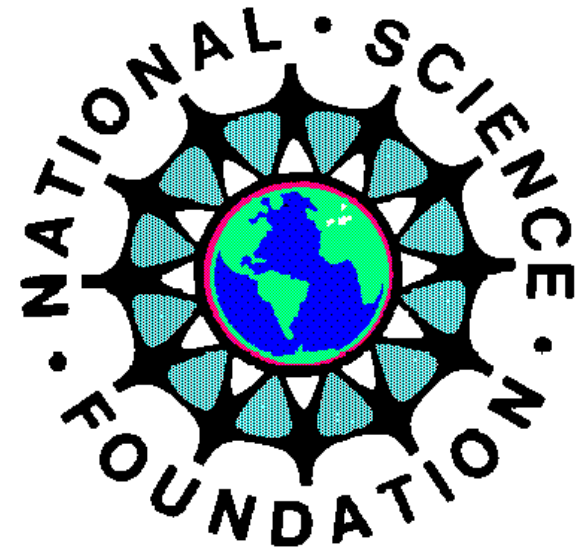


**NATIONAL SCIENCE
FOUNDATION**



Tsunami Research at NSF

Richard J. Fragaszy, Program Director

rfragasz@nsf.gov

(703) 292-7011



NSF ROLE

- **NSF provides funding on a competitive basis for basic research in science and engineering**
 - Almost all funds go to Universities and Colleges
 - NSF does not conduct research itself
- **NSF provides funding for Equipment and Instrumentation**
 - Major Research Instrumentation Program (MRI)
 - Major Research Equipment and Facility Construction (MREFC)
- **NSF provides funding for Education and Outreach**
 - Support of graduate and undergraduate students
 - Curriculum Development



Tsunami Research at NSF

- **NSF has no dedicated tsunami research program**
- **Tsunami related proposals compete with all other proposals**
- **Tsunami research is funded through individual research programs. The main program sources include:**
 - **Engineering Directorate (ENG)**
 - » **Geoenvironmental Engineering and GeoHazards Mitigation**
 - » **Infrastructure Management and Hazard Response**
 - » **Structural Systems and Hazards Mitigation of Structures**
 - **Geological Sciences Directorate (GEO)**
 - » **Marine Geology and Geophysics**
 - » **Tectonics**
 - » **Geophysics**
 - » **Physical Oceanography**
 - **Social, behavioral and Economic Sciences (SBE)**
 - » **Economics**
 - » **Geography and Regional Science**
 - » **Decision, Risk and Management Sciences**



Tsunami Research at NSF

(continued)

- **Additional tsunami research funding comes from:**
 - **Office of International Science and Education (OISE)**
 - » **CI-TEAM**
 - » **Partnerships for International Science and Engineering (PIRE)**
 - » **International Workshops**
 - **Mathematical and Physical Sciences (MPS)**
 - » **Applied Mathematics**
 - » **Computational Mathematics**
 - **Education and Human Resources**
 - » **Educational Materials Development**
 - **Computer and Information Science and Engineering (CSE)**
 - » **Digital Society & Technology**
 - » **Information Technology Research**



Equipment Funding

- **MREFC**
 - **George E. Brown, Jr. Network for Earthquake Engineering Simulation**
 - » Included tsunami wave tank at Oregon State University (approx. \$5million for construction, \$540k per year for maintenance and operations)
- **MRI**
 - **Modular Wave tank at University of North Carolina**



Post Disaster Data Collection

- NSF has a long tradition of making awards immediately after disasters for collection of ephemeral data
- The Small Grants for Exploratory Research (SGER) mechanism is used to process awards quickly (as little as 48 hours) after natural disasters to send research teams to the site as quickly as possible
- In FY05, approximately \$1million was awarded through SGERs for rapid data capture, mainly in response to the Indian Ocean Tsunami



Example of NSF Awards: Tsunami Field Surveys

1992-2002 : Perspective on a decade of tsunami field surveys (ITST)

