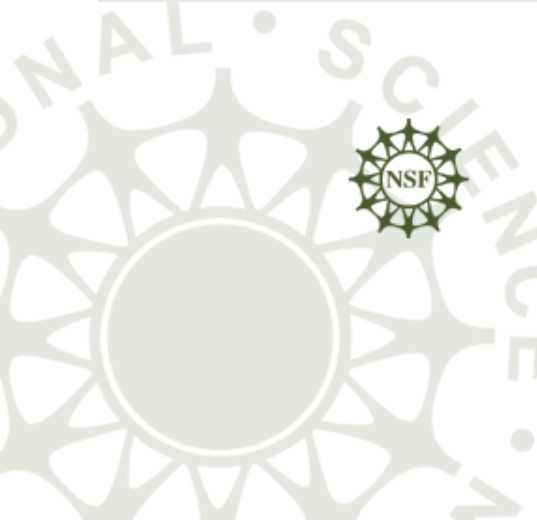




***Office of International  
Science and Engineering***

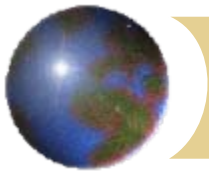


**Supporting International Collaborations  
for U.S. Researchers at the  
National Science Foundation**



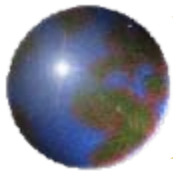
**Regional Grants Conference  
Providence, RI  
April 7, 2008**

**Ed Murdy  
emurdy@nsf.gov**



# Outline

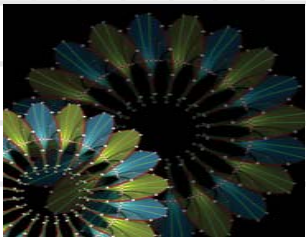
- Why collaborate internationally?
- International Collaboration at NSF
  - Integrated throughout the Foundation
    - Research and Education Directorates
    - Office of International Science & Engineering
- Types of Support
  - Programs for Faculty
  - Programs for Postdoctoral Researchers
  - Programs for Undergraduate and Graduate Students



# *Why International Collaboration?*

**“International cooperation in science is not a luxury; it is a necessity – and the foundation for the future.”**

*Arden L. Bement, Jr.  
NSF Director  
May 2006*

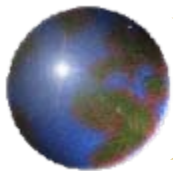


## **Investing in America's Future**

Strategic Plan FY 2006-2011

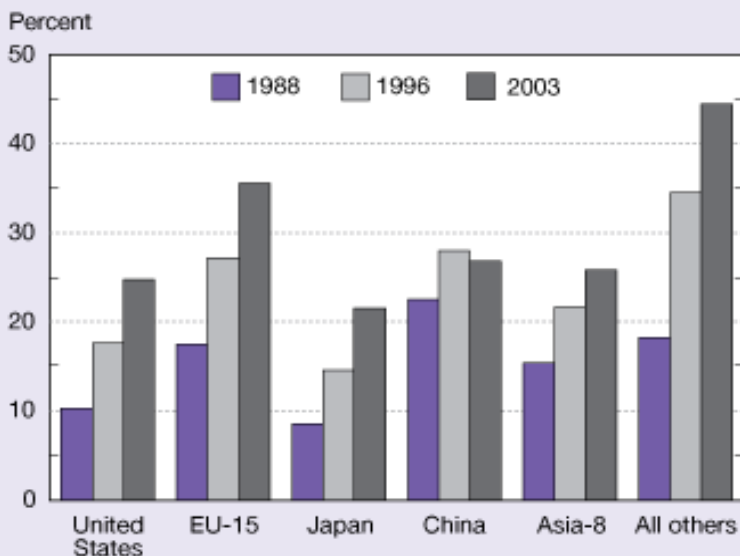
NSF 06-48

*Strengthen the nation's collaborative advantage by developing unique networks and innovative partnerships...both nationally and **internationally**, to leverage intellectual capabilities.*



# Why International Collaboration?

Figure O-19  
Share of scientific and technical articles with international coauthorship, by country/region: 1988, 1996, and 2003



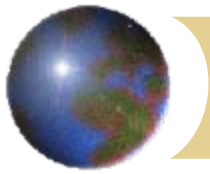
EU = European Union

NOTE: Asia-8 includes South Korea, India, Indonesia, Malaysia, Philippines, Singapore, Taiwan, and Thailand.

