

# The Natural Hazards and Disasters Reconnaissance Facility (RAPID Facility)



J. Berman<sup>1</sup>, J. Wartman<sup>1</sup>, M. Olsen<sup>2</sup>, N. Errett<sup>3</sup>, J. Irish<sup>3</sup>, K. Gurley<sup>4</sup>, L. Lowes<sup>1</sup>, T. Tanner<sup>1</sup>,  
M. Grilliot<sup>1</sup>, A. Lyda<sup>1</sup>, J. Zdebski<sup>1</sup>, K. Dedinsky<sup>1</sup>



UNIVERSITY of WASHINGTON

<sup>1</sup>University of Washington, <sup>2</sup>Oregon State University, <sup>3</sup>Virginia Polytechnic Institute, <sup>4</sup>University of Florida

## Mission

The RAPID Facility enables transformative research by providing investigators with the instrumentation, software, and support needed to collect, process, and analyze perishable data from natural hazard events and from disasters.

## Values

The RAPID Facility promotes reconnaissance-based science, shared resources, open data, convergence research, community engagement, and innovation to reduce the adverse impacts of natural hazards.

## Strategic Activities

To achieve its mission, the RAPID facility engages in the following strategic activities:

- Acquire, maintain, and operate state-of-the-art data collection instrumentation for natural hazard and disaster investigations
- Develop and support the mobile application Rapp for field data collection to advance interdisciplinary reconnaissance and enable convergence research
- Provide advisory services and essential logistics support for reconnaissance investigations
- Facilitate widespread use of collected data through systematic processing, visualization, and publication with DesignSafe-CI
- Train a broad and diverse user base through workshops and other activities
- Engage the public through mission-related community outreach and education

## Science Plan

- Aligns with NHERI Science Plan (Edge et al. 2020) and its identified Grand Challenges
- Driven by natural hazards community—2017 Facility Workshop
- Updated in 2020 to reflect improved understanding of socioeconomic factors
- Facilitate collection, analysis and synthesis of data that is multidisciplinary in order to establish relationships between hazard events, their antecedents, and their broad consequences, ultimately leading to an improved ability to model, manage, and mitigate disaster risk to communities

