



WICHITA STATE
UNIVERSITY

OVERVIEW OF DATA-DRIVEN HAZARD-DETECTION TECHNOLOGY RESEARCH AT WSU'S DRAC FOR ENHANCING COMMUNITY RESILIENCE

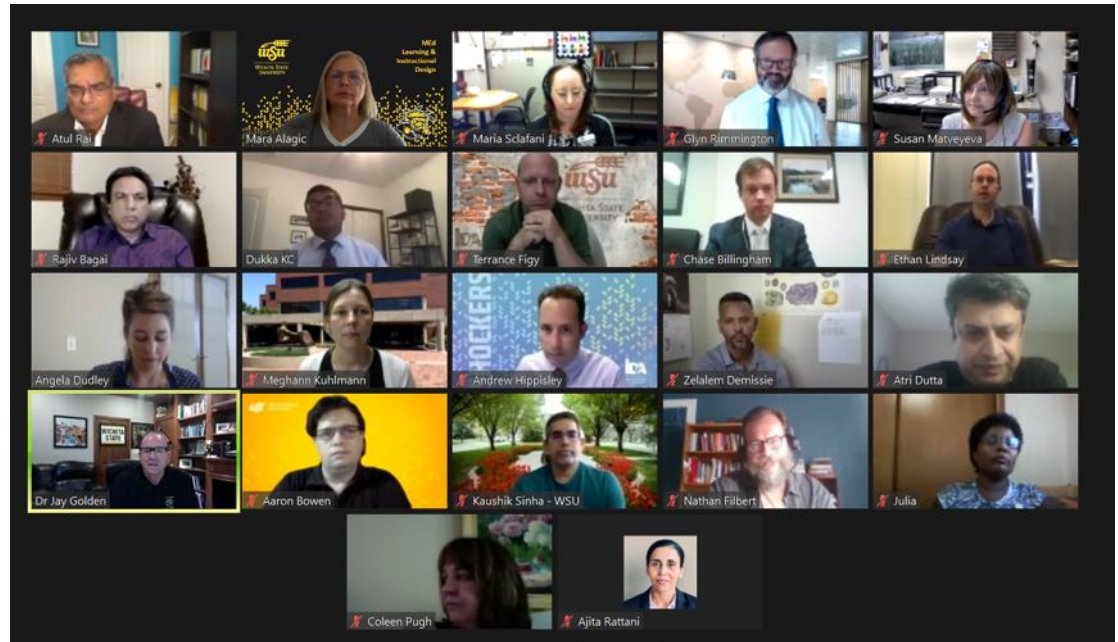
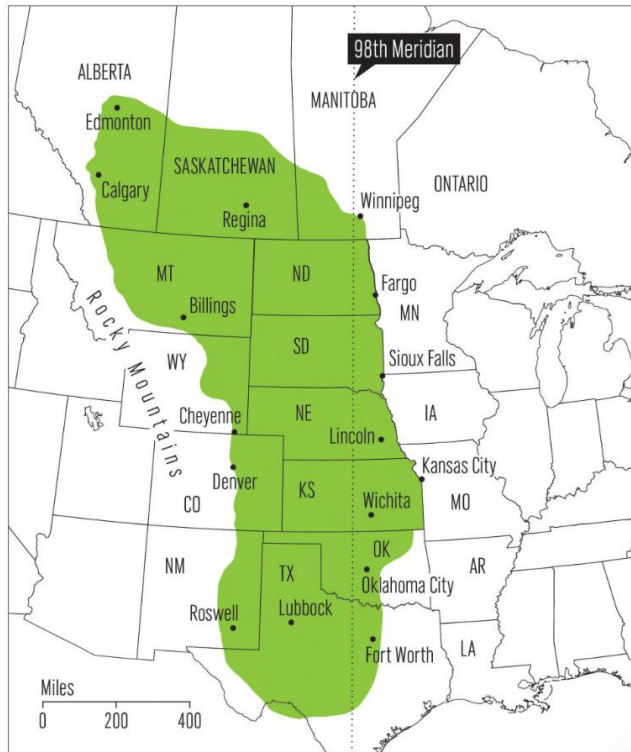
Atri Dutta

Disaster Resilience Analytics Center (DRAC)

Wichita State University (WSU), Wichita, KS, USA

WSU CONVERGENT SCIENCE INITIATIVE

Formed in 2020; faculty from multiple Colleges (Applied Studies, Business, Engineering, Liberal Arts and Sciences) and University Libraries



DRAC GOAL

A platform to contribute to improving prediction of disasters (extreme weather and geological events), to understand the resilience of communities to such disasters, and to create awareness in the communities of the Great Plains region regarding potential risks and mitigation strategies.



