



SZ4D News and Updates

MSROC Annual Meeting - December 8, 2024



www.sz4d.org



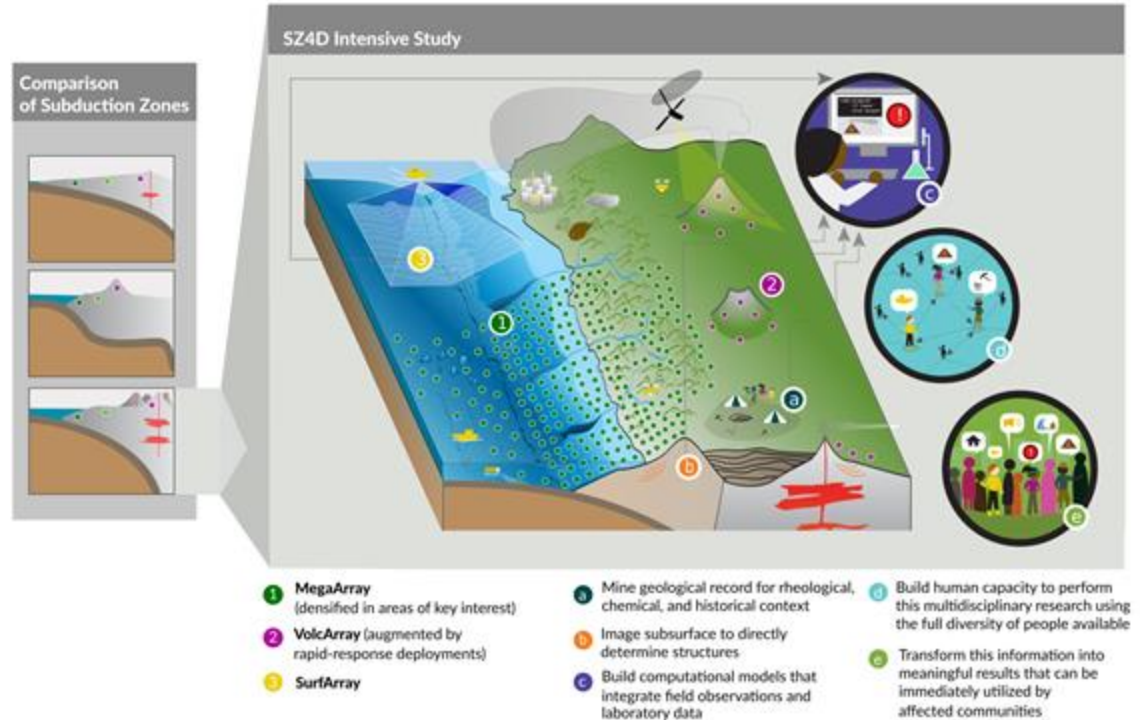
Instrumentation and Activities

Observational arrays

- EarthquakeArray
- VolcArray
- SurfaceArray

Activities

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



SZ4D Implementation Report Fig. ES-1

Locations for study

Recommend:

- Complementary domestic and international sites

Regions of Special Interest:

- Chile

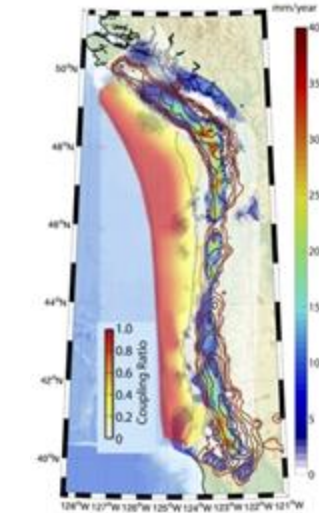
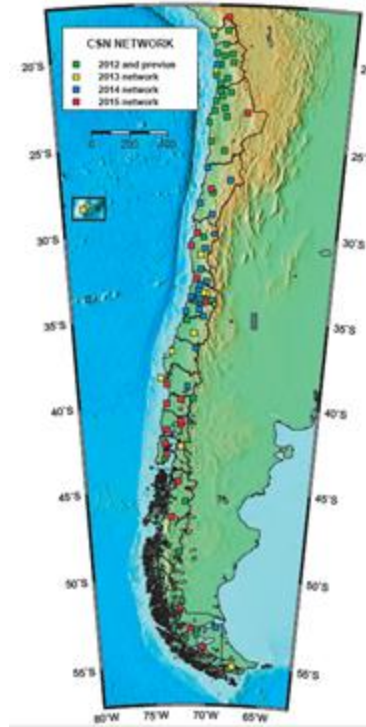
70% Instrumentation; 50% Activities

