



SZ4D



www.sz4d.org



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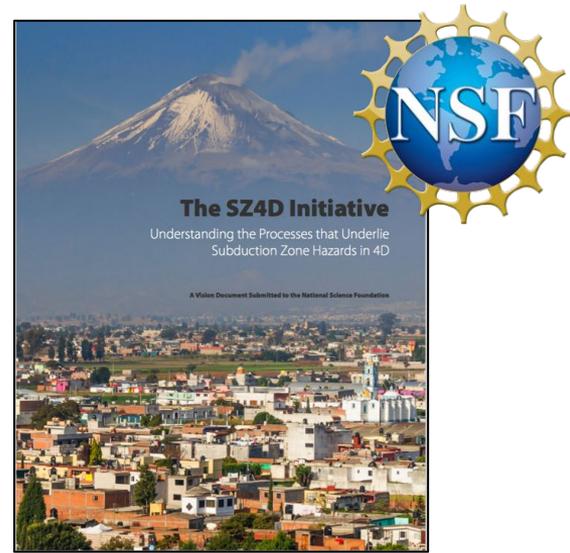


SZ4D: What is it and where did it come from?

A community initiative to investigate the fundamental processes that underlie subduction zone geohazards

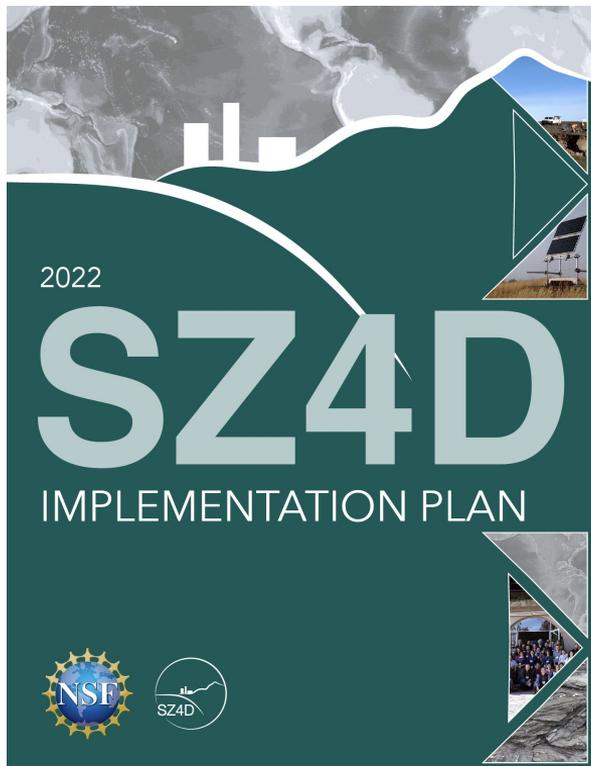
Focuses on earthquakes, volcanoes, landslides and other catastrophic mass movements

Funded by NSF to plan a transformative strategy through RCNs (Research Coordination Networks) and now a standalone planning entity with committees that include ~150 community members (including USGS scientists!) and 3500 participants in workshops, webinars and townhalls.