MARCH 7, 2017

Thousands evacuated as Reno County fires rage

LOCAL

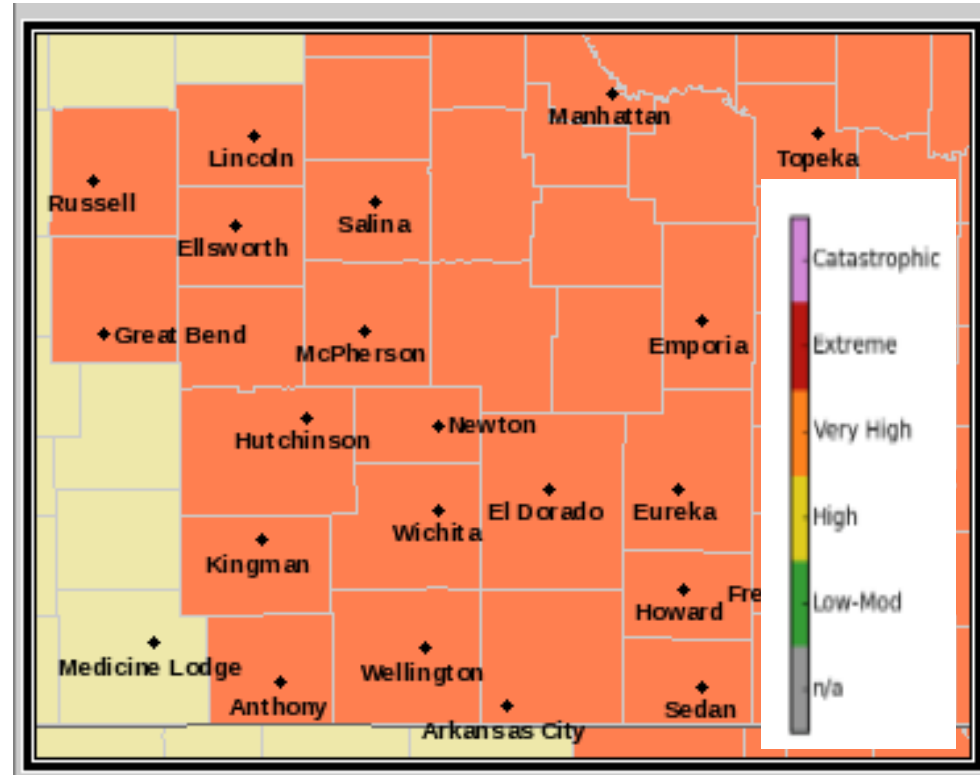
Families still working to recover 2 months after the Andover tornado

by: [Jessica Watson](#), [Carina Branson](#)
Posted: Jun 29, 2022 / 10:22 PM CDT
Updated: Jun 30, 2022 / 09:38 AM CDT