- **Cascadia**

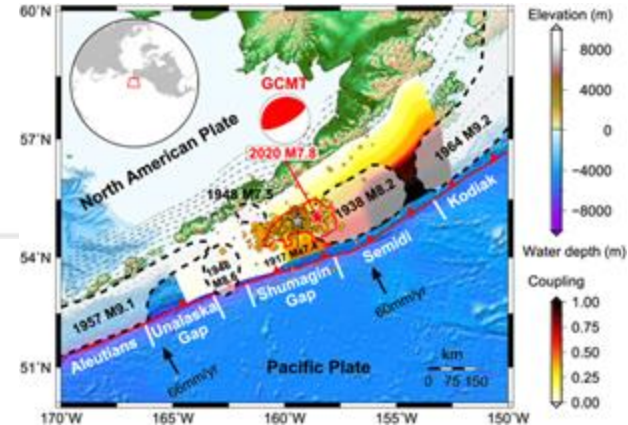
20% Instrumentation; 40% Activities

- Alaska

10% Instrumentation; 10% Activities

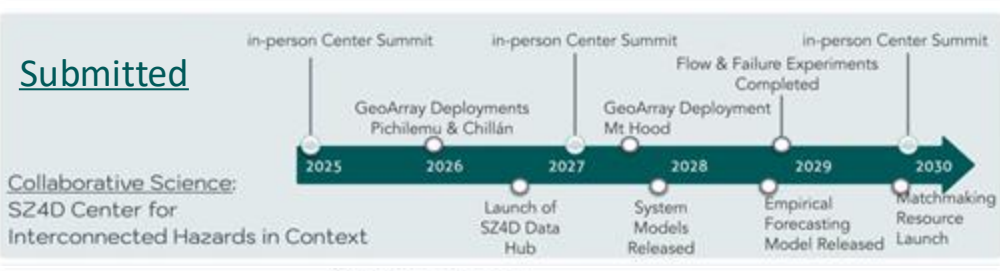
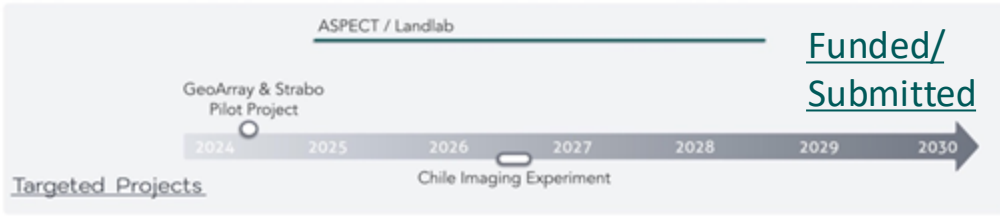


Bartlow (2020)



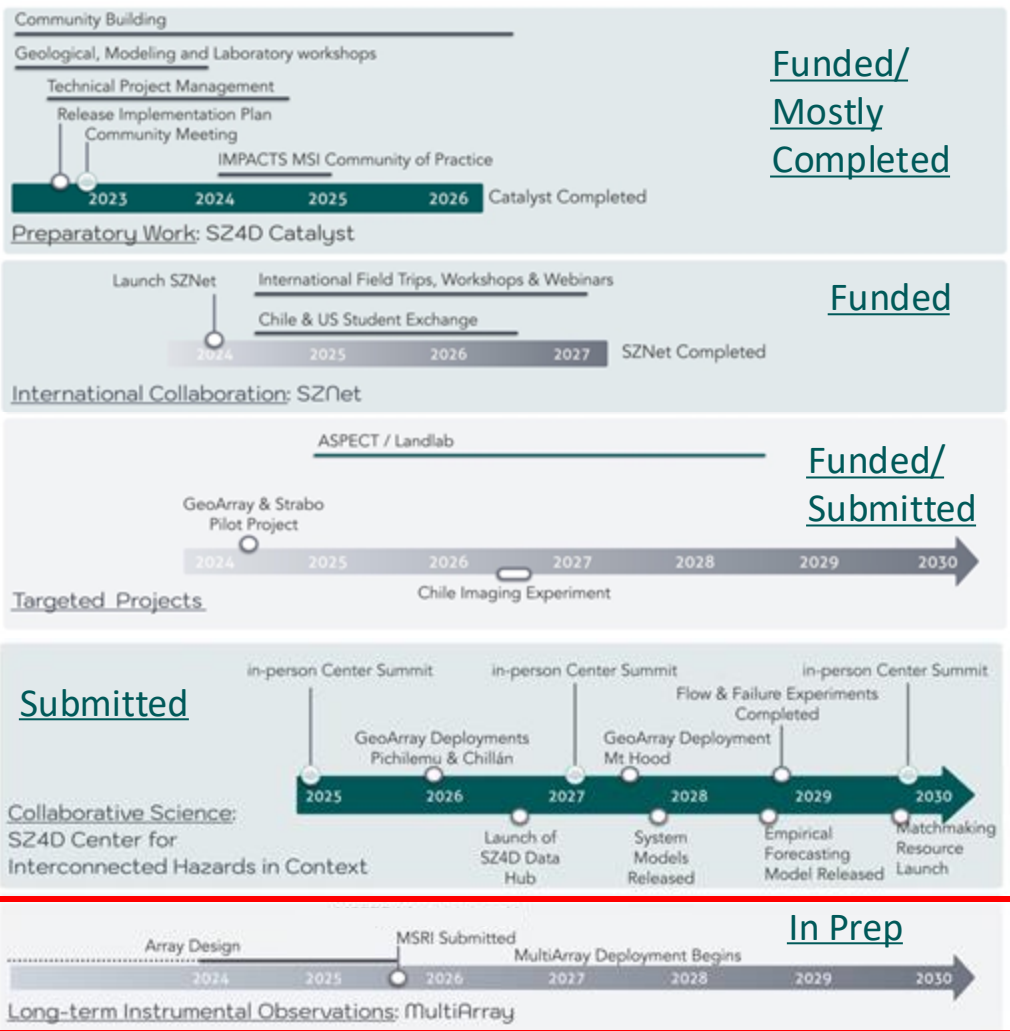
Liu et al. (2020)