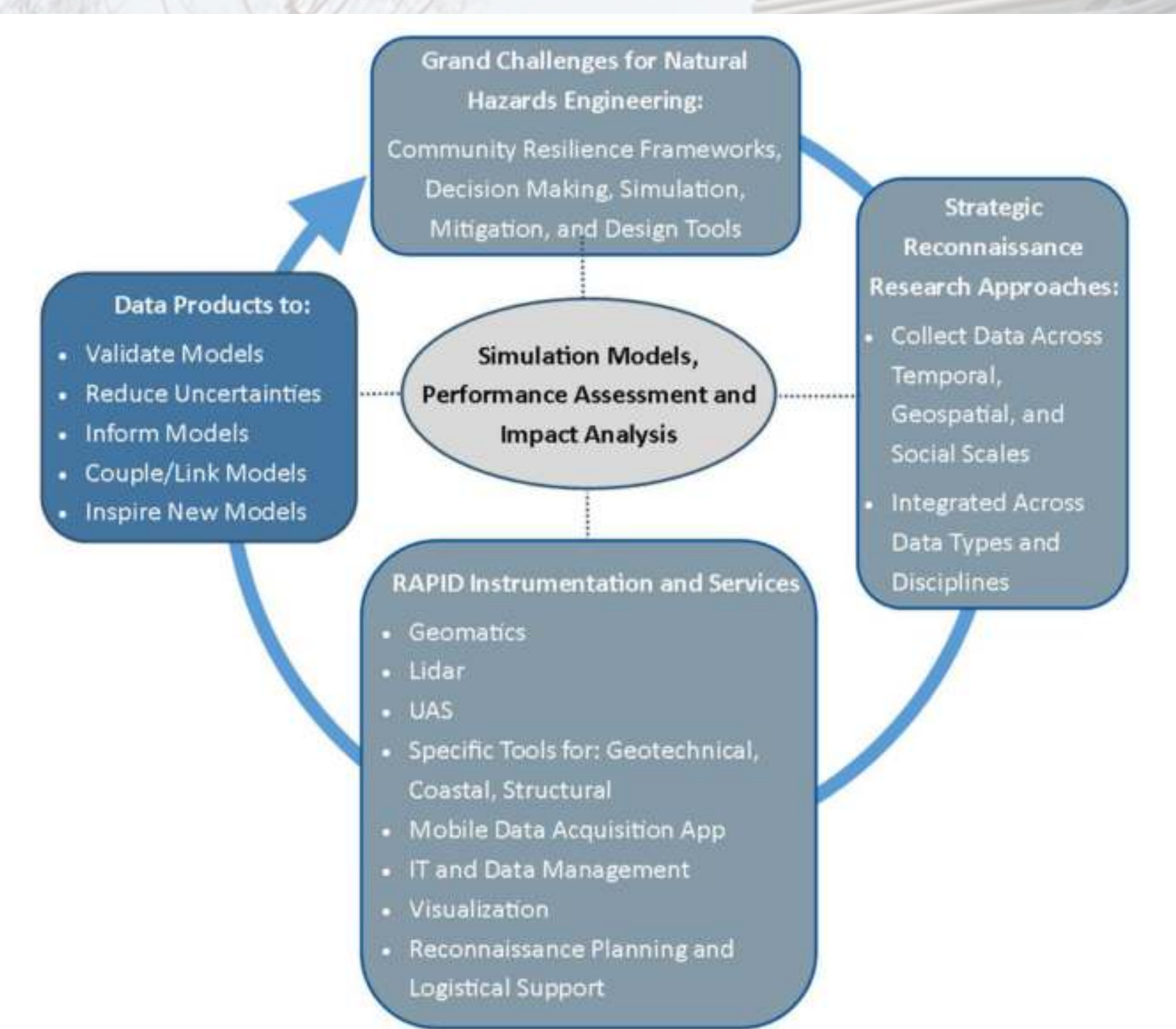


Fig. 2: RAPID Facility Science Plan (Wartman et al. 2020)

## Mission Support

Since beginning field operations in September 2018, the facility has supported of **over 80 natural hazard deployments worldwide** for over 60 organizations.

