



We envision a just and equitable world where knowledge is applied to ensure that humans live in harmony with nature.

CONVERGE: Research Infrastructure for Disaster Resilience

Rachel Adams, PhD, MPH

Research Associate

Natural Hazards Center and CONVERGE

University of Colorado Boulder



University of Colorado **Boulder**

NSF Award #1841338



NHERI 

The Natural Hazards Center

Mission: We are the National Science Foundation-designated information clearinghouse for the **societal** dimensions of hazards and disasters. We are dedicated to reducing disaster harm through:

1. translating and sharing hazards and disaster research and information;
2. building connections between researchers, non-profit and private sector professionals, the media, policy makers, and local, state, and federal officials;
3. advancing social science and interdisciplinary knowledge, with a special emphasis on the most vulnerable populations and places; and
4. training and mentoring the diverse next generation of hazards and disaster professionals.



hazards.colorado.edu/signup



CONVERGE

CONVERGE is a new National Science Foundation-Natural Hazards Engineering Research Infrastructure (NSF-NHERI) facility dedicated to:

- **identifying** researchers;
- **educating** and **training** researchers;
- **setting** a convergence research agenda that is problem-focused and solutions-based;
- **connecting** researchers and **coordinating** functionally and demographically diverse research teams; and
- **supporting** and **funding** convergence research, data collection, data sharing and solutions implementation.



CONVERGE

- In 2020 we published an article on CONVERGE in *Frontiers in Built Environment*
- This article synthesizes 20 years of convergence research in an effort to bring that framework to the natural hazards field
- Access the article for free online at:

<https://www.frontiersin.org/article/s/10.3389/fbuil.2020.00110/full>





NSF Extreme Events Reconnaissance / Research (EER) Networks

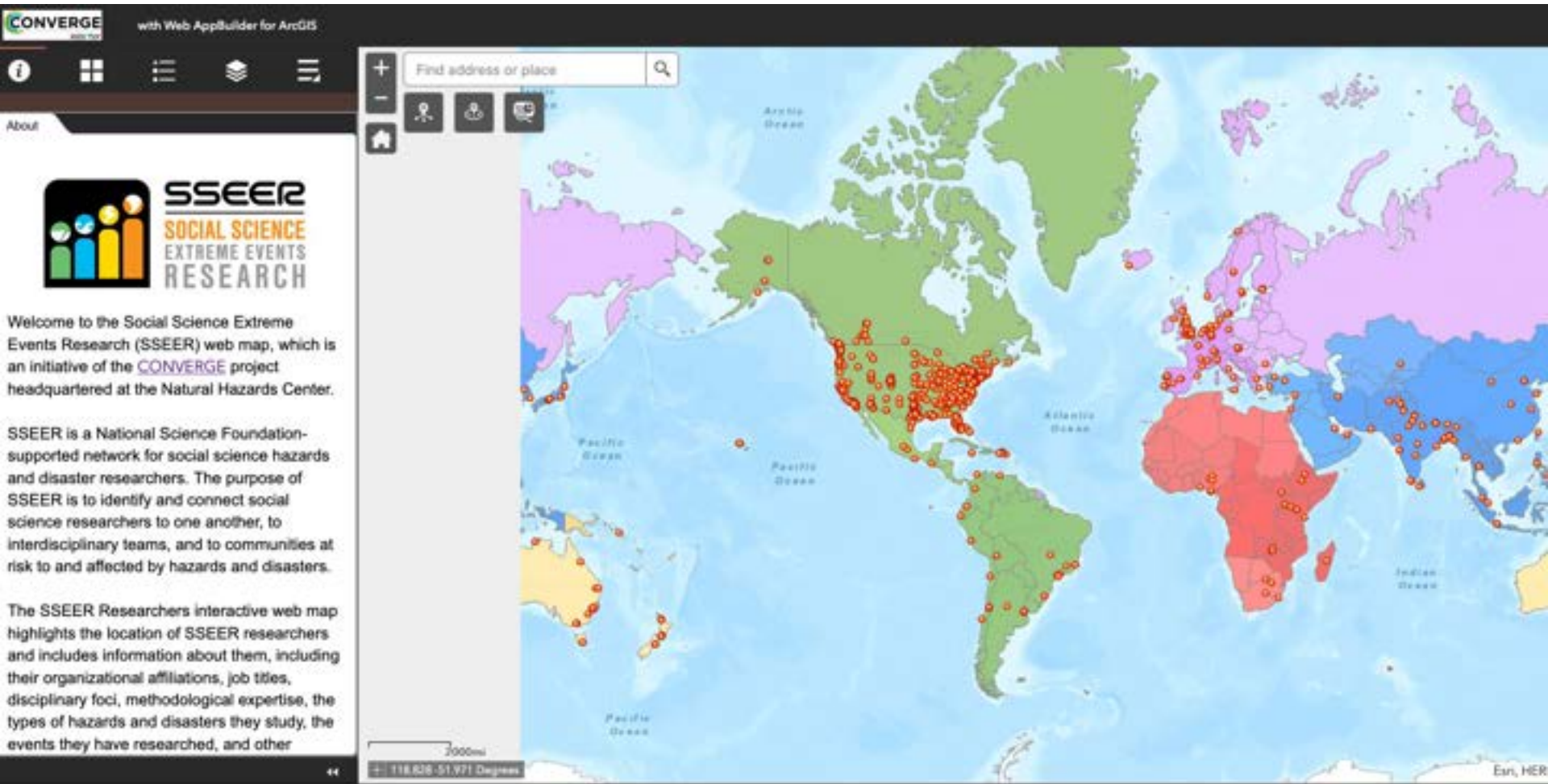
1. Geotechnical Engineering (GEER)
2. Social Sciences (SSEER)
3. Structural Engineering (StEER)
4. Nearshore Systems (NEER)
5. Operations and Systems Engineering (OSEEER)
6. Sustainable Material Management Engineering (SUMMEER)
7. Interdisciplinary Science and Engineering (ISEEER)



