

**SZ4D International**  
**Summary of Meeting at AGU**  
**Tuesday December 12, 2017**

Attendees: Anne Meltzer (Lehigh Univ.), Sergio Barrientos (Univ. Chile), Xyoli Perez Campos (IG-UNAM), Philippe Charvis (Univ. Nice, CNRS, IRD), Bob Detrick (IRIS), Karen Fischer (Brown Univ.), Andy Frassetto (IRIS), Jeff Freymueller (Univ. Alaska), Gavin Hayes (USGS), Stephen Holtkamp (Univ. Alaska), Shuichi Kodaira (JAMSTEC), Meghan Miller (ANU), Meghan Miller (UNAVCO), Mario Ruiz (IG-EPN), Kerry Sieh (EOS), Frederik Tillman (GFZ), Harold Tobin (Univ. Wisconsin), Doug Wiens (Washington Univ.), Bob Woodward (IRIS).

There is interest in building partnerships internationally to leverage, enhance, and develop human and technical infrastructure to catalyze subduction zone science. The SZ4D initiative ([https://www.iris.edu/hq/workshops/2016/09/szo\\_16/](https://www.iris.edu/hq/workshops/2016/09/szo_16/) and attached) provides a framework to marshal resources and facilitate collaboration on a global scale; to explore, observe, and model the geological and geophysical processes generating subduction zone hazards; to significantly advance our ability to forecast earthquakes, tsunamis, landslides, and volcanic eruptions.

Infrastructure is defined broadly to include technical capabilities for observation and analysis (instrumentation, telemetry, computation), data (archiving, management, dissemination, integration), and people.

Taking advantage of the forum provided by the Fall AGU meeting, we gathered a group to discuss ways the community can facilitate and advance international engagement in subduction zone science. This is the first of what will be an ongoing conversation that will more broadly engage members of the international community moving forward. The NSF Research Coordination Network (RCN) Program (\*program synopsis below) provides a mechanism to foster international collaboration and coordination of infrastructure to support subduction zone science.

Summary of items discussed at the 12.12.17 meeting are listed below.

**Informational Items:**

- As an outcome of the SZ4D report an ad hoc SZ4D Steering Committee was formed. Harold Tobin is leading a Research Coordination Network (RCN) proposal to the NSF to establish a SZ4D coordination office to promote communication and community engagement via a website, e-news, and listserv, and to serve as an umbrella for various SZ4D science related communities and activities (see attached).
- Additional activities related to SZ4D are in various stages of development and may result in additional RCN, workshop, and community experiment proposals to the NSF:

- modeling collaboratory workshop (Thorsten Becker)
- volcano rapid response capability (Tobias Fischer)
- volcano community experiment (COVE, Brandon Schmandt)
- seafloor geodesy
- NSF RCN proposals are limited to a maximum of 5 years and \$500K.
- The NSF issued a Dear Colleague Letter requesting input via a survey on potential mid-scale infrastructure projects (projects in the ~\$50-\$100 million range). Responses to the survey include a shoreline crossing multiparametric observing capability, an internationally distributed rapid response capability, and offshore geodetic capabilities.
- The NSF has a Major Research Instrumentation Program (MRI) that funds multi-user instrumentation in the \$1-4 million range. The program requires a 30% match of total program costs.
- A process exists in France for a funding structure very similar to RCNs. While smaller in scale, it supports collaboration.
- The Servicio Sismológico Nacional (SSN in Mexico) is working on obtaining a more permanent funding stream for operations from the Mexican Government. The recent large earthquakes catalyzed additional support for network development.

\*NSF RCN Program Synopsis: The goal of the RCN program is to advance a field or create new directions in research or education by supporting groups of investigators to communicate and coordinate their research, training and educational activities across disciplinary, organizational, geographic and international boundaries. The RCN program provides opportunities to foster new collaborations, including international partnerships, and address interdisciplinary topics. Innovative ideas for implementing novel networking strategies, collaborative technologies, training, broadening participation, and development of community standards for data and meta-data are especially encouraged. RCN awards are not meant to support existing networks; nor are they meant to support the activities of established collaborations. RCN awards also do not support primary research. Rather, the RCN program supports the means by which investigators can share information and ideas, coordinate ongoing or planned research activities, foster synthesis and new collaborations, develop community standards, and in other ways advance science and education through communication and sharing of ideas.