SOURCES: Thomson ISI, *Science Citation Index* and *Social Sciences Citation Index*, <http://www.isinet.com/products/citation/>; iPLQ, Inc.; and National Science Foundation, Division of Science Resources Statistics, special tabulations. See appendix tables 5-47, 5-48, and 5-49.

Science and Engineering Indicators 2006

- International collaboration is commonplace
- About 20% of the world's scientific and technical articles in 2003 had authors from two or more countries, compared with 8% in 1988
- One-quarter of articles with U.S. authors have international coauthors, similar to the percentages for Japan, China, and the Asia-8.

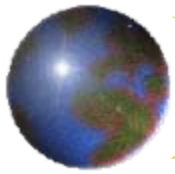


# *Why International Collaboration?*

## *Student Flows to/from the U.S.*

<u>Students</u>	<u>To U.S.</u>	<u>From U.S.</u>
<i>Total</i>	<i>582,984</i>	<i>223,534</i>
India	83,833	2,115
China	67,723	8,830
Korea	62,392	1,267
Japan	35,282	4,411
Taiwan	29,094	194

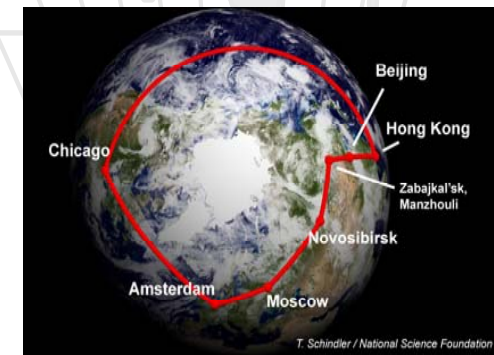
Source: Institute for International Education, *Open Doors 2007*

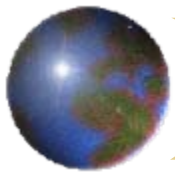


# International Collaboration at NSF

NSF support for international collaboration aims to:

- Advance the FRONTIERS of Science and Engineering
  - ACCESS to unique expertise, facilities, and phenomena
  - LEVERAGE limited resources
- Prepare a GLOBALLY-ENGAGED U.S. S&E workforce
  - DEVELOP understanding of science abroad
  - NURTURE capable, confident, adaptable young researchers with strong networks overseas

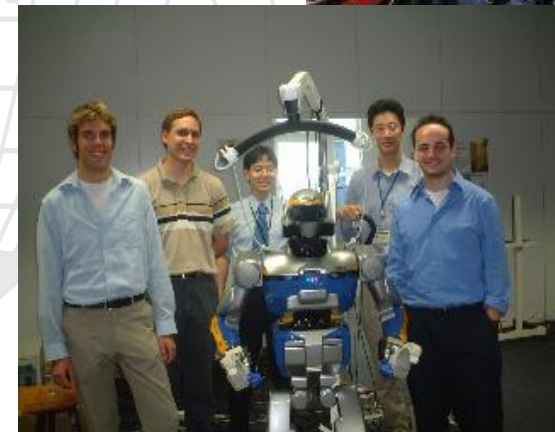


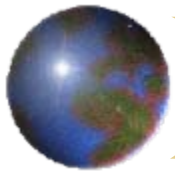


# Support for International Activities

*...is integrated throughout NSF*

- Supplements to existing NSF grants
- Integral part of new proposals to NSF research or education programs
- New proposal to the Office of International Science and Engineering



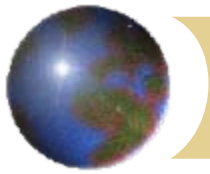


# *Support for International Activities*

Examples of NSF support for international activities are numerous.

To name just a few...