Leadership Corps for Natural Hazards Research











SSEER



CONVERGE Training Modules

- Free, online courses designed to accelerate the training of diverse hazards and disaster researchers, including students and early career researchers

 <p>Broader Ethical Considerations for Hazards and Disaster Researchers</p> <p>This Training Module focuses on the broader ethical considerations for conducting research in a disaster setting.</p> <p>Register</p>	 <p>Collecting and Sharing Perishable Data</p> <p>This Training Module focuses on ways to collect and share perishable hazards and disaster data.</p> <p>Register</p>	 <p>Conducting Emotionally Challenging Research</p> <p>This Training Module describes emotionally challenging research and highlights the ways that recognizing researchers' emotions can lead to more ethical and methodologically sound research practices in the context of extreme events.</p> <p>Register</p>	 <p>Social Vulnerability and Disasters</p> <p>This Training Module focuses on social vulnerability to hazards and disasters, with an emphasis on population groups that have been identified in the literature as especially at risk to the adverse effects of extreme events.</p> <p>Register</p>	 <p>Understanding and Ending Gender-Based Violence in Fieldwork</p> <p>This module describes gender-based violence in the context of field research and provides an in-depth exploration of misconceptions, real life scenarios, and strategies for safe fieldwork practices.</p> <p>Register</p>
 <p>Cultural Competence in Hazards and Disaster Research</p> <p>This Training Module focuses on culturally competent research and offers guidance on how hazards and disaster researchers can build cultural competence.</p> <p>Register</p>	 <p>Disaster Mental Health</p> <p>This Training Module focuses on mental health outcomes associated with disasters, with a particular emphasis on risk factors over time that make certain populations vulnerable to poor disaster mental health outcomes.</p> <p>Register</p>	 <p>Institutional Review Board (IRB) Procedures and Extreme Events Research</p> <p>This Training Module introduces users to Institutional Review Board (IRB) procedures and offers guidance on how to work with the IRB to ensure ethical extreme events research.</p> <p>Register</p>	<p>Module metrics: approximately 3,500 people have registered to date for training modules</p>	

Check Sheets

University of Colorado Boulder

CONVERGE | Natural Hazards Center
INSTITUTE OF BEHAVIORAL SCIENCE

About CONVERGE » Research Networks » Resources » Data » Communications »

Check Sheets

Resources / Check Sheets

Extreme Events Research Check Sheets Series

These short, graphical check sheets are meant to be used as researchers design their studies, prepare to enter the field, conduct field research, and exit the field. The series offers best practices for extreme events research and includes check sheets for free to the research community.