SZ4D Overview



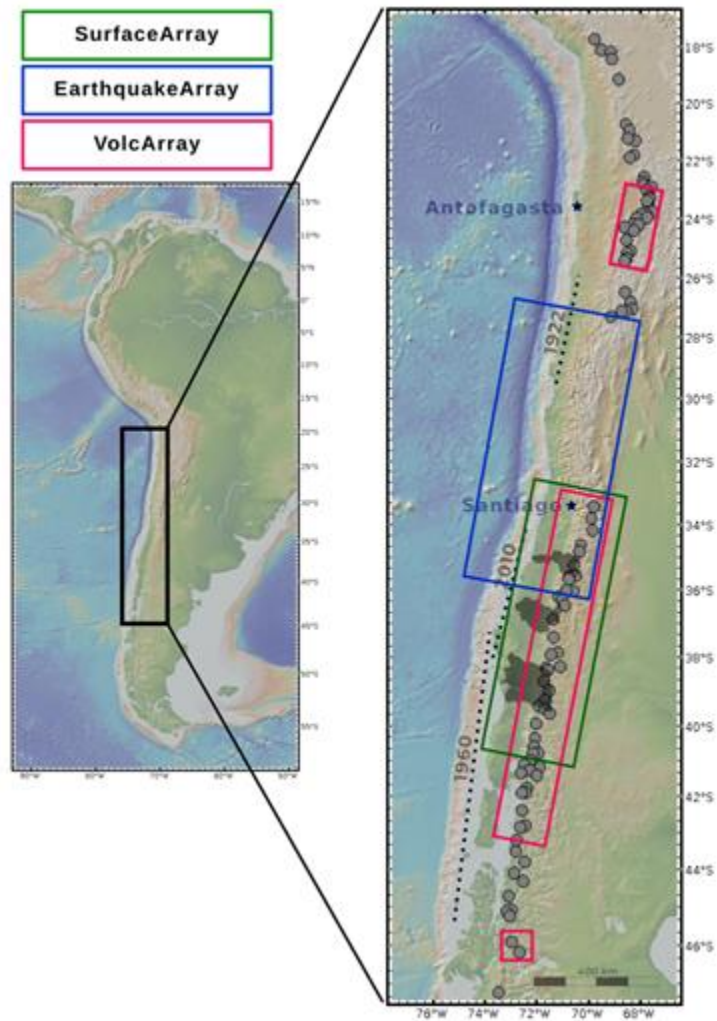
SZ4D Overview

MSRI-2 proposal in prep: The SZ4D MultiHazard Array



SZ4D MultiHazard Array: Chile Node

- Main target region: 28°S-43°S
- Developed based on input from AndesNet (SZ4D's Chilean partner consortium)
- Incorporates a nested set of instrumental arrays
 - SurfaceArray
 - EarthquakeArray
 - VolcArray



SZ4D MultiHazard Array: VolcArray

Chile Footprint (1200 x 100 km + additional targets in N. and S. Chile)