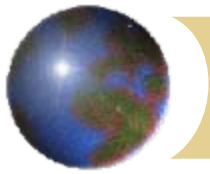




# *International Activities at NSF*

## *Materials World Network*

- Mathematical & Physical Sciences Directorate
- [http://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf07574](http://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf07574)
- Concurrent submissions to NSF and overseas funding agency
- FY2007 investment: \$10 million in 80 awards (new & continuing) with 25 countries
- OISE co-funds most awards



# *International Activities at NSF*

## *International Research & Education for Engineers*

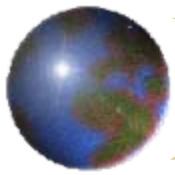
- Engineering Directorate
- Supplemental awards to promote international collaboration and student international engagement
- In FY2007, more than 100 supplements awarded, most with OISE co-funding
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13705&org=NSF](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13705&org=NSF)



# *International Activities at NSF*

## *International Collaboration in Chemistry*

- Mathematical & Physical Sciences Directorate
- Bilateral collaborations with Germany, U.K., China (more countries in future)
- Single proposal, joint decision-making
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=13627&org=CHE](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=13627&org=CHE)

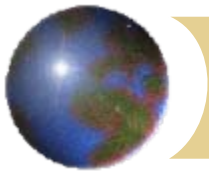


# *International Activities at NSF*

## *Research Experiences for Undergraduates (REU)*

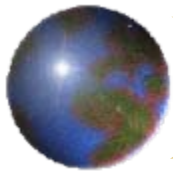
- NSF-wide
- New awards (“sites”) or “supplements” to existing awards
  - \* Both welcome international
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5517&org=NSF](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5517&org=NSF)





# OISE Overview

- Office of International Science & Engineering
  - 5 Geographical Groups + Cross-cutting Teams
    - Africa, Near East and South Asia
    - Americas
    - East Asia & Pacific
    - Europe/Eurasia
    - Global Initiatives
  - 3 NSF Overseas Offices – China, Europe, Japan
  
- Budget:
  - FY07 - \$40.61 Million
  - FY08 - \$41.34 Million (Estimate)



# *International Activities at NSF*

## *Office of International Science & Engineering*

Key elements for OISE funding

- Collaborative
- Synergistic
- Catalytic
- Engage students & junior researchers



## Office of International Science & Engineering (OISE)



### OISE Home

[About OISE](#)[Funding Opportunities](#)[Awards](#)[News](#)[Events](#)[Discoveries](#)[Publications](#)[Advisory Committee](#)[Career Opportunities](#)[Staff by Country](#)[Regional Opportunities](#)[Info for Travelers](#)[See Additional OISE Resources](#)[View OISE Staff](#)[Search OISE Staff](#)

## Office of International Science & Engineering (OISE)

### Important Notice

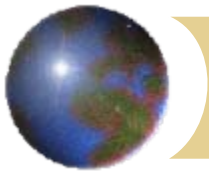
International science and engineering research and education activities are funded by all NSF directorates and offices.

Investigators seeking funding for international collaborative research may include an international component in **new proposals** submitted to their relevant NSF research program, or request [supplemental funding](#) to add international collaboration to projects supported by current NSF grants.

OISE works closely with other NSF directorates and offices to co-fund innovative, catalytic new awards and supplements that promote research excellence through international collaboration and develop the next generation of globally engaged U.S. scientists and engineers. OISE criteria for co-funding include:

- **True intellectual collaboration with a foreign partner** (The foreign partner's 2-page biographical sketch, communication outlining their role in the project, and a letter of endorsement from the foreign institution should be included.)
- **New** international collaborations, as opposed to well-established ones;
- Benefits to be realized from the **expertise and specialized skills, facilities, and/or resources** of the foreign collaborator; and
- Active research engagement of U.S. **students and junior researchers** at the foreign site.

Investigators should consult early in the application process with both the relevant disciplinary program manager and [OISE country program manager](#).

