Marin County Wildland Fires II

Improving Fire Suppression Modeling to Inform Fire Prevention and Suppression Decisions in Marin County, CA

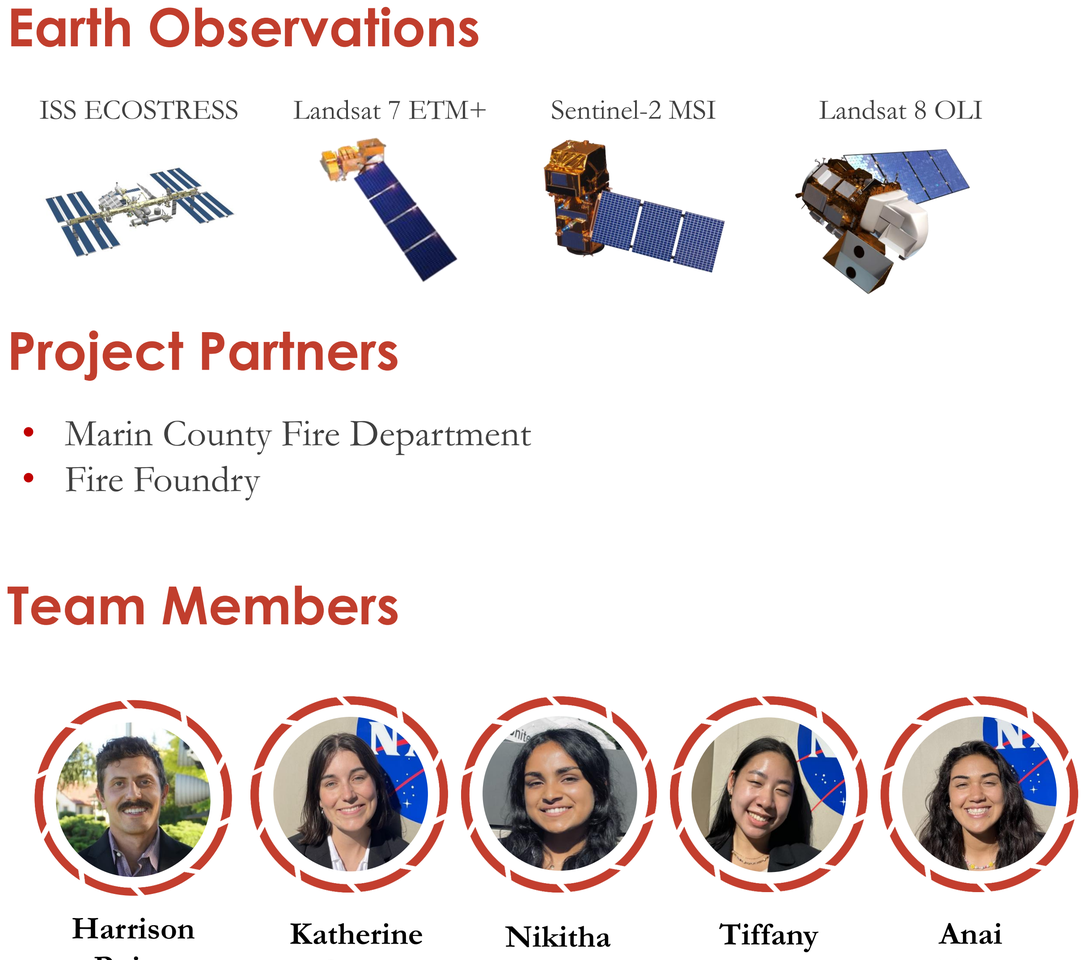
Project Synopsis

A future of increased wildfires requires greater integration of spatial analysis and local knowledge of emergency responders. We examined the application of a Potential Operational Delineations (PODs) framework for strategic pre-fire planning in Marin County, CA. PODs are spatial units for wildfire management that combine predictive modeling and local firefighter knowledge to identify potential control locations (PCLs) and assess wildfire hazard potential within units. This project constitutes a novel application of the PODs framework as it integrates expertise from municipal fire managers with spatial analysis techniques to assess fire risk and social vulnerability in Marin County.

Objectives

- **Integrate** spatial analysis techniques with local knowledge and expertise
- **Assess** fire risk in Marin county as it relates to vegetation, terrain, and weather
- **Identify** spatial units with high likelihood for successful fire suppression by defining potential wildfire control locations
- **Create** a lens focused on physical and social vulnerability by assessing access to evacuation routes in census-designated areas

Methodology



Earth Observations

ISS ECOSTRESS

Landsat 7 ETM+

Sentinel-2 MSI

Landsat 8 OLI

Project Partners

- Marin County Fire Department
- Fire Foundry

Team Members

Harrison Raine
(Project Lead)

Katherine Scott

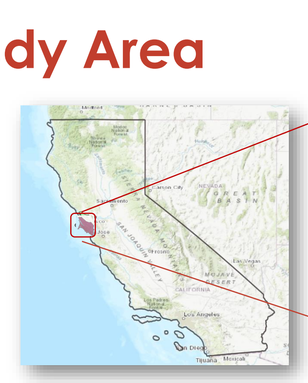
Nikitha Shivakumar

Tiffany Mar

Anai Tene

25TH DEVELOP ANNIVERSARY

Study Area



Sources: Esri, HERE, Garmin, Intermap, INCREMENT P, GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), © OpenStreetMap contributors, GIS User Community