22 Volcano Sensor Arrays (10+ years)

4 Volcano Imaging Arrays (2 year data collection)



Volcano Sensor Arrays

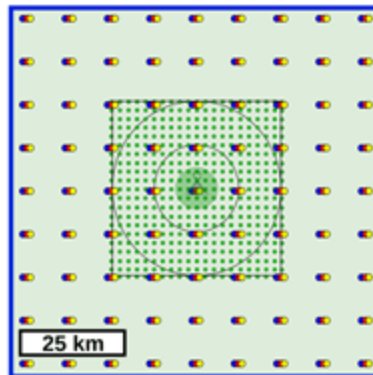
6 multi-sensor stations
~3 near-vent sensors



5 km

- ★ 4 Ash Collectors
- ★ 6 Seismometers
- ★ 2*3 Infrasond Sensors
- ★ 3 Tiltmeters
- ★ 6 GNSS
- ★ 2 Webcams
- ★ 3 FLIR
- ★ 3 ScanDOAS
- ★ 2 UV cameras
- ★ 2 MultiGas+met station

Volcano Imaging Arrays



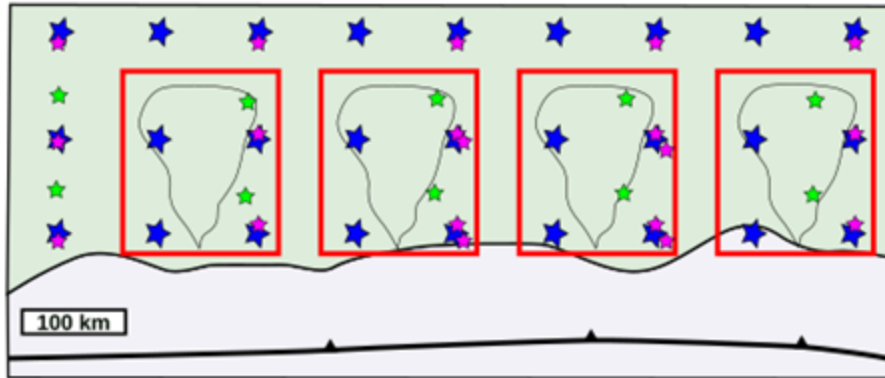
25 km

- 80 BB seismic (~10 km spacing, 40 km radius)
- 450 Nodal seismic (~1.5 km spacing, 20 km radius)
- MT Survey Points (~10 km spacing)
- Bouguer gravity/Diffuse CO₂ survey point
- VSA footprint

SZ4D MultiHazard Array: SurfaceArray

Backbone Array (over 850 x 300 km region):

- ★ 27 Met Stations (100 km spacing)
- ★ 15 Seismometers (35 km spacing)
- ★ 10 GNSS



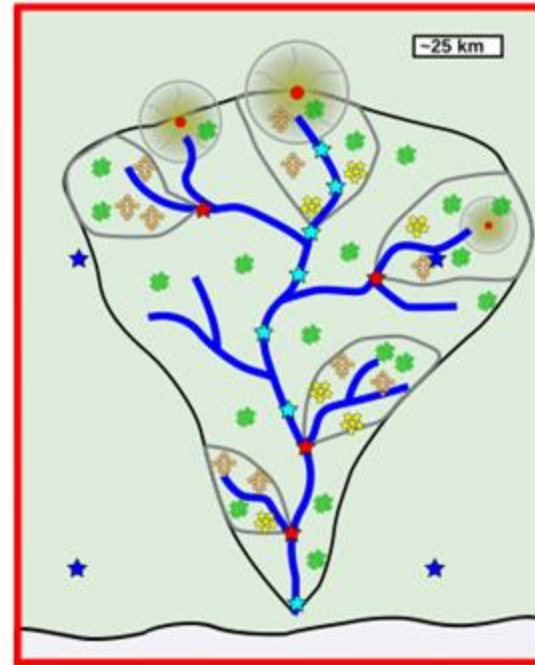
4 Watershed-Scale Arrays (~150 x 175 km each)

Hillslope Arrays:

- ★ 6 Fancy Packs* per watershed - 18 Fancy Packs total
- ★ 10 Midgrade Packs** per watershed - 30 Midgrade Packs total
- ★ 19 Simple Packs per watershed - 57 Simple Packs total

Stream Gauge Arrays:

- ★ 7 radar bounce gauges (stem) per watershed - 21 radar bounce gauges total
- ★ 4 simple level gauges (tributary) per watershed - 12 simple level gauges total



*Fancy Pack (river site):

- Precipitation
- Stream discharge
- Suspended sediment
- Microseismicity

* Fancy Pack (nonriver site):

