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Toward a Better Understanding of Wildfire with Spatial Data

Pre-fire, Active-fire, Post-fire, and Past fire

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A Common Foundation

- Understanding fire



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Wildfire is a Primary Driver of Change

- GIScience builds understanding
- Pre-fire mitigation
  - Focus on the wildland-urban interface (WUI)
- Active-fire risk
- Post-fire recovery
- Disaster resilience



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Pre-Fire Research

- 1999-2010 WUI fire susceptibility studies
- 2000-2003 Wildfire fuel load studies
- 2003-2006 Wildfire and Invasive plants interaction
- 2006-2009 Rangeland Health

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Active Fire Research

- We have not undertaken active fire work
- Typically, this involves fire behavior modeling
- Fires can generate their own weather and microconditions
  - Pyrocumulonimbus clouds
  - Fire front dessication
  - "Laying down"



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Forecast Models

- Must take into account TIME STEP
  - Based on input (historical) conditions
  - This might be a span of minutes, hours, days, weeks, months, years, decades, centuries, etc.
  - Fire behavior models tend to use hourly or daily conditions
- Single TIME STEP models are most accurate
- Must understand feedback loops
  - And build these into the model

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Post-Fire Research

- 2009-2011 Post-fire recovery of rangelands
- 2012-2025 RECOVER Post-fire decision support system
- 2022-2023 Power Grid and wildfire

NASA

CAES Center for Advanced Energy Studies

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The NASA RECOVER Platform

- Licensed (no cost) and adopted by USDA Forest Service

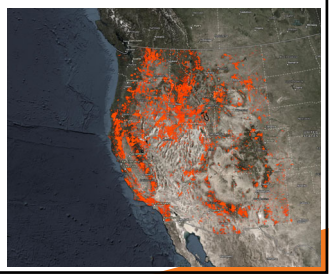


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Historic Fires Database (HFD)

- The HFD has over 800 subscribers with annual updates
  - Polygon data for all documented wildfires in the western US (1950-present)
  - Burn-on-burn events



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More Pre-Fire Research

- 2018-2025 Lidar studies (including Ladder Fuels modeling)
- 2024-2025 Lightning studies
- 2024-2026 Bannock County Hazards (BRIC)

FEMA NASA

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Incorporating Lidar

- ISU's GIS TREC is the primary repository of lidar data for the state of Idaho
- Our studies developed methods to use lidar to identify **ladder fuels** in forests
- We fused **Height Above Ground (HAG)** models with high resolution aerial imagery and AI deep learning to extract buildings
- These data are used for wildfire risk modeling

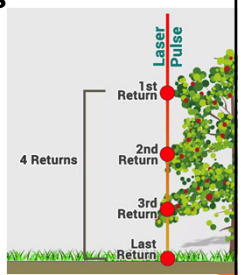


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Lidar Services

- ISU's GIS TREC provides:
  - Download access to all Idaho Lidar data
  - Streaming web services of these data (no download needed)



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Current Research

- NASA ISGC Wildfire Risk/Conflagration Risk modeling



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Spatial Data

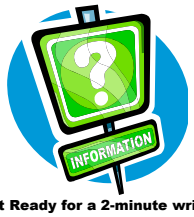
- Brainstorm!



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Questions



Get Ready for a 2-minute write!

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