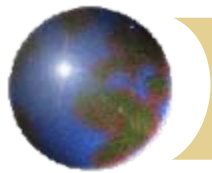


# Outline

- International Collaboration at NSF
- Support for Faculty
- Programs for Postdoctoral Researchers
- Programs for Undergraduate and Graduate Students

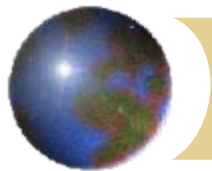






# *OISE Faculty Opportunities*

- Planning Visits (\$20,000 max., NSF 04-035)
- Workshops (\$25,000 – 60,000, NSF 04-035)
- Pan-American Advanced Studies Institutes program (PASI) (\$100,000 max., NSF 03-506)
- Partnerships for International Research and Education (PIRE) (\$2.5 million max., NSF 06-589)



## Planning Visits, NSF 04-035

- Trips by U.S. researchers in promising new areas to get *new* research collaboration off the ground
- Detailed preparation for collaborative research
  - Fully assess foreign expertise, facilities, equipment, data, experimental protocols, sites, etc.
- Intended outcome: Research proposal to NSF Directorate
- 7-14 days on average
- \$20,000 maximum budget
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12815&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12815&org=OISE&from=home)

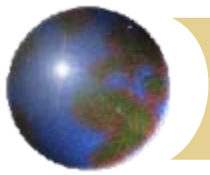


# Planning Visits, NSF 04-035

## Example:

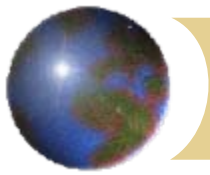
- “Humanoids-based Multidisciplined International Teaming and Large Scale Systems Integration”; PI Paul Oh, Drexel University
- To develop a concrete plan for collaborative research on humanoid robotics.
- PI and 4 students spent 1 week at KAIST.
- Spawned PIRE award.





## *Workshops, NSF 04-035*

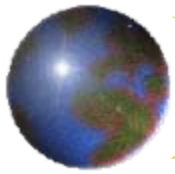
- Small-scale, focused meetings co-organized by U.S. and foreign investigator to identify areas of joint research interest and develop new collaborations
- NSF supports U.S. faculty and students
- Intended outcome: research proposal to NSF research directorate
- Priorities vary by region
- \$60,000 max
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12815&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12815&org=OISE&from=home)



# *Workshops, NSF 04-035*

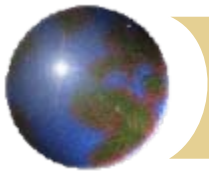
## **Example:**

- “U.S.-China Workshop: Rapid Bridge Replacement after Extreme Events”; PIs Yong Bai and Steven McCabe, U Kansas. Civil Engineering.
- Purpose: To discuss new developments in rapid bridge replacement after extreme events, such as hurricanes, earthquakes, or terrorist strikes.
- Ten days of meetings to be held in three cities in China.



## *Pan-American Advanced Studies Institute, NSF 03-506*

- Short courses (2-4 weeks) at the advanced graduate and post-doctoral level.
- Involve distinguished lecturers and active researchers in the field, preferably from the Americas.
- PASIs aim to disseminate advanced scientific knowledge and stimulate cooperation among researchers of the Americas in the mathematical, physical, and biological sciences, and in engineering fields.
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pi\\_ms\\_id=5327&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pi_ms_id=5327&org=OISE&from=home)

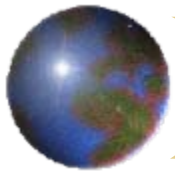


# PASI

## Examples:

- Modern challenges in statistical mechanics - *Argentina*
- Study of surfaces, interfaces and catalysis - *Venezuela*
- Physics at the nanometer scale - *Argentina*
- Green chemistry - *Uruguay*
- Quantum information - *Brazil*
- Materials for energy conversion and environmental protection – *Brazil*
- Process Systems Engineering - *Argentina*