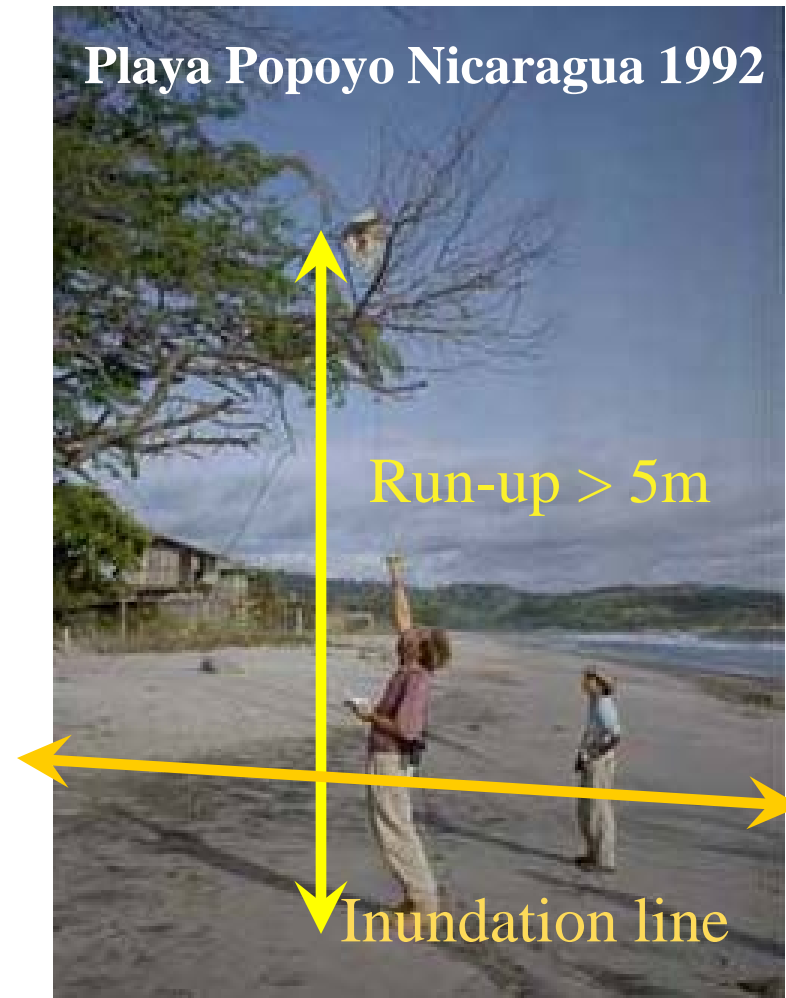
Examples: CMS 0129999 Okal, E. , Northwestern University- Peru 2001

CMS 0244537 Synolakis, C., U. of Southern California- New Guinea 2002

Efforts from Field Surveys: Collection of ephemeral run-up, inundation data and eyewitness accounts as well as education and public outreach

Milestones: Provided key data for the validation of inundation codes for extreme run-up and overland flows. Identification of sources, dislocation vs. submarine landslides. Advance research in the numerical and physical simulations to predict local site conditions (e.g., directionality, convergence)