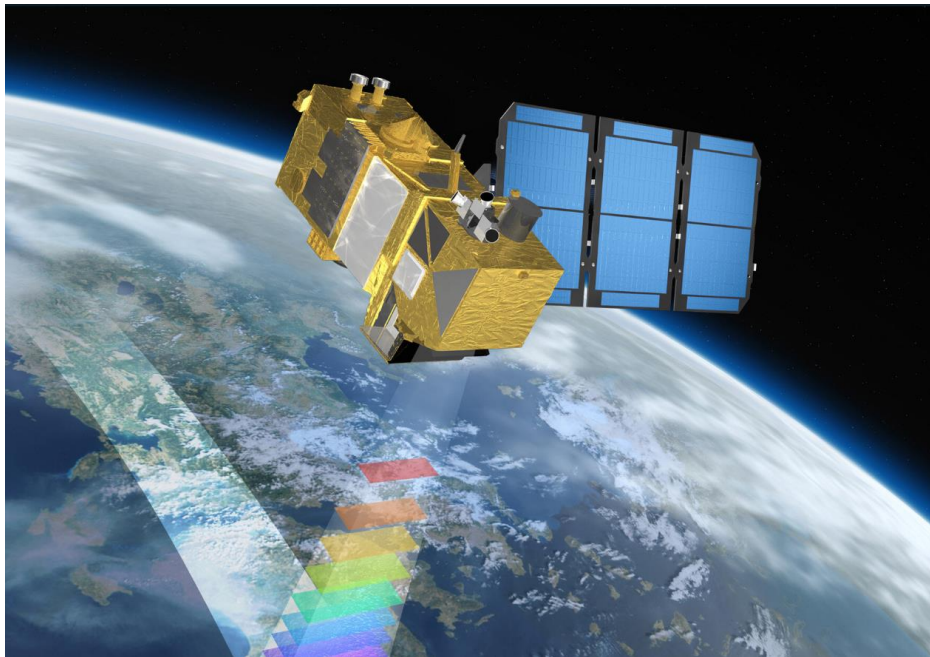


COMMUNITY RESILIENCE

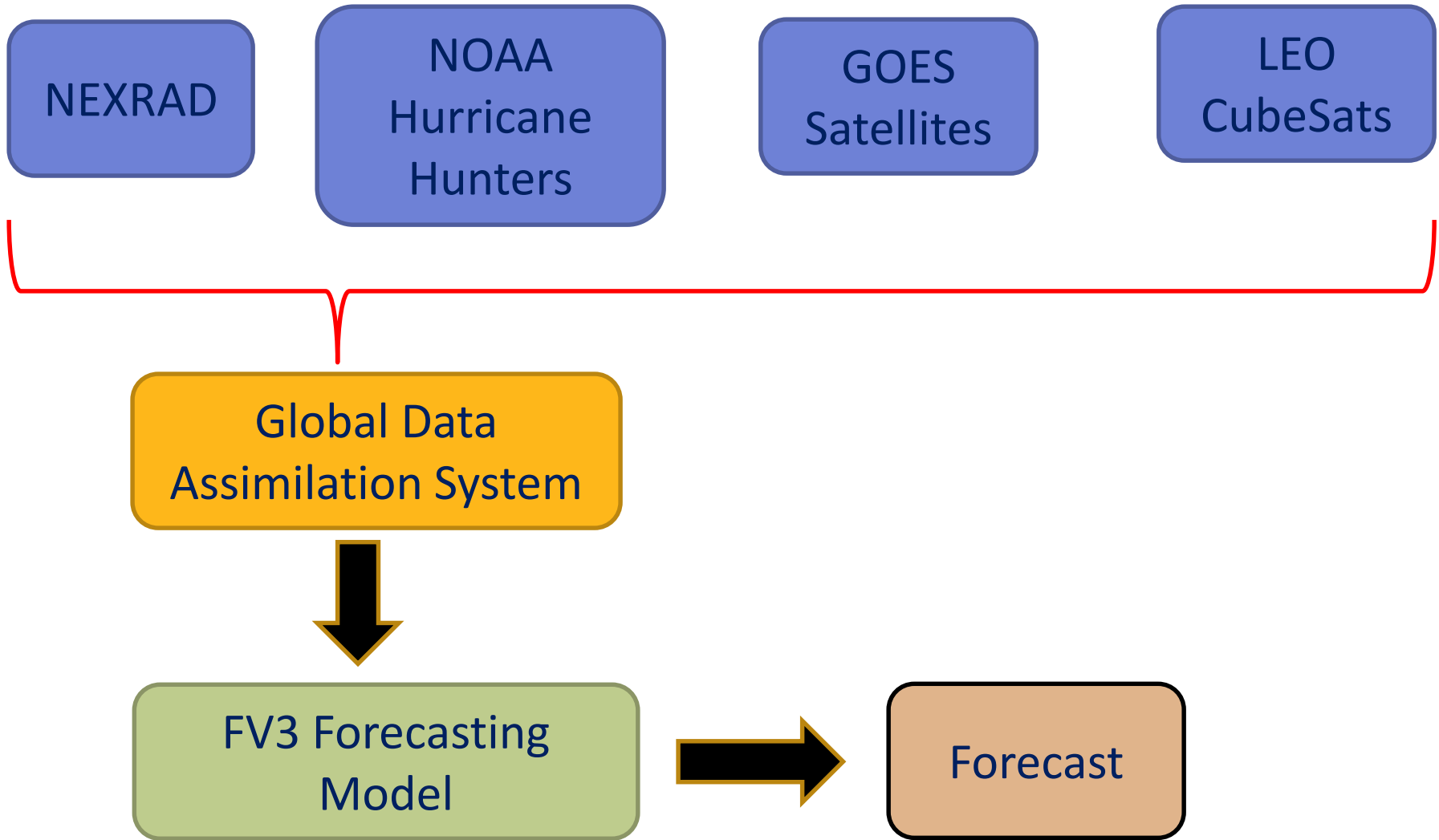
- Local knowledge
- Community networks
- Disaster related communication
- Health factors
- Leadership factors
- Community resources
- Economic investment
- Disaster preparedness
- Community mental outlook



DATA SOURCES (SENSORS)