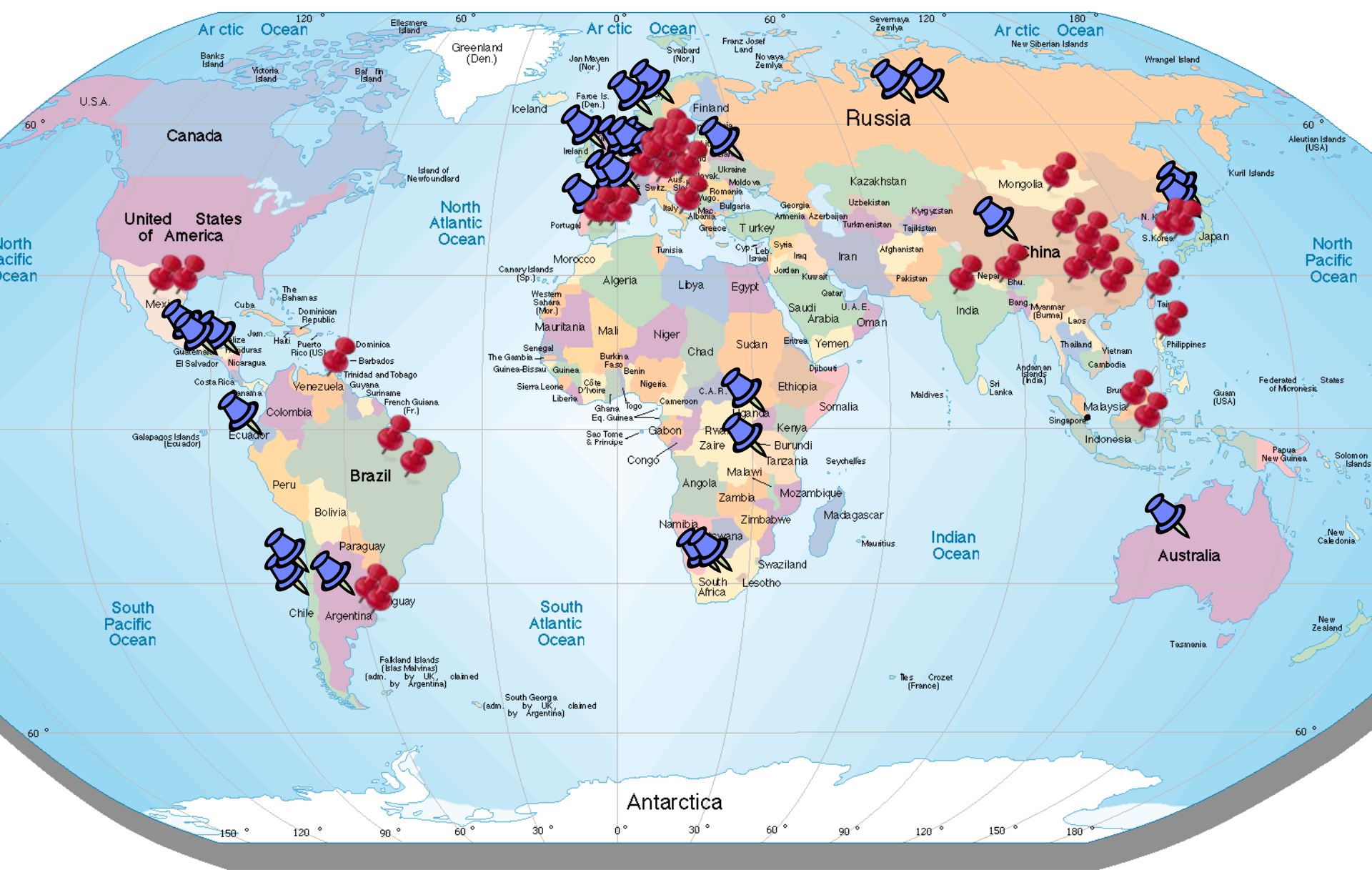


# *Partnerships for International Research & Education (PIRE)*

## ➤ Objectives

- Frontier research that requires international partnership
  - Unique, complementary expertise of international partners
  - Student engagement in international research
- 5-year awards of up to \$2.5M each
- 32 active awards across all NSF disciplines
- Next competition: FY2009
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12819&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12819&org=OISE&from=home)





 PIRE I Awards

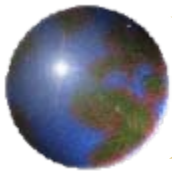
 PIRE II Awards



# PIRE, NSF 06-589



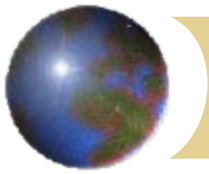
U.S.-Japan Cooperative Research and Education: Ultrafast and Nonlinear Optics in 6.1-Angstrom Semiconductors – PI: Junichiro Kono, Rice University



# ***PIRE, NSF 06-589***



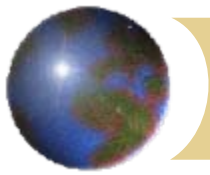
Remote Sensing for Hazard Mitigation and Resource Protection in Pacific Latin America – PI: Gregg Bluth, Michigan Tech University