McGuire et al., 2017

Implementation Report Released November 2022



CONTENTS

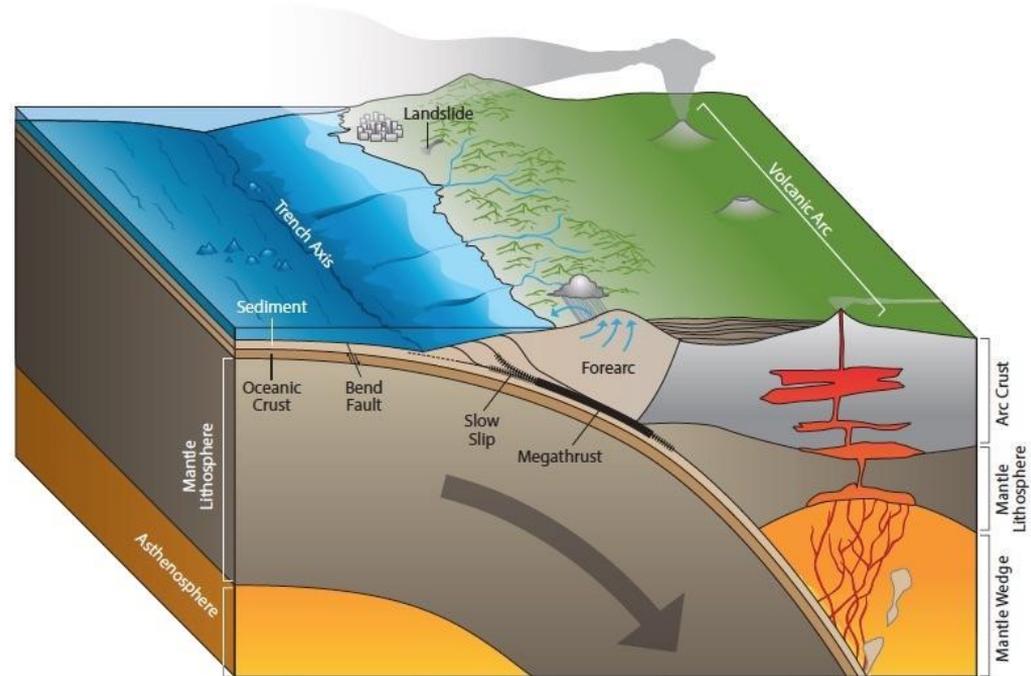
EXECUTIVE SUMMARY	8
1 INTRODUCTION	15
2 CROSSCUTTING SCIENCE THEMES	22
WORKING GROUPS	
3.1 FAULTING AND EARTHQUAKE CYCLES	32
3.2 LANDSCAPES AND SEASCAPES	62
3.3 MAGMATIC DRIVERS OF ERUPTION	87
INTEGRATIVE GROUPS	
4.1 BUILDING EQUITY AND CAPACITY WITH GEOSCIENCE	118
4.2 MODELING COLLABORATORY FOR SUBDUCTION	140
SYNTHESIS	
5.1 GEOGRAPHY	151
5.2 DATA AND TECHNICAL SYNERGIES	161
5.3 PHASING	166
5.4 PROGRAM STRUCTURE AND GOVERNANCE	169
A. APPENDICES.	176

What's in the report?

The Importance of Studying Geohazards in Subduction Zones

Societally: The world's largest hazards converge

Scientifically: Natural laboratories need controlled conditions and systematic variables; Subduction zones have them along-strike and between zones



SZ4D Implementation Report Fig S1-1

The power of an integrated geohazards approach

→ Scientifically overlapping goals

→ Practical overlapping needs

1. FORECASTING AND PREDICTION

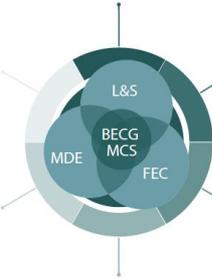
An integrative understanding of the subduction zone system is essential for relating precursors to hazards.

6. TRIGGERING & CASCADING HAZARDS

Subduction zone hazards often occur as a cascading series of events, requiring a system wide and integrative approach to understand.

5. CLIMATE VARIABILITY

Earth surface processes are strongly linked to the deeper earth in subduction zones. Climate variability, and future climate change, will strongly influence subduction zone hazards and processes.



2. MASS AND ENERGY BALANCE

Hazards reflect the movement of mass and energy through subduction zones. Understanding the energy and mass budget requires an inherently integrative approach.

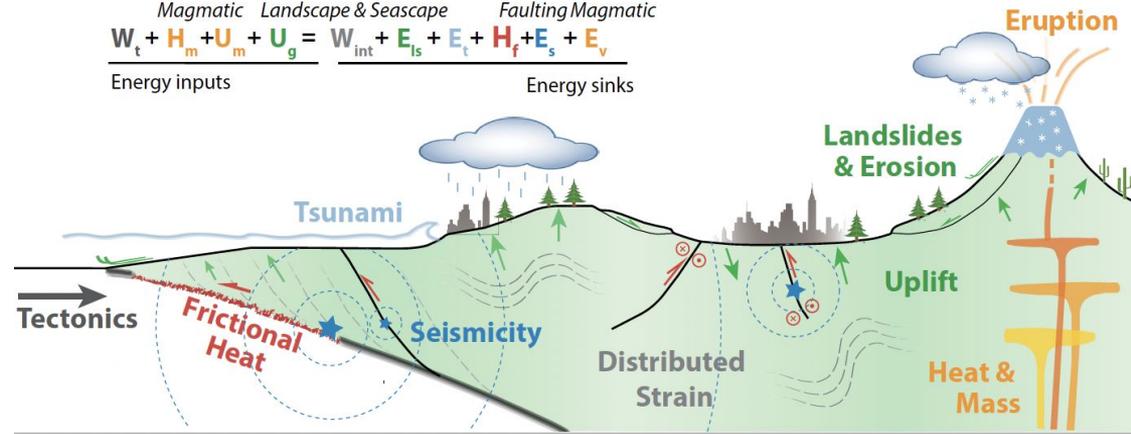
3. RHEOLOGY AND STRESS

The rheology of subduction zone materials influences the partitioning of stress and strain, and the nature of hazards in all parts of the subduction zone system.