RESEARCH DESIGN TABLE



PART I: CONDUCTING A SYSTEMATIC LITERATURE REVIEW



PART II: SYSTEMATIC LITERATURE REVIEW TABLE



DON'T FORGET: A CHECKLIST OF THINGS TO BRING TO THE FIELD

NSF Award #1841338



converge.colorado.edu/resources



Data Ambassadors

CONVERGE Data Ambassadors

CONVERGE Data Ambassadors have completed a National Science Foundation-supported [Cultivate Your Data](#) training session. As Data Ambassadors, they have committed to publishing their own data and instruments on [DesignSafe](#) or learning about the [CONVERGE](#) by writing and their responses, and for sharing their newly acquired knowledge with other social and environmental scientists and colleagues from other allied disciplines in the hazards and disaster field. CONVERGE Data Ambassadors will help other in a culture shift toward data publication and data and instrument sharing across disciplines.

The following page includes a list of instruments, reports, protocols, and other research materials published by the CONVERGE Data Ambassadors via the DesignSafe Cyberinfrastructure.



Lauren Clay
Associate Professor, Health Administration and Public Health
St. Vincent's College

Research Instrument Repository

Clay, L. (2022). "COVID-19 and Social Determinants of Health Data Collection Instrument Repository." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018>

Research Brief

Clay, L., S. Penta, and A. Silver. (2022). "Risk Perception, Information Seeking, and Protective Actions During COVID-19 Among New Yorkers (May-July 2020)." In A Multi-Wave Study of Risk Perception, Information Seeking, and Protective Action in COVID-19. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-001>

Data Report

Clay, L., S. Penta, and A. Silver. (2022). "Worrying and Secondary Health Impacts of the COVID-19 Pandemic on New Yorkers (May-June 2020)." In National Flood Access and (NFA) Research Team (NFA-RT). New York: DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-002>



Alice Greer
Associate Professor, College of Emergency Preparedness, Homeland Security, and Cybersecurity
University of Miami

Research Instruments and Data

Greer, A., T. Wu, H. Murphy, and R. Chang. (2022). "Survey of Students and Households and Interviews with Key Stakeholders in Oklahoma" in Earthquake Adjustment in Oklahoma. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-010>



Betty Lai
Assistant Professor, Department of Counseling, Developmental, and Educational Psychology
Boston College

Interview Protocol

Waters, B., J. McElhiney, C. Colgan, B. Liang, and B. Lai. (2022). "Semi-Structured Interview Protocol on College and COVID-19." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-003>



Lori Peak
Professor, Department of Geology and Director, Natural Hazards Center
Principal Investigator, CONVERGE, NHERI, and NCEM
University of Colorado Boulder

Dataset

Peak, L., E. Hines, M. Mathews, J. Gunderson, and H. Wu. (2022). "Global Academic Hazards and Disaster Research Centers Data." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-004>

Research Instruments

Peak, L., W. Rosenbloom, G. Gu, S. Yen-Zhang, L. Peak, H. Dillard, J. Tobin, and S. Harshbarger. (2022). "Household Survey Instrument, November 26, 2019, Wave 1" in A Longitudinal Community Resilience Focused Technical Investigation of the Lumberton, North Carolina Flood of 2016. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-005>

Peak, L., H. Dillard, S. Harshbarger, W. Rosenbloom, J. Tobin, S. Peak, S. Seung, A. Barlow, T. Tomczak, J. van de Linde, and G. Gu. (2022). "Household Survey Instrument, January 19, 2019, Wave 2" in A Longitudinal Community Resilience Focused Technical Investigation of the Lumberton, North Carolina Flood of 2016. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-006>