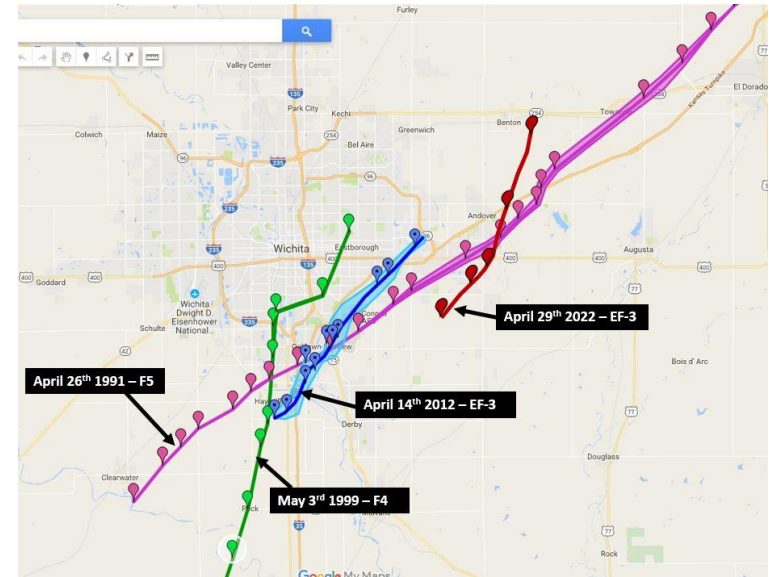
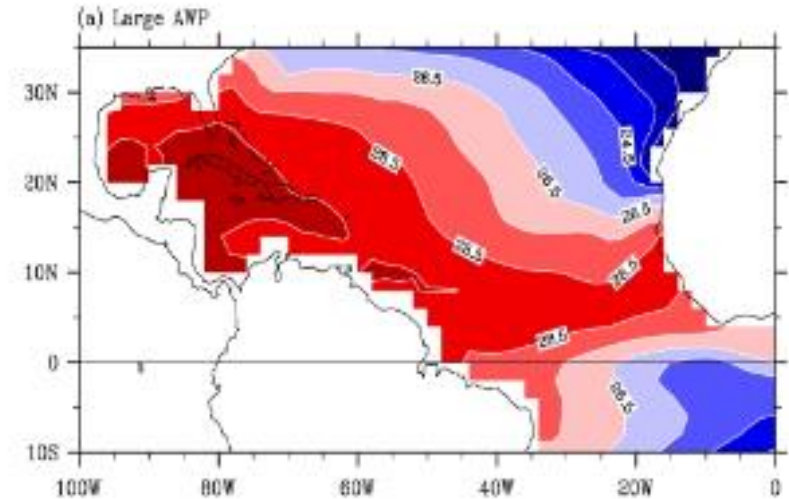


EXAMPLE: HURRICANE FORECASTS



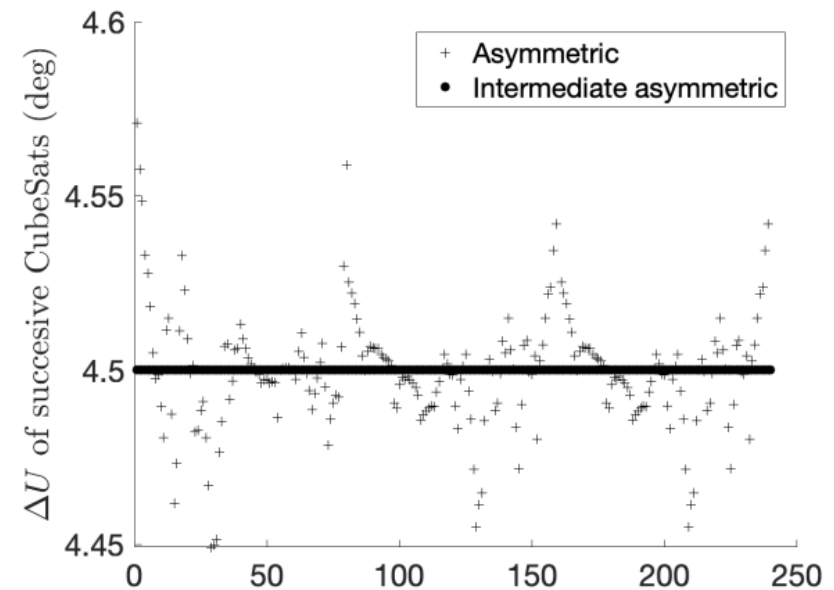
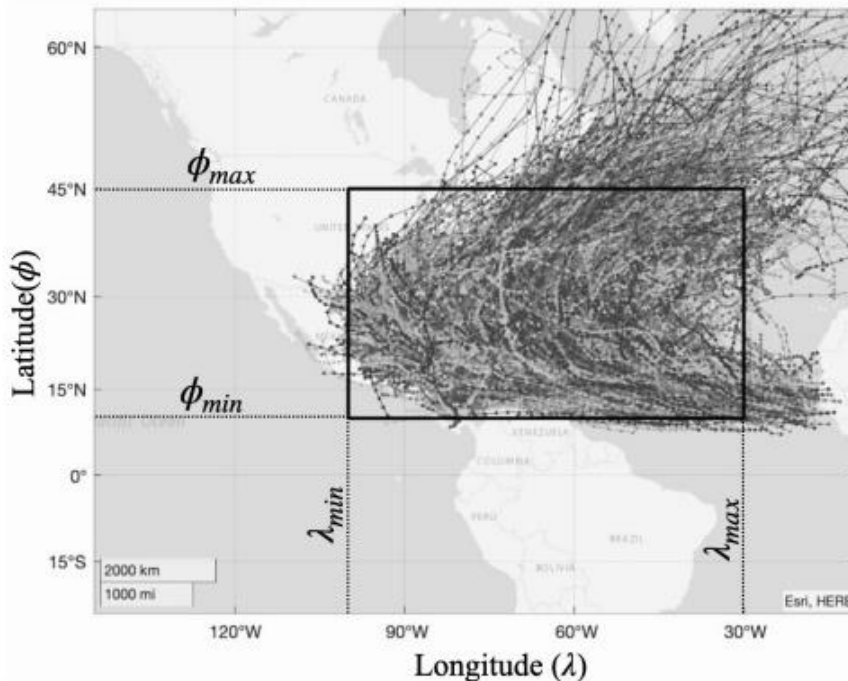
CHALLENGES