# Outline



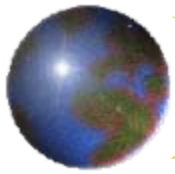
- International Collaboration at NSF
- Support for Faculty
- Programs for Postdoctoral Researchers
- Programs for Undergraduate and Graduate Students



# Postdoctoral Researchers

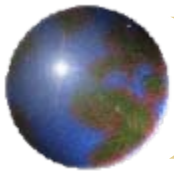
- Inclusion in NSF disciplinary awards
- Disciplinary Postdoctoral Fellowships
- International Research Fellowships (NSF 06-582)





# *International Research Fellowships*

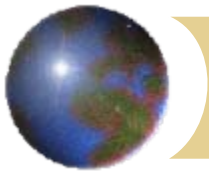
- NSF 06-582
- Designed to introduce young scientists to international research opportunities
- Provides support for research at S&E establishments in foreign countries for 9-24 months
- Applications from women and minorities, and for work in developing countries are especially encouraged.



# *International Research Fellowships*

- U.S. citizenship/permanent residence
- Have Ph.D. by the time IRFP tenure begins
- Applicants cannot have had their Ph.D. longer than two years at the time of application
- Deadline: Second Tuesday in September
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5179&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5179&org=OISE&from=home)



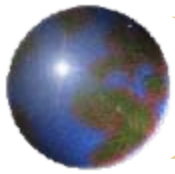


# Outline

- International Collaboration at NSF
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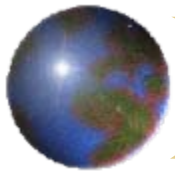






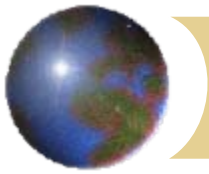
# *Undergrads and Grad Students*

- Participation in NSF disciplinary awards
- Integrative Graduate Education and Research Traineeship (IGERT) Program
- Graduate Research Fellowships
- Participation in OISE planning visits or workshops
- Doctoral Dissertation Enhancement Projects (DDEP)
- East Asia and Pacific Summer Institutes (EAPSI)
- International Research Experiences for Students (IRES)
- International REU's
- PIRE and PASI



## *Doctoral Dissertation Enhancement Project*

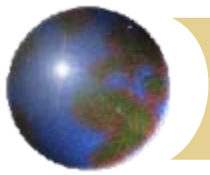
- NSF 04-036
- Provides travel support for doctoral research overseas
- Must be collaborative, with evidence of intellectual involvement of foreign institution
- U.S. faculty mentor is PI on proposal
- \$15,000 max.
- No deadlines: Proposals welcome year-round
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=12831&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=12831&org=OISE&from=home)



## **Example:**

Steve Gaines, UCSB for his Ph.D. student Kimberly Selkoe. "Marine Population Connectivity Across the U.S./Mexican Border: A Genetic Approach to Dispersal Dynamics in Kelp Bass."

How do we manage ecological systems which cross international borders? Although original grant was small and just for this student, collaboration has blossomed. Work helped to seed a multi-institutional study.



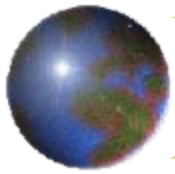
# East Asia and Pacific Summer Institutes

- NSF 07-584
- Individually tailored overseas research experience
- ~ 8 weeks
- Australia, China, Japan, Korea, New Zealand, Singapore and Taiwan
- Application deadline: December 2008
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pims\\_id=5284&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=5284&org=OISE&from=home)



1991 SUMMER INSTITUTE KYOTO STUDY TOUR JUL.12 KIYOMIZU TEMPLE





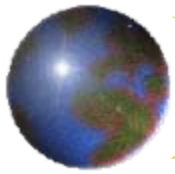
# *East Asia and Pacific Summer Institutes*

## ➤ Eligibility

- U.S. citizen or permanent resident
- Enrolled at U.S. institution in a research-oriented masters or Ph.D. program
- Fields of science or engineering supported by NSF and represented among host institutions