Scoping Literature Review

Wu, H., L. Peak, M. Mathews, and H. Mathews. (2022). "A Scoping Literature Review: Cultural Competence for Hazards and Disaster Research." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-007>



Nathaniel Rosenbloom
Associate Research Scientist and Director of Research, Hazard Prediction & Recovery Center
Texas A&M University

Research Instruments

Peak, L., W. Rosenbloom, G. Gu, S. Yen-Zhang, L. Peak, H. Dillard, J. Tobin, and S. Harshbarger. (2022). "Household Survey Instrument, November 26, 2019, Wave 1" in A Longitudinal Community Resilience Focused Technical Investigation of the Lumberton, North Carolina Flood of 2016. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-005>

Rosenbloom, N., W. Rosenbloom, H. Peak, and G. Gu. (2022). "Food Retail Survey Instrument" in Food Retail Impact Survey for Southwest Texas and Harris County: State after Hurricane Harvey. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-008>

Dataset

Rosenbloom, N., H. Bantley, C. Goodman, A. Barlow, S. Seung, E. Harshbarger, J. Karamboudis, and M. Watson. (2022). "Systematic Literature Review Toolkit." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-009>



Kevin Smith
Professor, Department of Landscape Architecture and Environmental Planning
North Carolina State University

Research Instrument

Smith, K., G. Wu, and C. Cooley. (2022). "A National Evaluation of State Roles in Hazard Mitigation: Building Local Capacity to Implement FEMA Hazard Mitigation Assistance Grants." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-011>



Maria Matzoni
Research Assistant Professor, Department of Landscape Architecture and Urban Planning
Texas A&M University

Research Instruments

Smith, K., H. Dillard, S. Harshbarger, W. Rosenbloom, J. Tobin, S. Peak, S. Seung, A. Barlow, T. Tomczak, J. van de Linde, and G. Gu. (2022). "Household Survey Instrument, January 19, 2019, Wave 2" in A Longitudinal Community Resilience Focused Technical Investigation of the Lumberton, North Carolina Flood of 2016. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-006>

Wu, H., M. Watson, J. Gunderson, B. Fawcett, J. van de Linde, J. Harshbarger, E. Seung, J. Dillard, T. Tomczak, A. Barlow, J. Fung, G. Wu, and H. Dillard. (2022). "Business Survey Instrument, January 19, 2019, Wave 2" in A Longitudinal Community Resilience Focused Technical Investigation of the Lumberton, North Carolina Flood of 2016. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-012>



Haerol Wu
Assistant Professor, School of Social Work
Southern University

Dataset

Peak, L., E. Hines, M. Mathews, J. Gunderson, and H. Wu. (2022). "Global Academic Hazards and Disaster Research Centers Data." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-004>

Scoping Literature Review

Wu, H., L. Peak, M. Mathews, and H. Mathews. (2022). "A Scoping Literature Review: Cultural Competence for Hazards and Disaster Research." DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-007>



W. Tristan Wu
Associate Professor, Department of Emergency Management and Disaster Science
University of North Texas

Research Instruments

Wu, T., S. Huang, and M. Lindell. (2022). "Household Mail Survey" in 2017 New Zealand and Japan Earthquake Household Response Survey. DesignSafe-CI <https://doi.org/10.7927/D4HQ/8N2-018-013>

COVID-19 Resources

COVID-19 Resources



COVID-19 Working Groups

Due to the outpouring of interest from the research community and our mission to advance convergence research for the benefit of humanity, CONVERGE and the Social Science-Extreme Events Research (SSEER) Network have funded 10 COVID-19 Working Groups for Public Health and Social Sciences Research.

[View Groups](#)



COVID-19 Research Registry

The COVID-19 pandemic underscores the urgent need for coordination, collaboration, and information sharing among researchers worldwide. We hope those who are studying the human and societal impacts of this crisis will join the effort to build a global registry for public health and social science research.

[Learn More](#)



COVID-19 Virtual Forums

CONVERGE virtual forums bring together researchers to coordinate and collaborate after major events. Please check here for upcoming virtual forum and recordings of past forums.