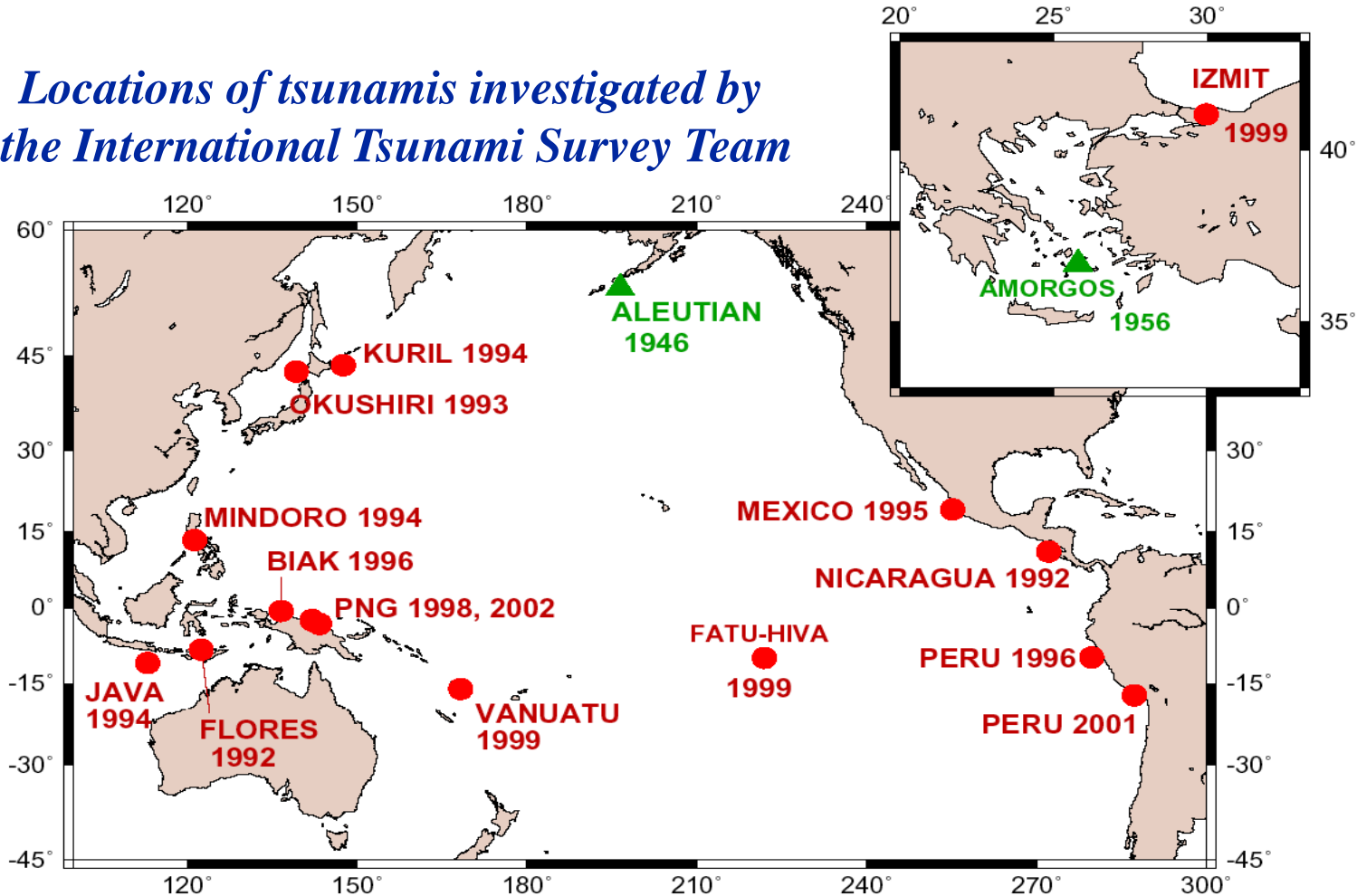
Playa Popoyo Nicaragua 1992





Example of NSF Awards: Tsunami Field Surveys

*Locations of tsunamis investigated by
the International Tsunami Survey Team*





Solicitations

- **Network for Earthquake Engineering Simulation Research (NEESR)**
 - 10 years of funding through 2014
 - 4 awards related to tsunamis to date - approximately \$3 million in funding

- **Human Social Dynamics**
 - 6 awards to date (FY07 is last year)
 - Approximately \$1.6 million funded through FY06 directly related to tsunamis



Current Awards

- **Currently there are 29 active NSF awards directly related to tsunamis (“tsunami” is in the title)**
 - \$7.4 million in funding
- **71 other active NSF awards have some relationship to tsunamis (“tsunami” is in the award abstract)**
 - \$20.4 million in funding



EXAMPLES OF AWARDS

- **NEESR-SG: TSUNAMOS: A Validated, Multi-Scale Tsunami Model for Hybrid Numerical-Experimental Simulation Hazard Assessment – CMMI-0619183**
 - Lynette, Liu, Mercado, Teng, von Hillebrandt-Andrade
 - Texas A&M; Cornell; U. Of Puerto Rico; U. of Hawaii
 - \$1.1 million/ 4years
- **Reconnaissance Survey of the July 17, 2006 Central Javan Earthquake and Tsunami - CMMI-0646278**
 - Synolakis & Fritz, USC and Georgia Tech
 - \$40k
- **NEESR-SG: Development of Performance Based Tsunami Engineering, PBTE- CMMI-0530759**
 - Riggs, Cheung, Robertson, Yim and Young
 - University of Hawaii, Oregon State University and Princeton University
 - \$1.3 million/4 years



EXAMPLES OF AWARDS

- **NSF Workshop: Tsunami Deposits and Their Role in Hazard Assessment, June 2005 – EAR-0531497**
 - Bourgeois, University of Washington
 - \$80k
- **Collaborative Research: DRU: Community Risk Management of Hurricane and Tsunami Surge Hazards - SES-0527699**
 - Yeh and Lindell, Oregon State University and Texas A&M University
 - \$750k, 3 yrs
- **Modelling Tsunami Effects on Mangrove Ecosystems and the Role They Play in Saving Lives and Properties - BCS-0649413**
 - Myint, Arizona State University
 - \$50k



Future Funding Opportunities

- **Future funding for tsunami research at NSF will depend on competitiveness of research proposals**
 - **Tsunami research is a small component of many different programs that span all the Directorates**
 - **The NEES research program will continue for 6 more years, as will funding for the Oregon State wave basin**
 - **Future solicitations may provide opportunities for the tsunami research community, as has HSD and NEESR**