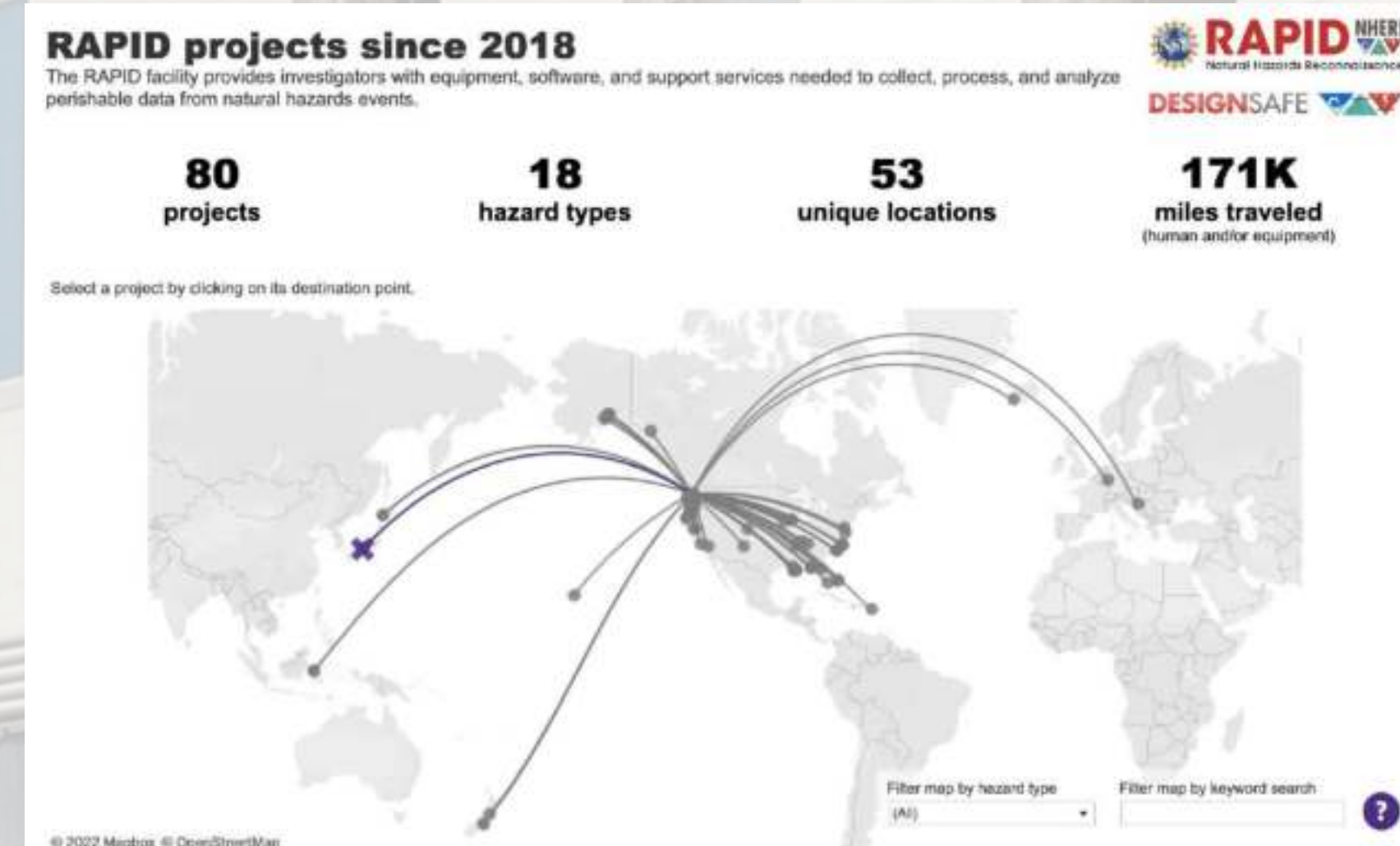


Fig. 4: RAPID Deployments

## Example Mission: Camp Wildfire, California

- Goals: Data collection on wildfire urban interface for schools and hospitals
- Lead by Erica Fischer (Oregon State University, NSF Award 1917298)



Fig. 6: Camp Wildfire Data Collection and Subsequent Analysis of Damaged Buildings (Schulze et al. 2020)

## Example Mission: Seattle COVID 19 Streetview

- Goals: Data Collection on long term urban recovery from COVID
- Lead by Nicole Errett, Joe Wartman, Youngjun Choe (UW, NSF Award 2031119)