[View Forums](#)



COVID-19 Quick Response Research Grants

This is a list of recently funded COVID-19 Quick Response Research. These were awarded by the Natural Hazards Center as part of two distinct special calls for research in this global crisis. Within three months of completing data collection, researchers submit an abstract and 10-page report detailing their preliminary findings. Completed reports are available on the Quick Response Reports page.

[View All](#)

Webinars

CONVERGE | Natural Hazards Center INSTITUTE OF BEHAVIORAL SCIENCE

About CONVERGE ■ Research Networks ■ Resources ■ Data ■ Communications ■

CONVERGE Webinar Series



CONVERGE Collecting and Sharing Portable Data Training Module A Demonstration Webinar

Aug 6, 2021 - 12 to 12:30 pm MT



Make CONVERGE Training Module Part of Your College/University Course - Here's How!

Jul 16, 2021 - 2 to 3:15 pm MT



CONVERGE Extreme Events Research Check Sheets

Jun 16, 2021 - 12 to 12:30 pm MT



Mobile Data Collection via Rikis Advanced Questionnaire

Dec 11, 2020 - 11 to 11:30 am MT



Coordinating After Natural Hazards to Document the Performance of the Built Environment: The Structural Extreme Events Reconnaissance (SEER) Network

Oct 28, 2020 - 1 to 1:30 pm MT



CONVERGE Conducting Emotionally Challenging Research Training Module A Demonstration Webinar

Oct 8, 2020 - 2 to 3:30 pm MT



CONVERGE Broader Ethical Considerations for Hazards and Disaster Research Training Module A Demonstration Webinar

Apr 16, 2021 - 10 to 10:30 am MT



CONVERGE Understanding and Ending Gender-Based Violence in Fieldwork Training Module A Demonstration Webinar

Mar 16, 2021 - 2 to 3:30 pm MT



Publish Your Data! Learn How to Use DesignSafe and Meet the CONVERGE Data Ambassadors

Jan 29, 2021 - 1 to 1:30 pm MT



Collaborating to Learn from Hurricanes The Nearshore Extreme Events Reconnaissance (NEER) Association

Aug 11, 2020 - 2:30 to 3 pm MT



CONVERGE Institutional Review Board (IRB) Procedures and Extreme Events Research Training Module A Demonstration Webinar

Jun 25, 2020 - 12 to 12:30 pm MT



CONVERGE Federal Briefing - Rapid Response Disaster Research NSF-Supported Research Networks and Resources

May 20, 2020 - 10 am to 12 pm MT



We envision a just and equitable world where knowledge is applied to ensure that humans live in harmony with nature.

Schools, Earthquakes, and Early Warning Systems



ShakeAlert



University of Colorado **Boulder**

NSF Award #1841338



NHERI 

Our Research Team



University of Colorado
Boulder



Lori Peek, Rachel Adams, Jolie Breeden, Jennifer Tobin,
Natural Hazards Center



Robert de Groot,
USGS



Sara McBride,
USGS



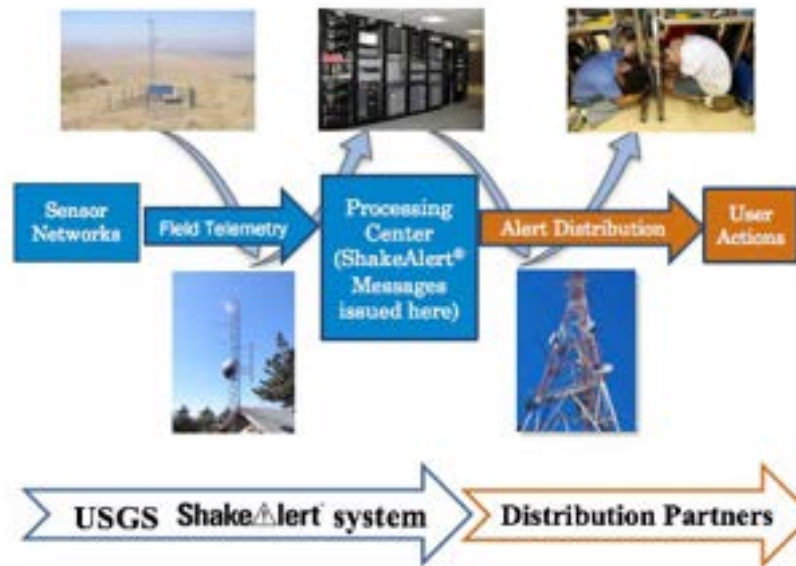
The Importance of Schools and Earthquake Safety