- Precipitation
- Soil moisture
- Soil temperature
- Microseismicity

**Midgrade Pack (river site):

- Precipitation
- Stream discharge
- Turbidity
- Microseismicity

**Midgrade Pack (nonriver site):

- Precipitation
- Soil moisture
- Microseismicity

***Simple Pack (nonriver site):

- Precipitation
- Soil moisture

SZ4D MultiHazard Array: EarthquakeArray

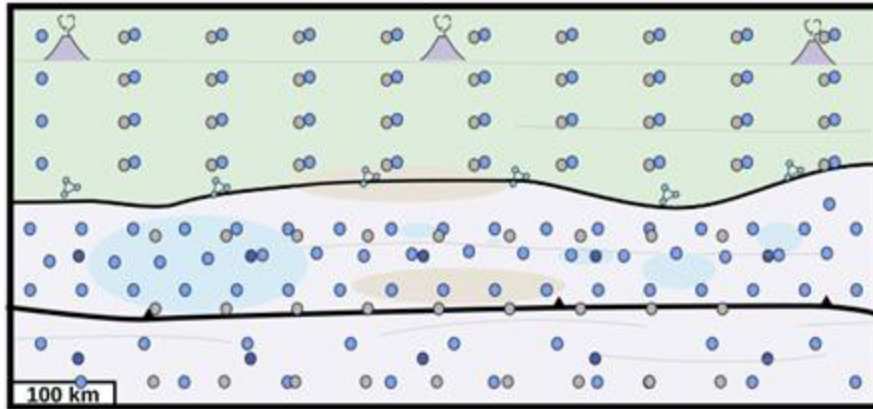
Phase 1:

Offshore (850 x 200 km)

- 70 OBS + APG (denser landward of trench, sparser seaward of trench)
- 50 GNSS-A (70 km spacing)
- 10 Offshore MT (multiphased survey - multiple two-month drops)

Onshore (850 x 200 km)

- 40 Seismometers (+ other sensors?)
- 36 GNSS (+ other sensors?)
- 6 Microseismicity arrays [1 BB+8 SP]



Coupled patch SSE Source Volcano Crustal fault Subduction thrust



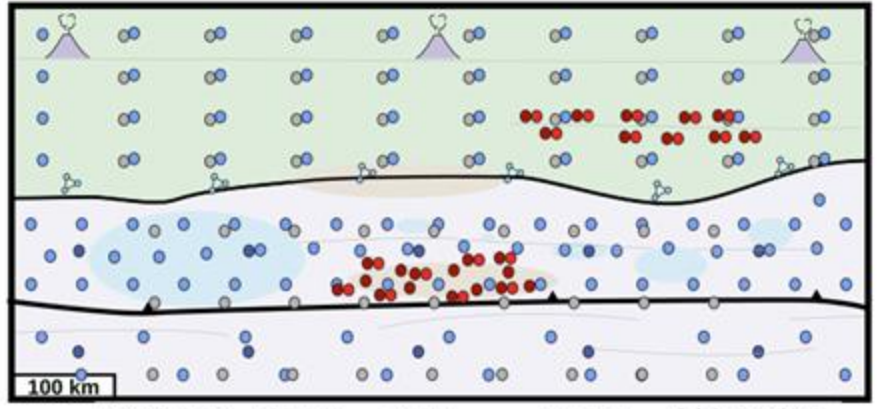
Phase 2 (6 years):

Offshore (targeted deployment)

- 15 OBS
- 8 GNSS-A

Onshore (targeted deployment)

- 10 Seismometers
- 10 GNSS



Coupled patch SSE Source Volcano Crustal fault Subduction thrust



SZ4D MultiHazard Array: Alaska and Cascadia Nodes

SurfaceArray:

- Opportunistic studies and event response to mass movement events (Alaska and Cascadia)

EarthquakeArray:

- 9 OBS/GNSS-A (Alaska)
- 10 onshore seismic/GNSS (Alaska)
- 9 GNSS-A+APG (Cascadia) + 2 wavegliders

VolcArray:

- 3 Volcano Sensor Arrays (Cascadia)
- 2 Volcano Imaging Arrays (Cascadia)
- 5 Volcano Sensor Arrays (Alaska)



SZ4D MSRI Planning + More

How to Stay Informed and Engaged

- AGU 2024 townhall - Wednesday, December 11, 6-7pm
 - Updates and a breakout discussion on the MSRI proposal
- Where to provide input, get updates, and ask questions in the interim:
 - New 'Infrastructure Planning' webpage @ www.sz4d.org
 - Email the SZ4D OPC-I or Infrastructure PI**
 - Email the SZ4D Working Groups**



www.sz4d.org*

