



*Summary of
NSF GeoPRISMS Program
& Draft Science Plan*
GeoPRISMS Chair: Julia Morgan

Website: www.geoprisms.org

E-mail: info@geoprisms.org

... investigate the coupled geodynamics, earth surface processes, and climate interactions that build and modify continental margins over a wide range of timescales (from s to My), and cross the shoreline, with applications to margin evolution & dynamics, construction of stratigraphic architecture, accumulation of economic resources, and associated geologic hazards and environmental management.

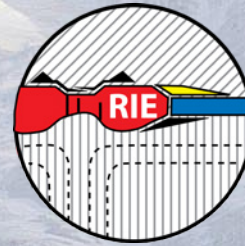
What is GeoPRISMS

- ✧ **Decadal Program, successor to NSF MARGINS Program**
- ✧ **To facilitate investigations of the origin and evolution of continental margins**
 - ✧ Community-driven, interdisciplinary, cross-divisional NSF-funded
 - ✧ Integrating field, theory, and modeling
- ✧ **Focus on rifts and subduction zones, where**
 - ✧ Geodynamic processes most active
 - ✧ Geology and society intersect
 - ✧ Economic resources form and are found
- ✧ **Shoreline-crossing, i.e., “amphibious”**
 - ✧ Describes most rifts and subduction zones
 - ✧ Geologic & geodynamic processes span the shoreline
 - ✧ Where interdisciplinary, cross-divisional efforts most needed
- ✧ **Guided by a community-developed science plan; coordinated by a national office and steering committee; enabled by YOU!**

GeoPRISMS Structure & Strategies

✧ Two broadly integrated initiatives

**Subduction
Cycles &
Deformation**



**Rift
Initiation &
Evolution**

- ✧ “Hybrid” approach, Primary Sites & Thematic
- ✧ Integrated surface processes and feedbacks
- ✧ Expanded societal relevance
- ✧ Broad education & outreach programs
- ✧ Opportunities for leveraging:
 - ✧ EarthScope (e.g., Cascadia Initiative, ENAM, Alaska)
 - ✧ International & agency collaborations
 - ✧ Industry linkages

What Distinguishes GeoPRISMS?

✧ **Shoreline-crossing investigations**

- ✧ Spanning traditional NSF divisions & programs

✧ **Collaborative, interdisciplinary research teams**

✧ **Scientific scope of research**

- ✧ Complex, coupled problems
- ✧ Systems-oriented approach

✧ **Community Building**

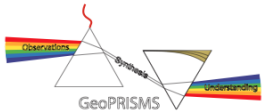
- ✧ Community-driven research, guided by focused Science Plan
- ✧ Community workshops > shared knowledge
- ✧ Community data sets > broader benefit
- ✧ “The whole is greater than sum of its parts”

✧ **What science needs GeoPRISMS to succeed?**

- ✧ Define compelling science that is unique!

How Community Science is Done (The GeoPRISMS Model)

GeoPRISMS Draft Science Plan



Submitted to NSF, April 19, 2010

Assembled by the MARGINS Office
Lamont-Doherty Earth Observatory
of Columbia University
61 Route 9W
Palisades NY 10964
www.nsf-margins.org



GeoPRISMS Draft Implementation Plan

Submitted to NSF, March 2, 2011

***"A Living
Document"***

Assembled by the GeoPRISMS Office
Rice University, MS-121
6100 Main Street
Houston, TX 77005
www.geoprisms.org

✧ Community planning at workshops

- ✧ MSPW - Feb 2010
- ✧ RIE IW - Nov 2010
- ✧ SCD IW - Jan 2011
- ✧ ExTerra – Dec 2011
- ✧ Alaska - Sep 2011
- ✧ ENAM - Oct 2011
- ✧ Cascadia – Apr 2012

✧ Science Plans w/ research objectives

✧ Proposals guided by SP (Deadline: July 1)

- ✧ PI-driven proposals
- ✧ Community-driven proposals
- ✧ Workshop proposals

✧ Program subject to regular review



Subduction Cycles and Deformation

Key Topics

- ✧ *Controls on size, frequency & slip behavior of subduction plate boundaries*
- ✧ *Spatial-temporal deformation patterns during seismic cycle*
- ✧ *Linkages between volatiles & plate boundary rheology*
- ✧ *Volatile storage, transfer, & release in subduction systems*
- ✧ *Geochemical products of subduction; continent creation*
- ✧ *Subduction zone initiation and arc system formation*
- ✧ *Feedbacks between surface processes & subduction dynamics*

Themes

- ✧ *Identifying controls on fault slip behavior and deformation history*
- ✧ *Understanding mantle wedge dynamics*
- ✧ *Fore-arc to back-arc volatile fluxes*
- ✧ *Metamorphic and igneous conditions and processes in subduction zones at depth*
- ✧ *Subduction initiation*

✧ **Primary Sites**

- ✧ *Alaska-Aleutians*
- ✧ *Cascadia*
- ✧ *New Zealand*

Implementation & Funding

Primary Site Studies *(eligible for sequestered funds)*

- ✧ Sites selected for ability to address key questions
- ✧ Concentrate resources, foster interdisc. collaborations
- ✧ Guide funding decisions

Thematic Studies *(may be eligible for sequestered funds)*

- ✧ Subsidiary but complementary to primary site studies,
 - ✧ Fundamental processes, parameters not at primary sites
 - ✧ Comparative studies; exhumed systems; lab, modeling studies
- ✧ **Must be justified in context of, integrated with, primary site studies**

GeoPRISMS-inspired Studies

- ✧ Motivated by well-defined community science plan
- ✧ Eligible for other relevant NSF programs

What GeoPRISMS wants from ExTerra

- ✧ Define **role of ExTerra** based on GeoPRISMS SP, e.g.,
 - ✧ What processes, parameters can / cannot be studied at the primary sites
 - ✧ Why are they critical for addressing SCD questions
 - ✧ How, where can these processes be studied
- ✧ Review **existing knowledge** and **identify gaps**
- ✧ Outline **proposed studies, approaches, timelines**
 - ✧ Define 3-5, 10 yr accomplishments
- ✧ Identify **opportunities beyond GeoPRISMS**
- ✧ Update **Science, Implementation Plan**
- ✧ Educate the **community**, encourage **collaborations**
- ✧ Community-guided, proposal-driven research!!