ShakeAlert Earthquake Early Warning

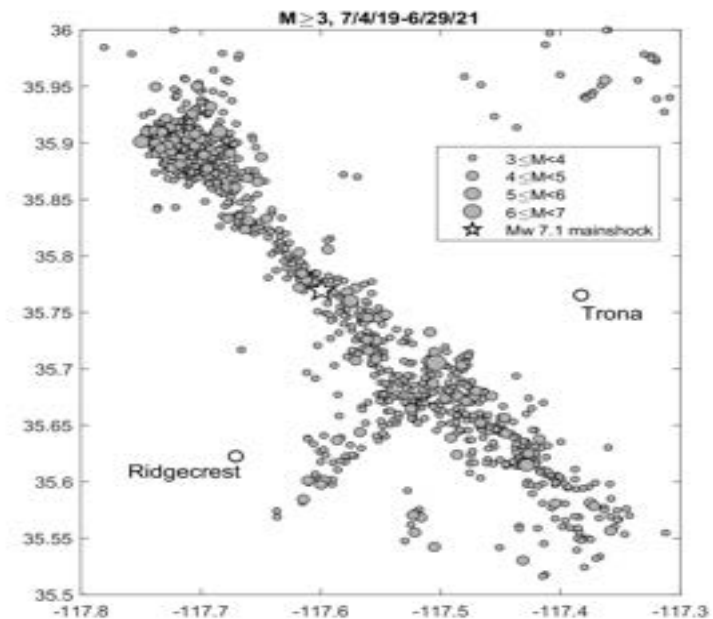
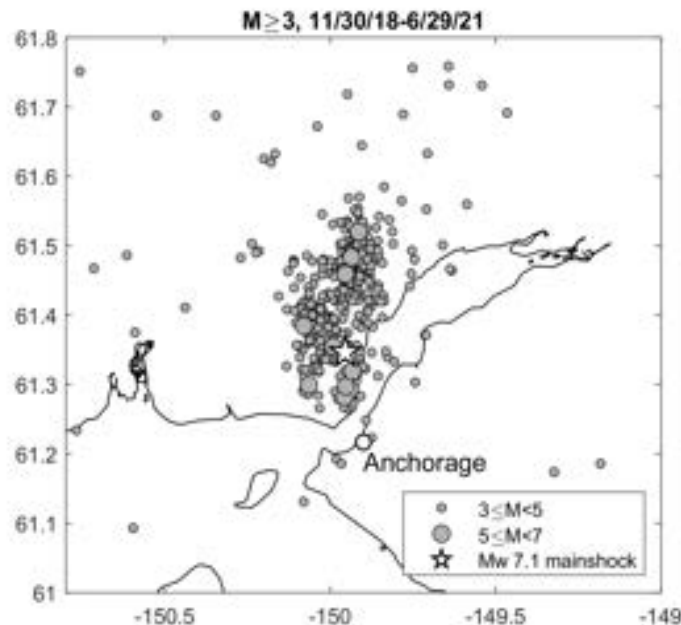
ShakeAlert® is an earthquake early warning (EEW) system that detects significant earthquakes so quickly that alerts can reach many people before shaking arrives.