- Spatial and temporal resolution of sensor data do not currently meet the needs of forecasting systems
- Prediction of intensity and path
- Limited formal mechanism to incorporate social media data into disaster risk reduction and disaster management operations



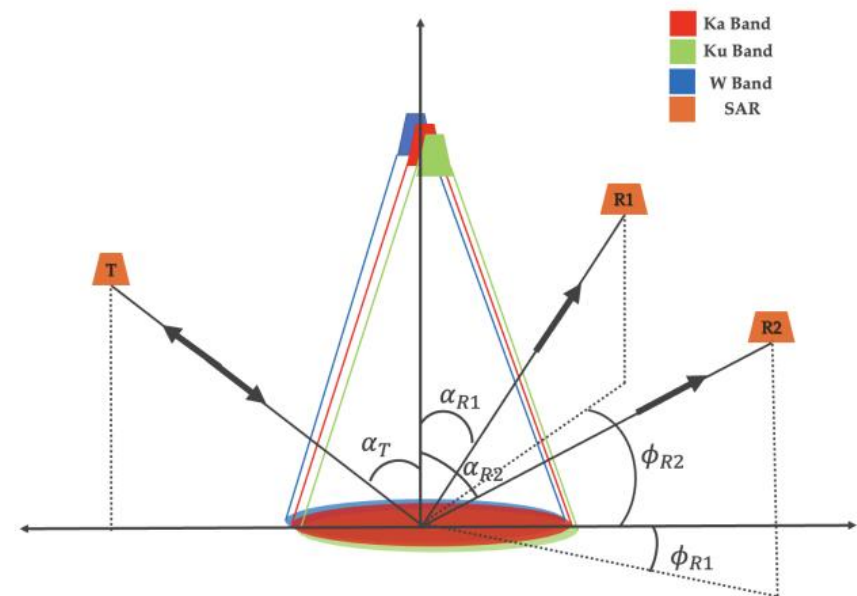
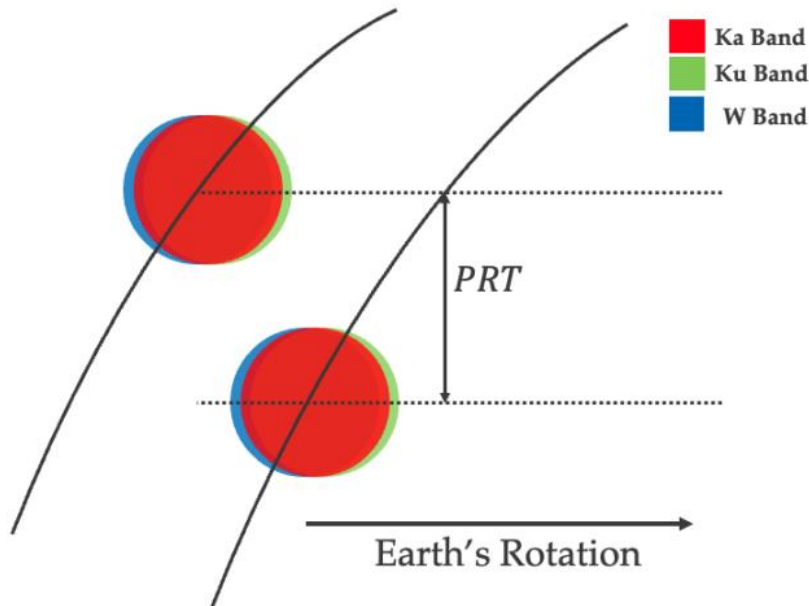
PROBLEM 1: SENSOR PLACEMENT PROBLEM

Multi-objective optimization problem to determine sensor locations to provide sensor data meeting the needs of modern forecasting systems



