traffic patterns to find the worst case for safety assurance, and find the optimal pattern that may be utilized for hazard mitigation (e.g., closing certain lanes). Another alternative is to develop a movable TMD system that can be driven on the bridges to act as a temporary vibration damper. The research activities and results will be incorporated into the new education curriculum - Hurricane Engineering developed at LSU with the NSF fund.

The proposed study is to address the issue of how large coastal bridges perform in hurricanes under evacuation conditions. The answer is very important since thousands of lives potentially hinge on the decision of when to close the evacuation routes too soon and people may be trapped in coastal areas subject to storm surge, too late and people may be on the bridge under unsafe conditions. The educational activities include high school outreaching, minority students recruiting, and technical information dissemination. These activities will promote minority participation, affect high school students career path, and foster future engineers to develop more systematical strategies in dealing with the most destructive hurricane hazards for years to come. International collaboration with Tongji University, China, will not only utilize the second largest boundary layer wind tunnel facility in the world, but will also foster further research and collaboration, increase the visibility of hurricane engineering in both countries, and combine the resources to deal with the worldwide engineering challenge of the 21st century . mitigating hurricane hazards. To achieve the research objectives, a unique team of researchers is formed. This team consists of Dr. Cai (PI) who has extensive expertise in wind vibration analyses, Dr. Levitan (co-PI), director of the LSU Hurricane Center and an expert in wind loading, Dr. Nikitopoulos (co-PI) is the Director of Wind Tunnel Laboratory with expertise in fluid dynamics and wind tunnel simulation.

MUSE: Materials and the Environment: A Binational Partnership for "Eco-Materials" Research and Education
Award Number: 0223891
Start Date : September 1, 2002
Expires : August 31, 2004
Total Amt. : $109497
Investigator: Gretchen Kalonji kalonji@u.washington.edu (Principal Investigator current)

Joyce S. Cooper (Co-Principal Investigator current)
Sponsor : U of Washington
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Seattle, WA 981056613 206/543-4043

For this MUSES planning activity, the University of Washington, in collaboration with Sichuan University in Chengdu, China, will undertake a set of workshops to generate a coordinated, binational plan for research and education in the area of the interaction of materials processing and use with the environment in our regions. The project will build teams on both sides, which on the faculty level, incorporate expertise in materials science, design for the environment, computational approaches to environmental modeling, and economics and social science. Significant roles for undergraduate and graduate students in the research and educational planning process are incorporated in the program design.

The program will support two planning workshops, one in Seattle and one in Chengdu, in which the binational teams will come together to more fully develop the research and educational agenda. There are three main foci for the collaboration 1) Design of comprehensive regional industrial ecology models for the effect of the materials processing industry on the environment. The regions of focus for this study are the Puget Sound Region and the Sichuan basin 2) Creation of a collaborative plan for research on materials for fuel cells, with a particular focus on the transportation sector, and; 3) Collaboration on the more effective incorporation of environmental issues in materials science curriculum.

As a concrete result of the workshops, detailed plans for ongoing partnerships will be generated which can be incorporated in proposals for more comprehensive funding to national research organizations in both countries, to private foundations, and to the industrial sector

Agent-Based Approach to Smart Sensing for Health Monitoring of Civil Infrastructure
Award Number: 0301140
Start Date : May 1, 2003
Expires : April 30, 2006
Total Amt. : $350000
Investigator: B. F. Spencer bfs@uiuc.edu (Principal Investigator current)
Sponsor : U of Ill Urbana-Champaign
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This investigation seeks to develop a broad foundation for innovative