West Coast Earthquake Early Warning System Components



Study Phase 1: Interviews and Focus Groups

- **Approach:** Qualitative fieldwork – interviews, focus groups, and observations
- **Study Sites:** Anchorage and Matanuska-Susitna Borough, **Alaska** and Ridgecrest and Trona, **California**



Study Phase 1: Interviews and Focus Groups

- **Study Focus:** Earthquake case studies and **earthquake early warning**
- **Sample:** 118 K-12 school administrators, teachers, parents, students, emergency managers, building officials, and engineers
- **Data Collection Timeline:** January and February 2020
- **Analysis:** Qualitative Content Analysis in Atlas.ti

Findings



(1) Questions about ShakeAlert

- ▶ School respondents in both Alaska and California reported that they had relatively little or no understanding of what earthquake early warning is or of how it would work in schools.



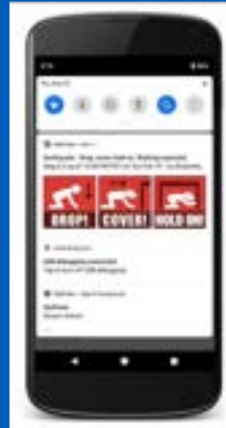
(1) Questions about ShakeAlert

- ▶ *How does it work?*
- ▶ *How much warning time will we have?*
- ▶ *How will the alerts be delivered?*
- ▶ *What is the earthquake magnitude threshold for an alert?*
- ▶ *What will the warning message say or sound like?*
- ▶ *What about when kids are on buses, in passing period in the hallways, in gym with no desks, or outside on the grounds?*
- ▶ *What if there is a false alert?*
- ▶ *Do schools have to pay to participate?*
- ▶ *What if our technology won't support the system?*



(2) Uncertainty about Delivery Mechanisms

- ▶ Mobile Phones?
- ▶ School Siren Systems?
- ▶ Principals or Administrators?



▶ Drill Fatigue



**NATURAL
HAZARDS
CENTER**

2019/20 DRILL SCHEDULE

CHECK 8
FRA-IC HAIL 7/15/2019

• Drill Date
• Drill Location
• Drill Type

Drill Date	Drill Location	Drill Type
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1/22/20
1/29/20
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(3) Concerns about Drills and Warnings

- ▶ Drill Fatigue
- ▶ Warning Confusion
 - ▶ Sounds?
 - ▶ Visual Alert (flashing lights)?
 - ▶ Words?

[illegible]

(3) Concern about Drills and Warnings

- ▶ Drill Fatigue
- ▶ Drill and Warning Confusion
- ▶ Drill and Warning Anxiety among Students
- ▶ Educational Consequences of “Over-Warning”