4. FLUIDS AND FLUID MIGRATION

Fluids and fluid migration occur throughout subduction zones and influence hazards and material transport across the entire subduction system.

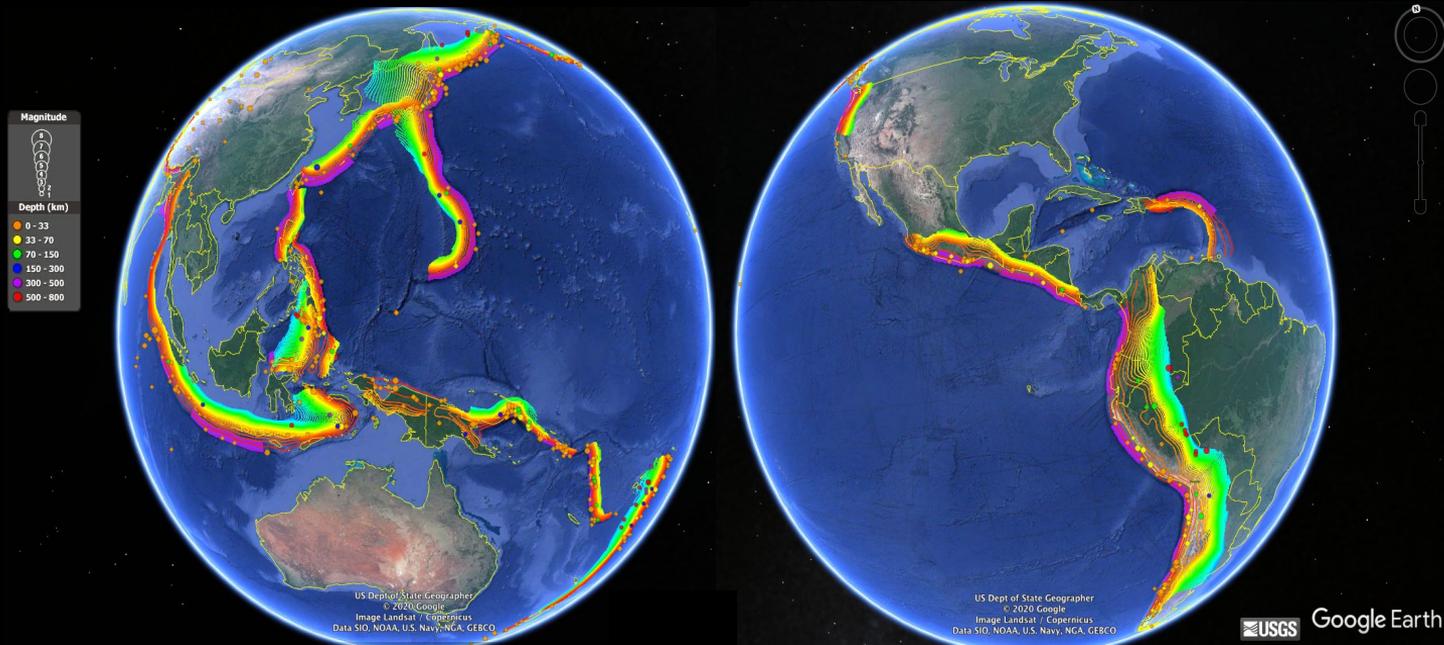
$$\frac{\text{Magmatic } W_t + H_m + U_m + U_g}{\text{Energy inputs}} = \frac{\text{Landscape \& Seascape } W_{int} + E_s + E_t}{\text{Energy sinks}} + \frac{\text{Faulting } H_f + E_s + E_v}{\text{Energy sinks}} + \text{Magmatic}$$



Solving the Science Problems

What needs to be done?