## ➤ Support

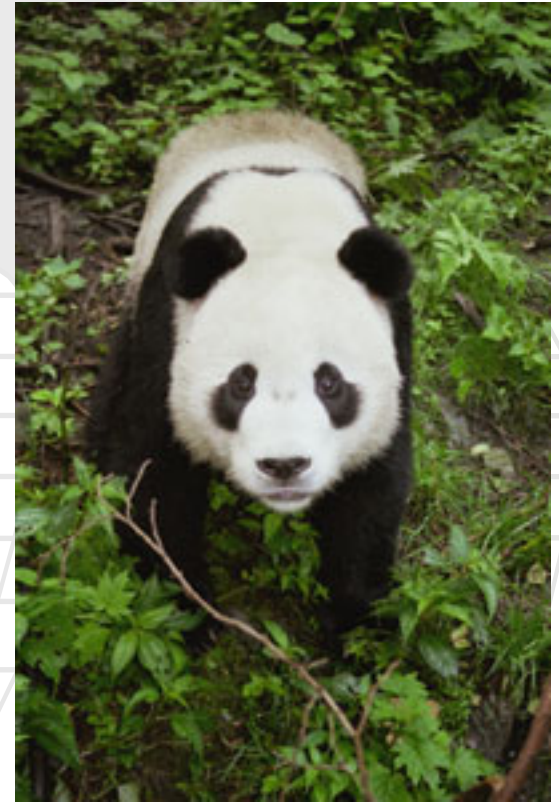
- \$5,000 stipend
- Travel
- Local housing and living allowance

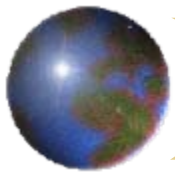


## *East Asia and Pacific Summer Institutes*

### **Example:**

A behavioral biology student from Texas A&M university established a live Web “panda cam,” at China’s Wolong nature reserve, and completed a preliminary study on the ability of giant pandas to recognize their kin. Through EAPSI, she opened a door for researchers and the broader public around the globe to observe the behavior of pandas in their natural habitat.

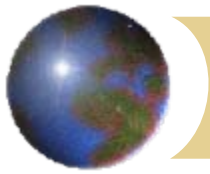




# *International Research Experiences for Students (IRES)*

- NSF 04-036
- Graduate and/or undergraduate students
- Supports small groups of students for focused research experiences overseas
- \$150,000 max (\$50,000 per year for up to 3 years)
- Deadlines: 9/15 and 2/15
- [http://www.nsf.gov/funding/pgm\\_summ.jsp?pi\\_ms\\_id=12831&org=OISE&from=home](http://www.nsf.gov/funding/pgm_summ.jsp?pi_ms_id=12831&org=OISE&from=home)



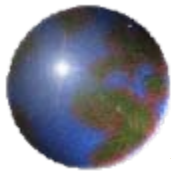


## **Example:**

Award to Cal State Northridge for a collaborative project in mathematics with the State University of Campinas in Brazil. PI is Helena Noronha.

Seven advanced undergrads/beginning grads spend summer working in pairs with Brazilian students on applied math each year for three years. Builds on existing REU program.



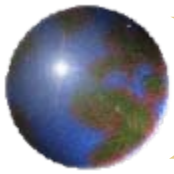


# *Effective International Collaboration*

*For more, see the OISE publication*

Looking Beyond the Borders:  
A Project Director's Handbook  
of Best Practices for  
International REU's

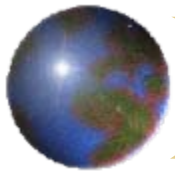
[www.nsf.gov/pubs/2006/nsf06204/index.html](http://www.nsf.gov/pubs/2006/nsf06204/index.html)



## *The Bad News...*

### *OISE Does Not Typically Fund*

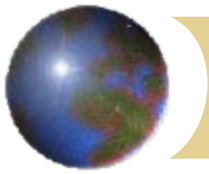
- Travel grants
  - Research-related travel costs should be included in standard research proposal
- Sabbaticals
- Costs of the foreign counterpart
  - In rare cases, exceptions may be possible
    - ❖ Discuss with country program manager before submitting a proposal
  - NSF does NOT have a foreign assistance mission



*If you don't find what you want...*

➤ Contact the appropriate OISE program manager to discuss options

<http://www.nsf.gov/od/oise/country-list.jsp>



**OISE**



**Thank You!**



<http://www.nsf.gov/oise>

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