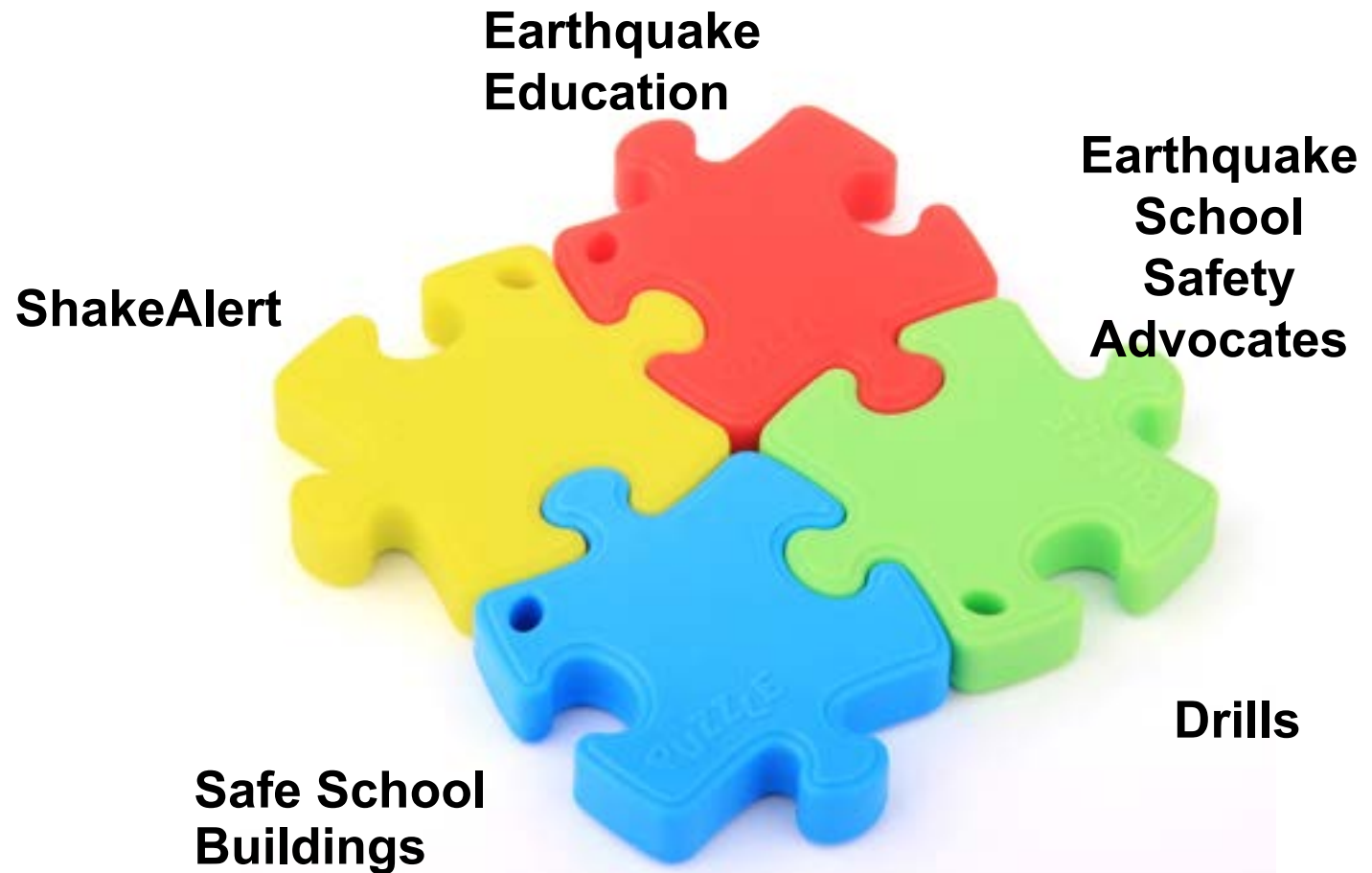


(4) Generational Differences: Adults, Children and Protective Actions

- ▶ When compared to their students, teachers may have received different earthquake education based on when or where they grew up.
- ▶ This could lead to conflicting messaging and behavioral cues from trusted adults.



(5) EEW as One Piece of a Puzzle



Study Phase 2: Survey of Superintendents

- **Approach:** 10-15 minute online survey
- **Study Focus:** Knowledge, understanding, and willingness/barriers to adopt ShakeAlert in K-12 schools
- **Sample:** One school superintendent from each school district in Washington, Oregon, California, and Alaska
- **Timeline:** January and February 2022

Survey Constructs

- Earthquake Experience
- Earthquake Drills and Warnings in Schools
- Knowledge and Current Use of ShakeAlert
- Perceived Opportunities of EEW in Schools
- Perceived Barriers of EEW in schools
- EEW Delivery Channel
- Preferences for Alert Messaging and Tolerance for False or Missed Alerts
- EEW Funding
- Respondent and School District Characteristics

Survey Measures

- ▶ Survey constructs were guided by qualitative results and the Ready, Willing, and Able framework
- ▶ Survey measures adapted from:
 - ▶ 2021 ShakeAlert Baseline Survey (U.S. Geological Survey)
 - ▶ 2014 Building Owners and Managers Association Survey (University of Washington School of Public Affairs)
 - ▶ 2001 Survey of Potential Early Warning System Users (University of California Los Angeles Center for Public Health and Disasters)

Next Steps

- ▶ Descriptive statistics
- ▶ Regression analyses
- ▶ Triangulation of qualitative and quantitative findings
- ▶ Report outlining recommendations for how to effectively integrate ShakeAlert into schools





We envision a just and equitable world where knowledge is applied to ensure that humans live in harmony with nature.

Thank you!

Contact Us at: converge@colorado.edu
Sign Up at: converge.colorado.edu/signup



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Q & A