Results

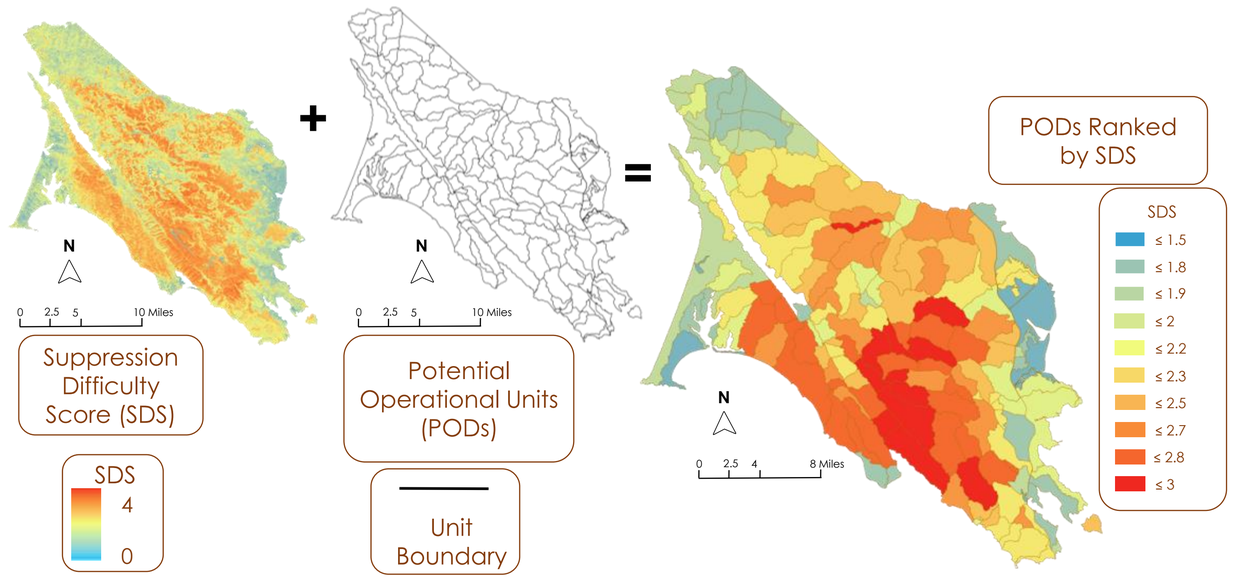


Figure 1. The SDS, which assesses predicted fire suppression success probability pixel-by-pixel, is combined with the PODs framework to yield control units ranked by predicted difficulty.

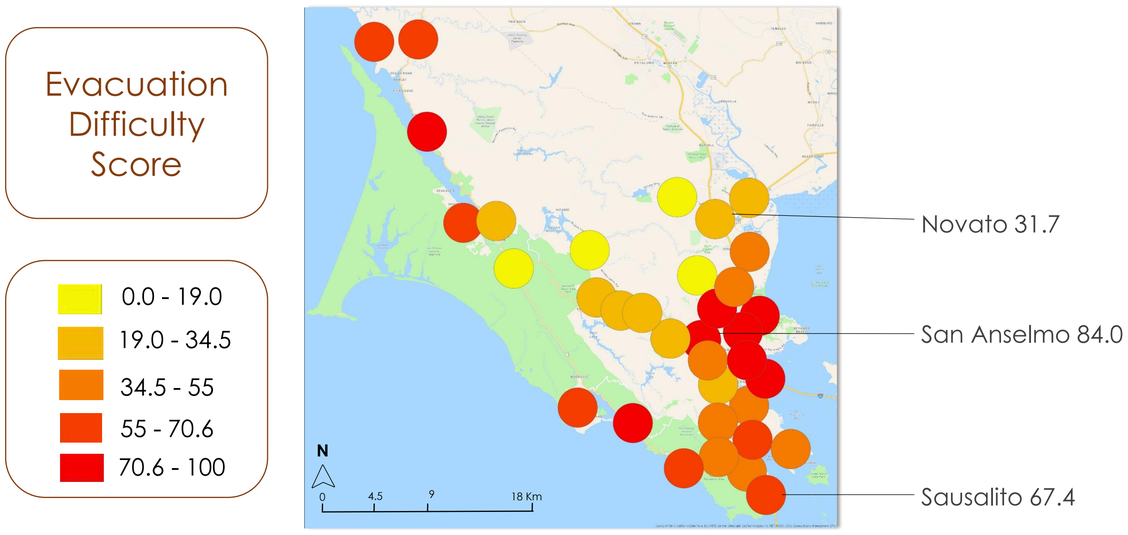


Figure 2. Census-designated areas in Marin County with Evacuation Difficulty Scores based on road networks, social vulnerability scores, and availability of cell coverage.

Conclusions

- A fusion of **satellite and ground LiDAR data**, focused on moisture, fuels, and topography can be used to **quantify fire severity** in Marin's unique environment of microclimates.
- **PODs** used to identify strategic boundaries where fire could be contained and fought effectively can be **effectively created** in Marin County through a **geospatial approach**. **78.5%** of expertise-identified POD boundaries **align** with GIS-determined boundaries.
- **Physical and social factors** of evacuation difficulty **can be effectively analyzed** through an EJ framework in the study area.

Acknowledgements

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Britnay Beaudry (NASA Ames Research Center)

Previous Contributors:
Suhani Dalal
Katera Lee
Gabriel Rosenstein
Chandler Ross

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