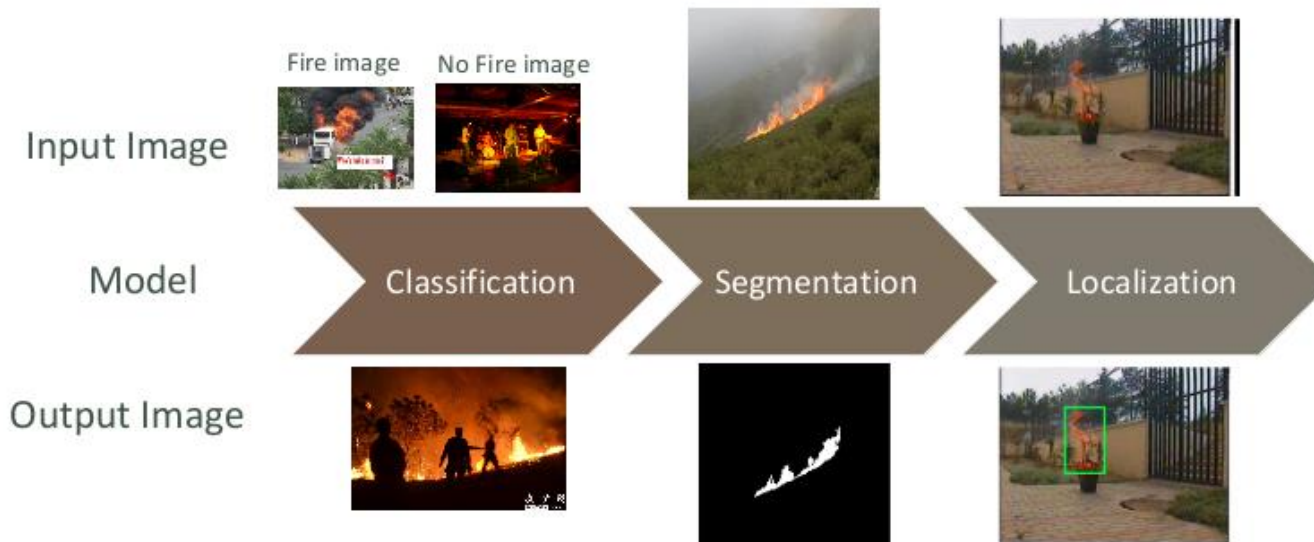
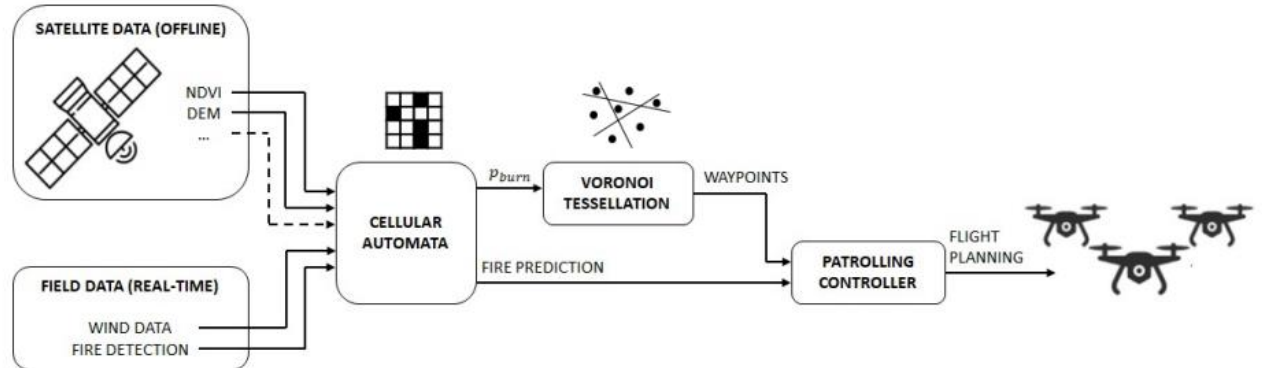
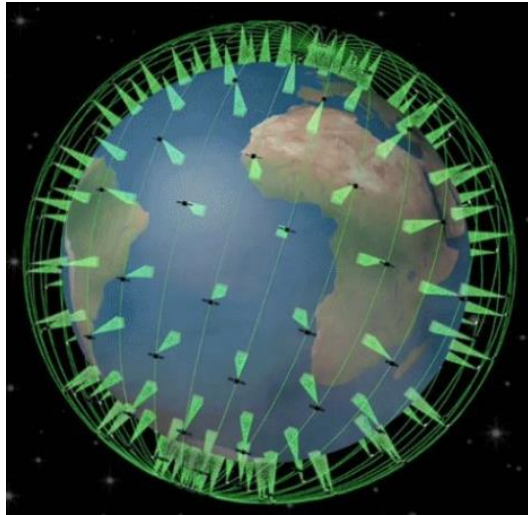
PROBLEM 2: SENSOR CLUSTER DESIGN

