

RAPID DISASTER RESPONSE WITH SENTINEL-1

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Rapid disaster response mobilizes resources rapidly to limit losses and provide emergency relief after a destructive event. It is essential to stabilize the situation before reconstruction begins. Sentinel-1, with its radar imagery (CSAR - Synthetic Aperture Radar operating in the C-band frequency), helps monitor affected areas in real time for rapid decision-making.

SENSOR DESCRIPTION

Resolution:

- Stripmap Mode (SM): 5m x 5m
- Interferometric Wide Swath Mode (IW): 20m x 22m
- Extra Wide Swath Mode (EW): 40m x 40m
- Wave Mode (WV): 5m x 20m

Bands:

- C-band (5.405 GHz)

Revisit Time:

- Single Satellite: 12 days
- Constellation (Sentinel-1A and 1B): 6 days

Coverage:

- Swath Width: Up to 400 km

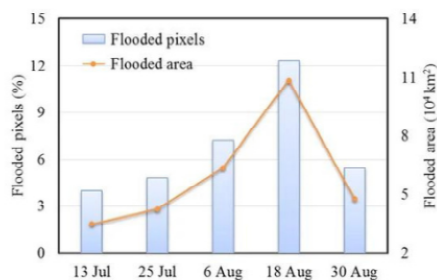
Polarization:

- Dual polarization (HH+HV, VV+VH)

RAPID DISASTER RESPONSE AND ITS CHALLENGES

Sentinel-1 data has a wide range of applications, between them :

- Wildfire progression monitoring
- Monitoring of flood events



Percentage of flooded pixels and flooded area during the flood season in 2015

- Landslides monitoring

The challenges of rapid disaster response include complex coordination between actors, difficult access to disaster areas, and decision-making with limited information.

WHY IS THE CSAR A GOOD CHOICE?

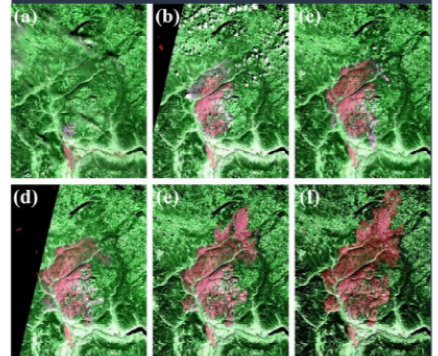
- **Immediate Data Availability:** The sensor's ability to operate in all weather conditions and during both day and night ensures that data can be collected and made available immediately after a disaster occurs. This is crucial for timely decision-making and response.
- **Detailed and Accurate Imaging:** The high resolution of the C-SAR sensor allows for detailed imaging of affected areas. This helps in accurately assessing the extent of damage, identifying affected infrastructure, and planning relief efforts.
- **Wide Area Coverage:** The sensor can cover large areas in a single pass, which is essential for monitoring widespread disasters like floods or hurricanes. This wide coverage ensures that no affected area is overlooked.
- **Multiple polarization modes** allow to distinguish between various types of surfaces and materials, which is useful to estimate the extent of damages.

RESEARCH REFERENCES

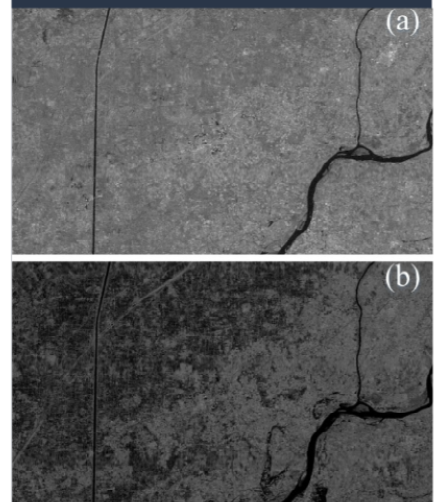
Rapid and robust monitoring of flood events using Sentinel-1 and Landsat data on the Google Earth Engine: <https://www.sciencedirect.com/science/article/pii/S003442572030033X#s0005>
Near Real-Time Wildfire progression Monitoring with Sentinel-1 SAR Time Series and Deep Learning: <https://www.nature.com/articles/s41598-019-56967-x>

C-SAR IMAGES

WILDFIRES



FLOODS



LANDSLIDES