- Traceability Matrices



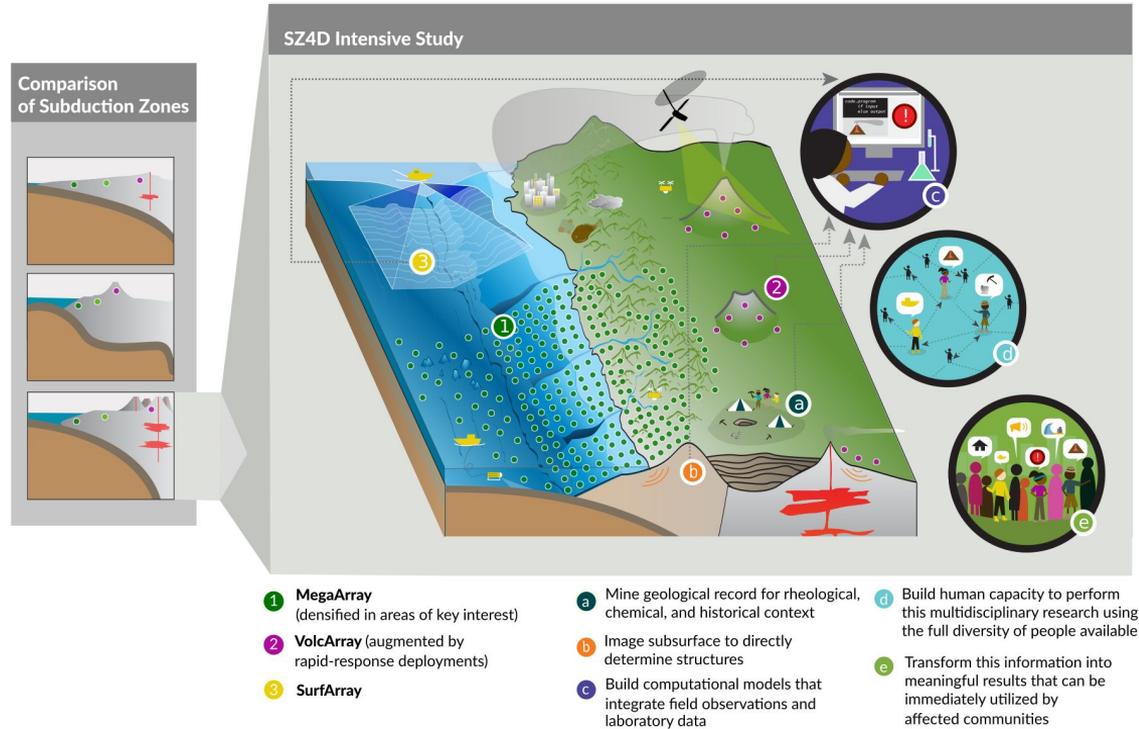
Instrumentation and Activities

Observational arrays

- MegaArray
- VolcArray
- SurfArray

Activities

- Analysis of data from arrays
- Other observations:
 - Field geology
 - Geophysical imaging
- Numerical modeling
- Lab experiments
- Training and outreach



Locations for study

Recommend:

- Complementary domestic and international sites

Regions of Special Interest:

- Chile

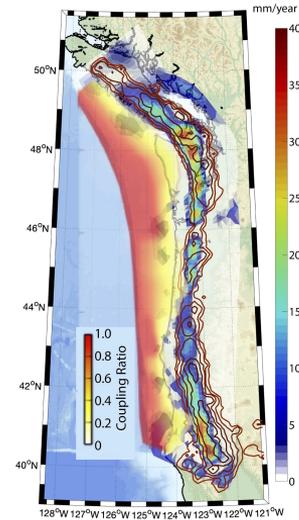
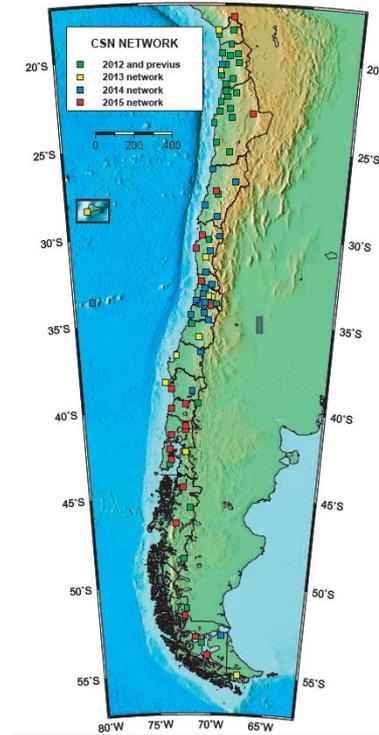
70% Instrumentation; 50% Activities