Satellite formations can provide sensor measurements to understand the internal structure of hurricane



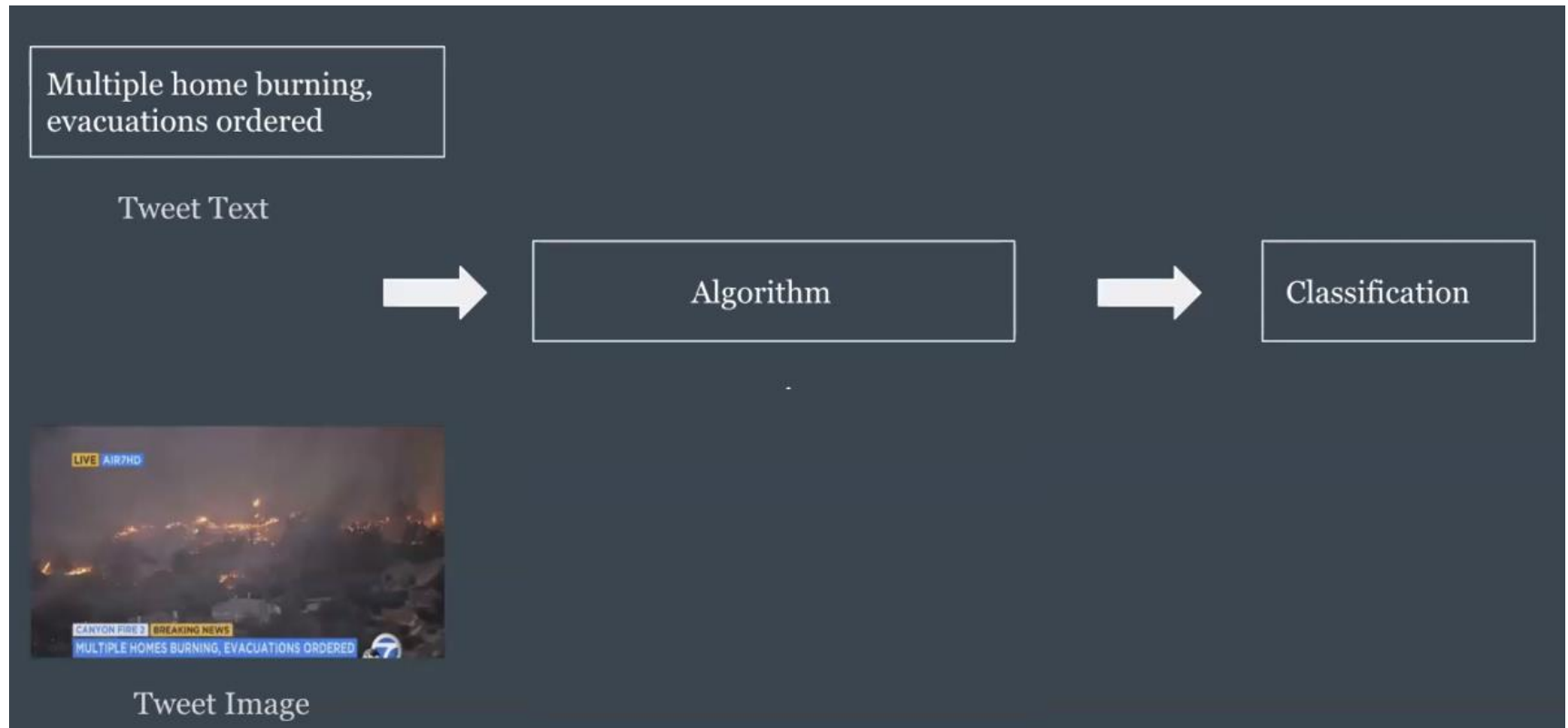
Next step: Targeted sensing to reduce infrastructure development cost?