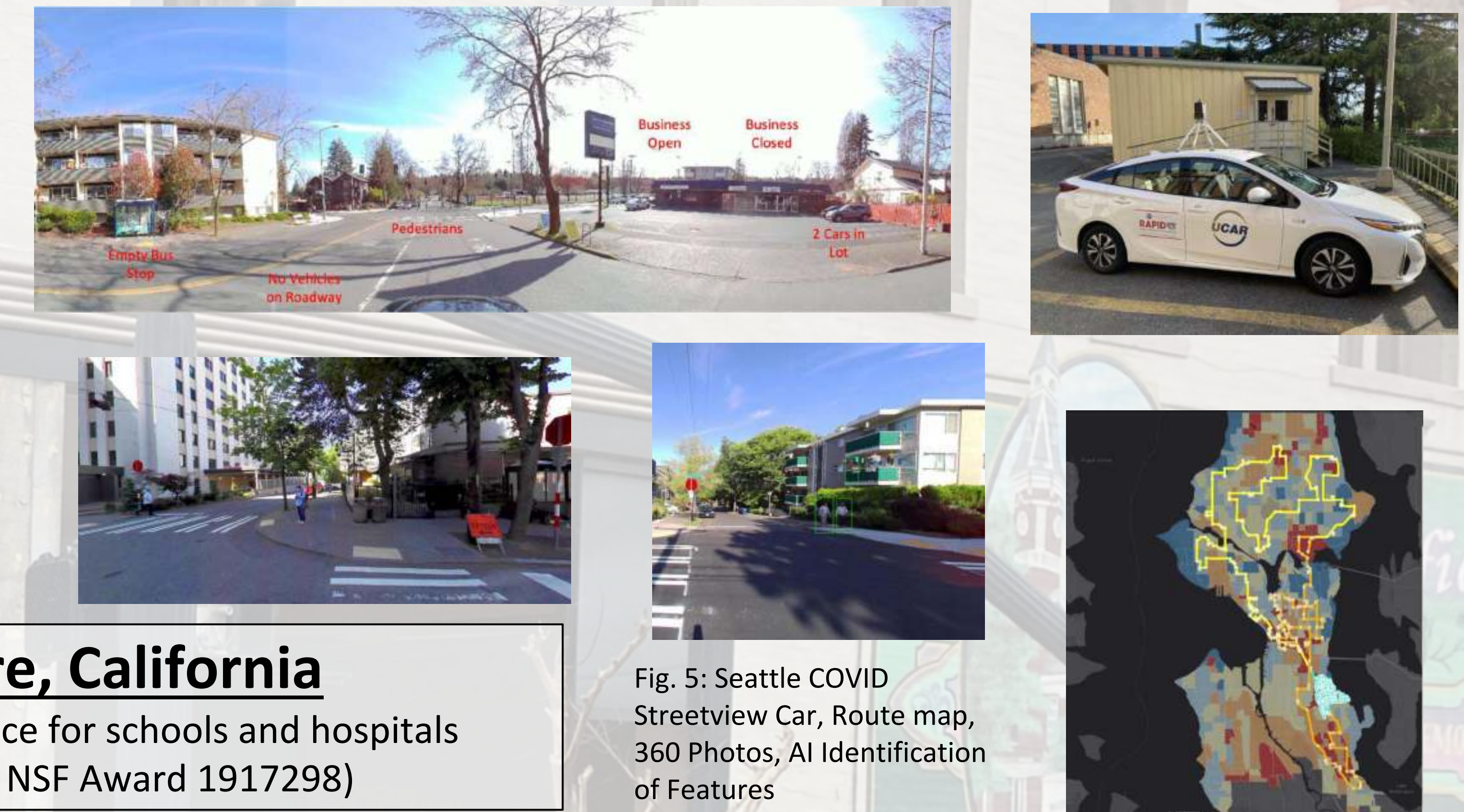


Fig. 5: Seattle COVID Streetview Car, Route map, 360 Photos, AI Identification of Features

## Example Mission: Hurricane Michael, Florida

- Goals: Documented damage to 10+ low-rise, large-volume buildings with similar failure mode during Hurricane Michael; examine failure modes, calculate likely wind loads, develop recommendations for design
- Lead by David Rouche (U. Auburn, NSF Award 1904327)



Fig. 7: Hurricane Michael Damage to Large-Volume Buildings and 3D Point Cloud Models