smart sensing and health monitoring concepts utilizing advanced sensing, micro-processing, digital signal processing, wireless communication, and damage diagnostic methods. This work is aimed at providing near real-time structural condition assessment for extreme events (e.g., strong earthquakes), as well as long-term deterioration. The goal is to develop a computational framework that can take full advantage of the continuous and periodic wireless monitoring strategy and that can automatically and reliably detect possible damage locations or deteriorated regions in a structure. Autonomous agents and multi-agent systems represent an important new way of analyzing, designing, and implementing complex distributed computing systems represented by smart sensors. The Mote platform developed at the University of California at Berkeley with funding from the Defense Advanced Research Projects Agency (DARPA) offers, for the first time, an open hardware/ software environment for broad smart sensing research and will be employed as a basis for this research. The comprehensive research plan has four primary tasks: (i) design and construct new high sensitivity acceleration and strain sensors for the Berkeley-Mote platform to facilitate global/local monitoring of civil infrastructure systems, (ii) conceptualize, develop, and implement an agent-based framework for monitoring and damage detection in civil infrastructure systems based on the Berkeley-Mote platform, (iii) develop new structural health monitoring algorithms that can be executed in the smart sensor's distributed computing environment, and (iv) prototype and test developed hardware and software in both the laboratory and field environment. This effort includes a significant US-China collaborative portion with three institutions. Successful completion of this research is expected to accelerate economic and practical implementation of innovative strategies for protecting our respective nations' infrastructure.

International Conference on Advances and New Challenges in Earthquake Engineering Research

Award Number: 0215676
Start Date : May 1, 2002
Expires : April 30, 2004
Total Amt. : $90000
Investigator: B. F. Spencer bfs@uiuc.edu (Principal Investigator current)
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A unique professional consortium called the Asian-Pacific Network of Centers for Earthquake Engineering Research (ANCER) was established in 2001 in Seoul, Korea by 7 existing national earthquake engineering research centers. The vision of ANCER is to broaden the research and development impact and mitigation practices through cooperative activities that can be best advanced on a center-to-center basis over a large geographical area. ANCER will sponsor,

for the first time of this kind, the International Conference on Advances and New Challenges in Earthquake Engineering Research in August 15-20, 2002. The Conference will consist of two consecutive back-to-back meetings in Harbin and Hong Kong, China. The common underpinning of both meetings is the application of advanced technologies and new design philosophies/methodologies to address recent challenges in earthquake engineering and hazard mitigation. This forward looking intellectual exercise will involve multiple agencies and major universities from the Asia-Pacific region, bringing together leading researchers in the field to develop a clear picture of the current status in the field, as well as to examine new opportunities on the basis of Asia-Pacific regional and global cooperation. This project provides the funds to allow a delegation of US researchers to participate in this important Conference.

Request for Funds for a NSF Delegation to Attend ASIATRIB2002 International Conference

Award Number: 0228880
Start Date : September 15, 2002
Expires : August 31, 2003
Total Amt. : $52000
Investigator: Steven Danyluk steven.danyluk@marc.gatech.edu (Principal Investigator current)
Sponsor : GA Tech Res Corp - GIT
Office of Sponsored Programs
Atlanta, GA 303320420 404/385-0866

Danyluk Travel support is provided for a group of US tribologist to attend the Asian tribology conference, which is held every four years and which is named ASIATRIB. The group will include several graduate students and postdocs. The purpose of the trip is to discover the status of the field in the Asian countries, in particular in the rapidly growing industrial economies of Korea, China and Taiwan, and to explore possible areas of future collaborative research. ***

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Ocean Drilling Program Committee/Panel Chinese representation

ODP Executive Committee (EXCOM) Associate Member Observer:

2002-2003	SHEN, Jianzhong	same inst.
2003	SUN, Hong	same inst.

ODP Science Committee (SCICOM) Associate Member Observer:

1997-2003	ZHOU, Zuyi	Tongji University, Shanghai

ODP Interior Science Steering and Evaluation Panel (ISSEP) (associate member gets one SSEP panelist)

1997-2003	JIN, Xianglong	State Oceanic Administration, Hangzhou

ODP Site Survey Panel (SSP)

1997-2003	YAO, Bochu	Guangzhou Geological Survey, Guangzhou
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