

Rapid Analytics for Disaster Response

When disaster strikes, assessing hazard extent and damage is the first step toward restoring community lifelines. The **Rapid Analytics for Disaster Response (RADR)** software suite, an R&D 100 award-winning technology, is an all-hazards detection system that combines multi-modal imagery, artificial intelligence (AI), and scalable cloud computing with an infrastructure damage assessment tool to understand current impact and risk to infrastructure from wildfires, floods, hurricanes, earthquakes, and more. The system is built to deliver high-resolution, high-cadence, large-extent situational awareness for incident command and disaster management teams to understand hazard extent, communities affected, impacts to critical infrastructure, blocked transportation routes, structural damage, and safe locations to establish relief efforts. All algorithms in RADR have been developed based on community requests.

RAPID ASSESSMENT THROUGH AI ANALYTICS

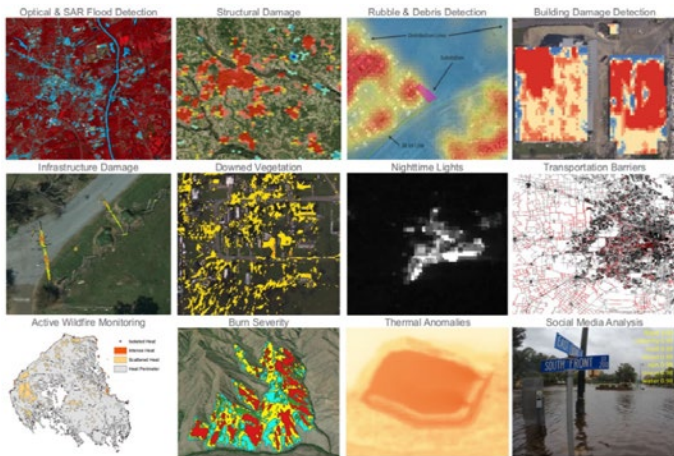
Designed by researchers at Pacific Northwest National Laboratory (PNNL) in 2014 and used on hundreds of events, the RADR disaster response and situational awareness tool automatically combines imagery collected by many different high-resolution (0.1–10 m pixel resolution) satellite, airborne, drone, and social media platforms and applies AI-based image analysis algorithms to detect hazards, damage, and risks to community lifelines. Using satellite-based infrared and microwave radar sensors, it is possible to “see” through wildfire smoke



and thick hurricane cloud cover at times when ground crews, aircraft, and drones cannot deploy. Once imagery is available, the resulting analytics are made available within minutes and are delivered in GIS-ready web service formats that can be ingested into your own analytic and modeling workflows.

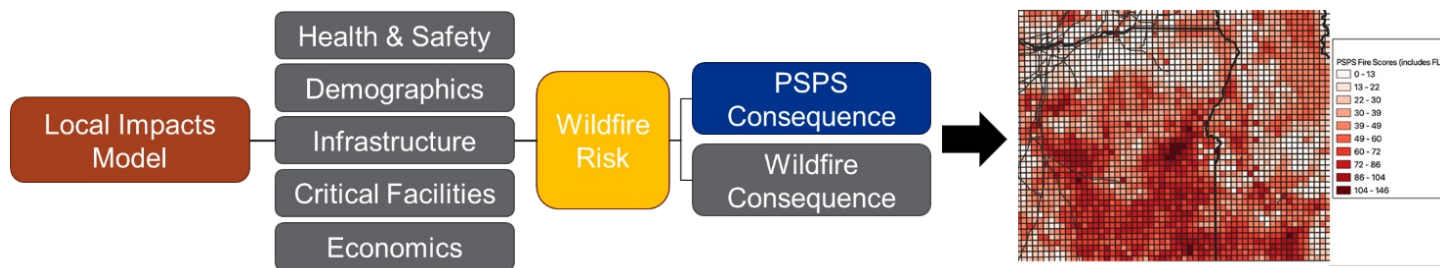
FOCUS ON WILDFIRE – RADR-FIRE

In response to increasing frequency and magnitude of wildfires, PNNL created the RADR-Fire system: a fully automated, cloud-based, AI-assisted system that consumes numerous types of high-resolution, open-access Earth observation satellite imagery and applies machine-learning algorithms to map the wildfire’s characteristics. The system produces geospatial data products through multiple endpoints (web



The RADR software suite is an all-hazards situational awareness system.

data services, mobile phone app, web browser) for all fires in the continental United States, but is capable of providing analysis anywhere in the world. RADR-Fire has also expanded beyond response-phase disaster management to provide timely information on risk planning, mitigation, and consequence analysis that is particularly focused on critical energy infrastructure. The risk analysis is established with up-to-date satellite-based vegetation characterization and current and forecasted weather, which is then fed into fire behavior models. These risk data help inform and prioritize on public safety power shutoff (PSPS) planning, infrastructure hardening, and other risk mitigation measures.



RADR-Fire includes response, planning, and risk mitigation tools focused on critical energy infrastructure.

BENEFITS

Accurately forecasting the movement of natural disasters—wildfires, floods, hurricanes, tornados, and earthquakes—gives disaster managers and first responders a lead on response. RADR does this through:

- **Up-to-date and high-resolution situational awareness** that enables ongoing monitoring of static or dynamic events, which can greatly facilitate response efficiency and recovery efforts.
- An **easily accessible cloud-based system** that creates an automated pipeline for retrieving imagery, generating analytics, and disseminating data for use in a user’s own workflows.
- Visual analytics that produce intuitive **images and analysis products easily used** by responders.
- Builds on 20-plus years of PNNL expertise supporting sponsors in all-hazards response, recovery, and resilience.
- Used by the Department of Energy, Federal Emergency Management Agency, National Interagency Fire Center, U.S. Geological Survey, U.S. Agency for International Development, private industry, and numerous utilities.

For more information, contact

Dr. André Coleman, Data Scientist

509.372.6077 | Andre.Coleman@pnnl.gov