### **Comments from meeting participants:**

- The capabilities, needs, and interests of individual countries will vary, so it will be important to establish a flexible structure and solicit input on what groups are capable of doing now and what they need in order to move to the next stage in their programs.
- Establishing backbone observing capabilities supports SZ4D science objectives. Many diverse resources for this are already in place. An international collaborative backbone is a way to start small and create a point of entry for broader initiatives. A backbone is

agnostic of potential observations and specific projects and helps build international collaboration and data exchange.

- There is community enthusiasm for a backbone with worldwide coverage.
- Many high-quality stations are already in place in a number of countries and are available to contribute to an international network.
- There is keen interest in developing offshore seismic and geodetic observing capabilities.
- Science and community needs should define infrastructure initiatives within SZ4D.
- There is a need to identify and/or coordinate resources to fund graduate students from developing countries in SE Asia and the Americas to obtain PhDs abroad.
- Engaging graduate students is important. In addition, given the time scale of this project there is an excellent opportunity to engage international undergraduate cohorts to engage in multidisciplinary subduction zone science, hazards, technology, and infrastructure.
- Research and science are key to driving hazard mitigation. Cooperation and collaboration on research is essential. Short and medium term visits and exchanges between researchers in partner countries facilitates true collaboration.
- In areas with existing very dense onshore/offshore networks and observations (e.g. Japan), international collaboration and research involving personnel exchange would be extremely helpful and is welcomed.
- Data from many existing networks is already open access representing a tremendous resource that can be leveraged immediately.
- There is a need to develop and support international data centers, where data archives remain in-country while being disseminated to the broader research/user community.
- Barriers limiting data sharing and open access need to be identified and lowered.
- Opportunities to discuss and share science are not as easily available outside of the U.S. and other developed countries. These are very important for developing a knowledge base for international participants and can motivate research collaboration and science exchanges.
- The needs of frequently unrepresented countries (e.g. South Pacific island nations like Tonga and the Solomons; Guatemala, El Salvador, etc. in the Americas) are relevant to this initiative. Finding ways to engage and include these countries is important.
- GRO-Chile is a good example of leveraging resources to enhance and build high-quality observing capabilities. An NSF MRI proposal needs 30% non-federal match for awards. International collaborations, such as with Chile, can use a match from the country in terms of labor and other in-kind contributions and coordination. Installation of 10 pilot stations set standards and supported in country expertise used to upgrade and expand the Chilean National Network. Network data is open access.
- While the September 2016 SZO workshop in Boise, Idaho included international participation, there were many countries with resources and expertise not at the meeting (i.e. Italy, Greece, China, Taiwan, etc.).

- Efforts need to reach broadly and be inclusive.
- There is value in engaging social scientists early, as the initiative develops. The challenge of translating science advances into risk reduction and resilience is significant.

**Potential activities/outcomes from an International Infrastructure RCN:** (list not prioritized, items below can be grouped into fewer overarching categories: infrastructure, data, people)

- Assess infrastructure strengths, needs, and opportunities from constituents and countries.
- Map infrastructure to science and hazard related goals.
- Identify ways to develop resources and facilities.
- Develop a flexible blueprint for establishing and maintaining observatory capabilities.
- Identify local science goals and hazard-related needs.
- Identify multinational, cross-border joint efforts to address science questions.
- Develop a plan to marshal and mobilize international resources.
- Engage the next generation of scientists and technicians in research and to run long-term infrastructure (graduate and undergraduate students).
- Develop federated datacenters allowing for exchange and discovery of consistently archived data/metadata.
- Facilitate open and free exchange of data.
- Establish international network for facilitating student exchange and support for PhDs.
- Establish proof of concept to help generate additional support.
- Encourage use of existing (underutilized?) data.
- Develop best practice/data products.
- Link social science expertise to the geoscience community

**2018 Action items:**

- Expand the list of countries represented in discussion of SZ4D International; identify and contact additional individuals to participate.
- Develop and submit a NSF Research Coordination Network (RCN) proposal to coordinate international infrastructure to support SZ4D science ([https://www.nsf.gov/publications/pub\\_summ.jsp?ods\\_key=nsf17594](https://www.nsf.gov/publications/pub_summ.jsp?ods_key=nsf17594)).
- Identify additional resources where available from partner countries to leverage NSF RCN funds to enhance RCN activities and partnerships.
- Coordinate with the SZ4D Steering Committee to host a planning workshop for Mid-Scale Infrastructure and MRI proposals.