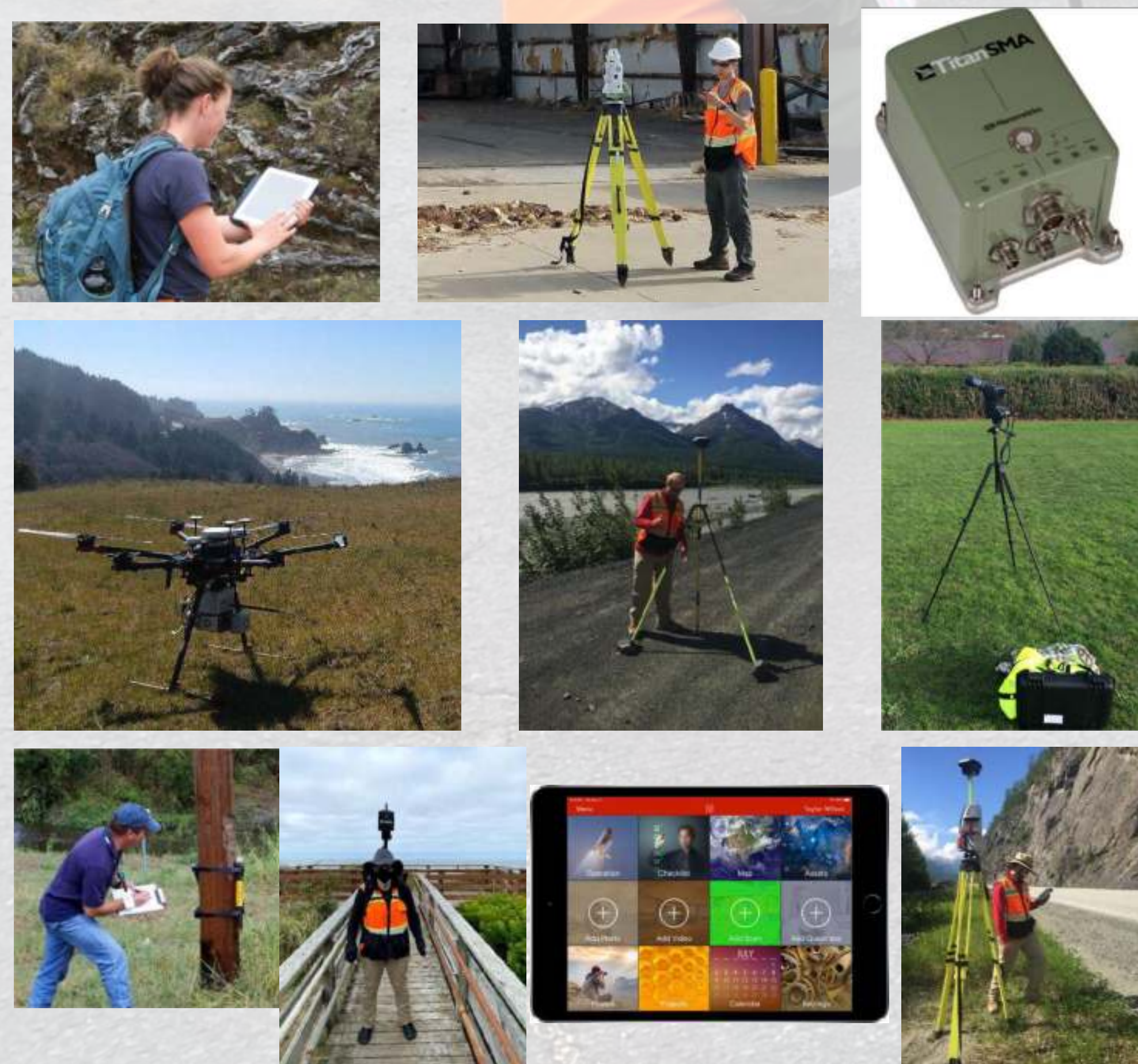


Fig. 1: RAPID Facility Instrumentation (Berman et al. 2020)



Fig. 3: RAPID Facility Multidisciplinary and Multi-Scale Data Collection (Berman et al. 2020)

## Instrumentation Portfolio

- Advanced Geomatics Technologies
- Seismic Instrumentation
- Wind and Storm Surge Instrumentation
- Social Science Reconnaissance Equipment
- Ground Investigation
- Imaging Equipment
- Software tools
- Full list on RAPID website:

## RAPID Facility Assessment of Social Sciences Research Support Needs



**Please take our survey!**

*In partnership with SSEER, this survey is designed to learn from the social sciences community about how the RAPID Facility could better support their natural hazard and disaster research.*

*Information from this survey will be used to inform future efforts to broaden use of the RAPID Facility among social scientists.*

**Acknowledgements:** The authors would like to acknowledge funding support from NSF award # 1611820 and 2130997. The authors and the University of Washington acknowledge the Coast Salish peoples of this land, the land which touches the shared waters of all tribes and bands within the Suquamish, Tulalip and Muckleshoot nations.

## References

1. Yang, Zhiqing and Choe, Youngjun and Martell, Matthew "COVID-19 economic policy effects on consumer spending and foot traffic in the U.S." J. of Safety Science and Resilience, v.2, 2021
2. Mason, H. B., Montgomery, J., et al., (2021). East Palu Valley flowslides induced by the 2018 MW 7.5 Palu–Donggala earthquake. *Geomorphology*, 373, 107482
3. Schulze, S.S., Fischer, E.C., Hamideh, S., Mahmoud, M. (2020). "Wildfire impacts on schools and hospitals following the 2018 California Camp Fire," *Natural Hazards*. Vol. 104.
4. Wartman et al. (2020). "Research Needs, Challenges, and Strategic Approaches for Natural Hazards and Disaster Reconnaissance." *Frontiers in the Built Environment*, Vol. 6, 2020
5. Berman et al. (2020). "Natural Hazards Reconnaissance with the NHERI RAPID Facility." *Frontiers in the Built Environment*, Vol. 6, 2020