PROBLEM 3: WILDFIRE DETECTION



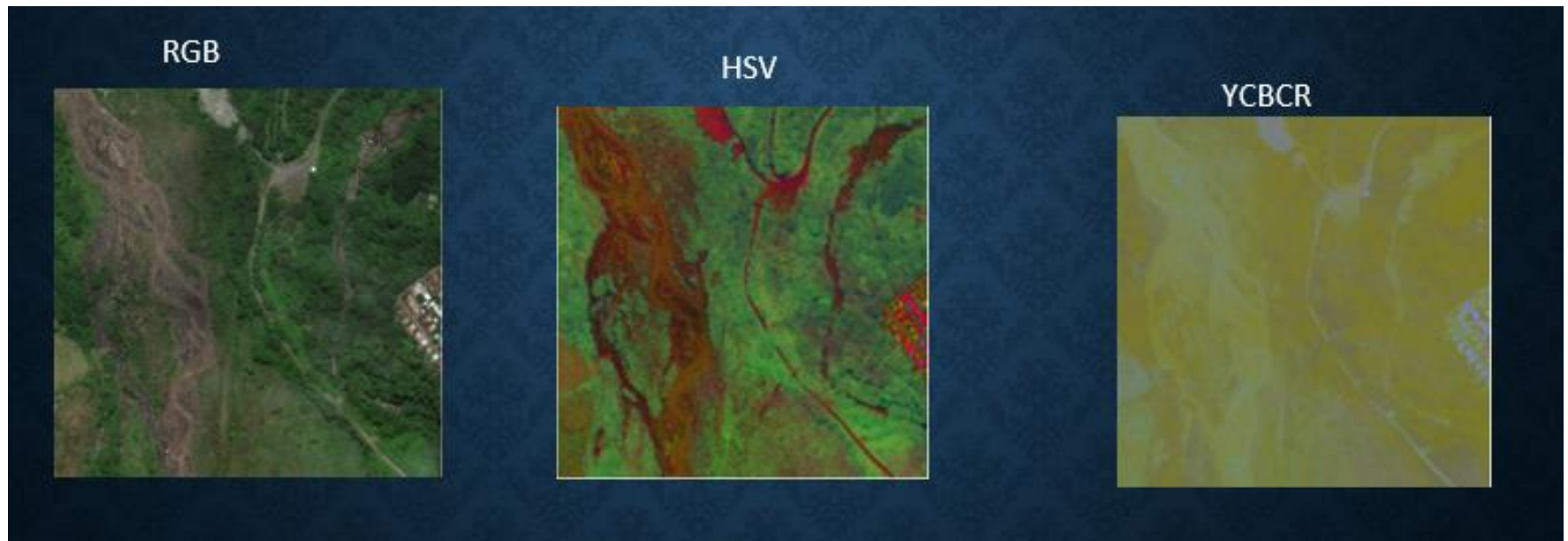
PROBLEM 4: DISASTER RESPONSE

Analyzing social media texts and images for disaster-related information



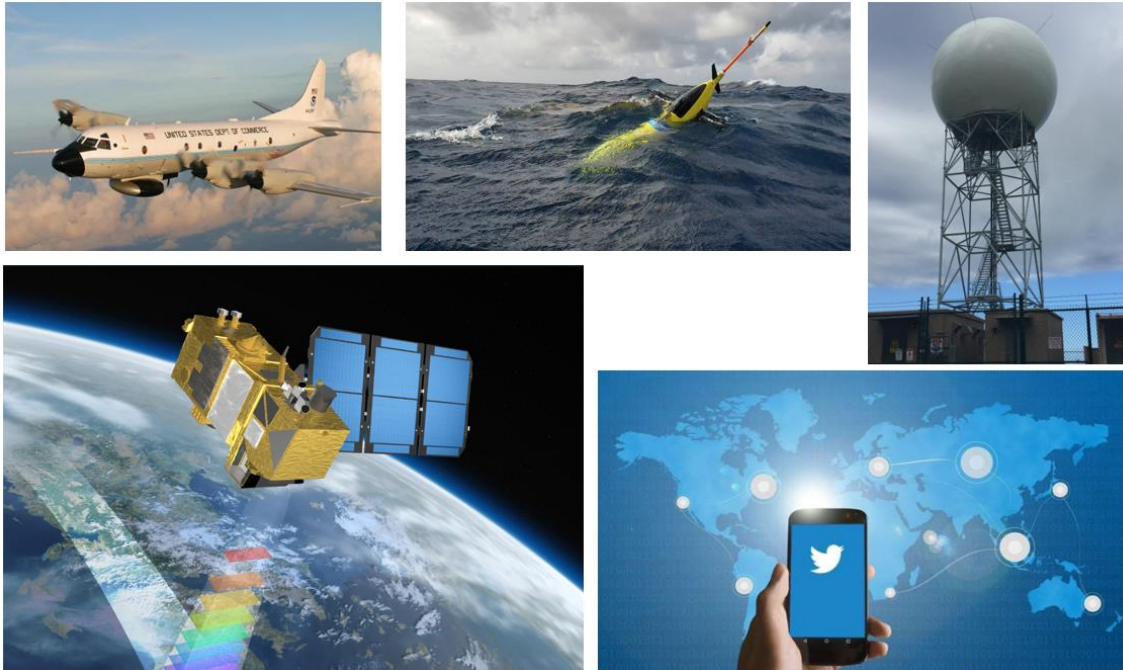
PROBLEM 5: DISASTER DAMAGE ASSESSMENT

Assessing severity of structural damage by comparing pre- and post-disaster images captured by satellites



CONCLUDING REMARKS

How data-driven sensing can improve community resilience?



Contact: atri.dutta@wichita.edu

DRAC Webpage: <https://www.wichita.edu/research/drac/>

Team info: <https://www.wichita.edu/research/drac/People.php>