- Cascadia

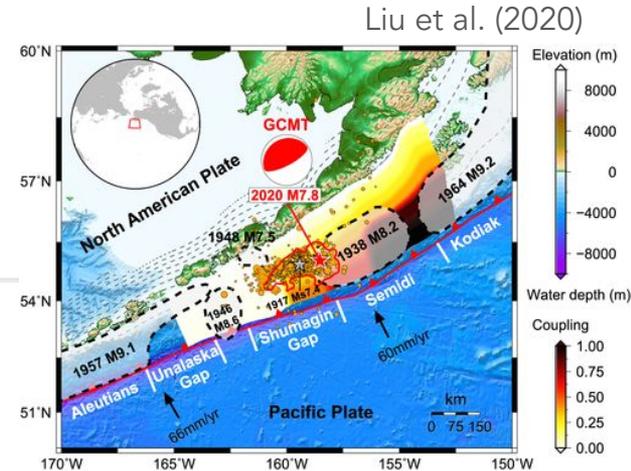
20% Instrumentation; 40% Activities

- Alaska

10% Instrumentation; 10% Activities



Bartlow (2020)



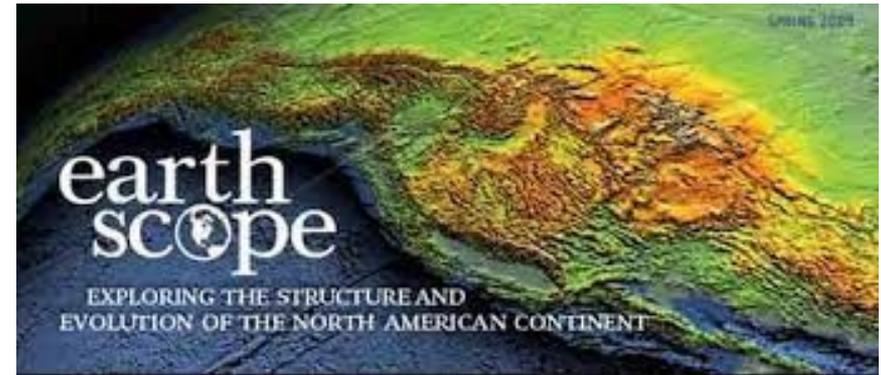
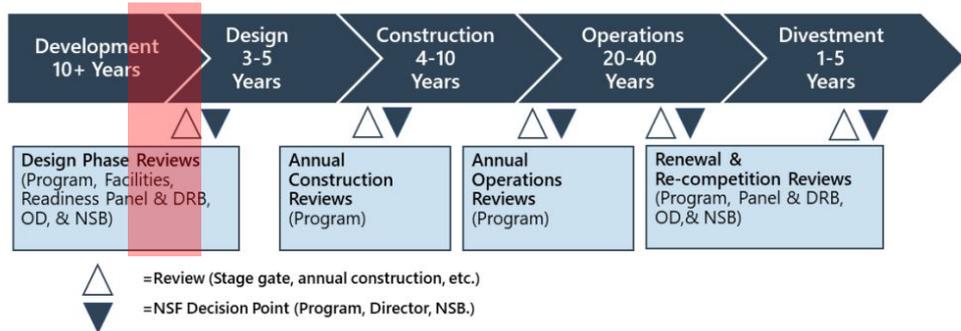
Liu et al. (2020)

How do large-scale programs in the US happen?

- Organize
- Write Reports
- ~~● Apply For Opportunities~~ **We are here**
- Coalesce within and across agencies



We are here (~\$3M to date)



What happens next?

- Identifying geographic targets in Chile
- Identifying activities + instrumentation targets in Cascadia + Alaska

Criteria: Strategically use the comparison strategy

Short Term Goal:

- Preliminary lists by April developed by the Working Groups + Integrative Groups Committees
- Present to community for feedback

How do I get involved?

- 1) Sign-up for newsletter contact@sz4d.org
- 2) Volunteer for committees
- 3) Attend town halls
- 4) Directly contact Committee Chairs with input (See www.sz4d.org)