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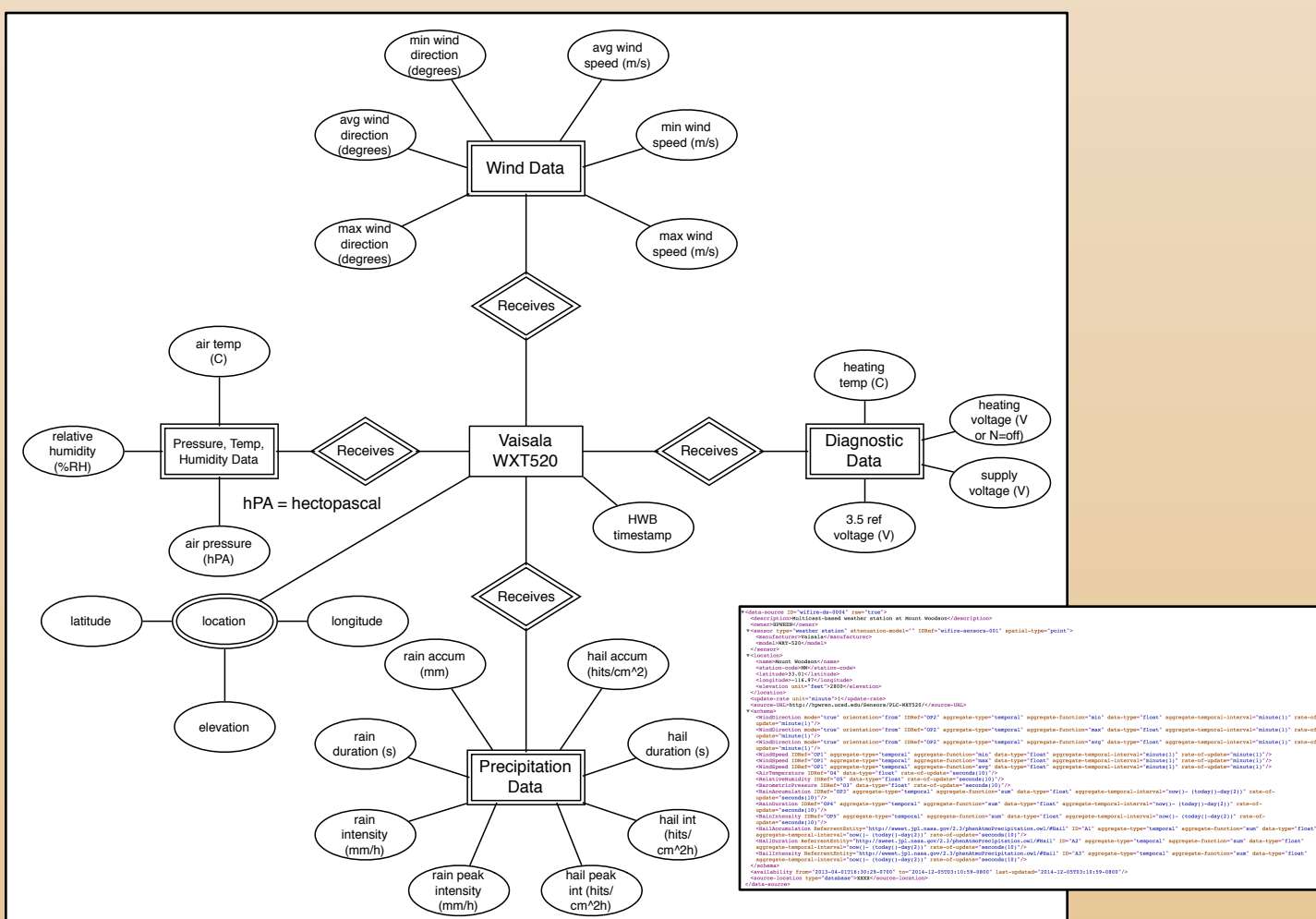
NH11B-3698

What is WIFIRE

WIFIRE is an NSF-funded project to build an end-to-end cyberinfrastructure for real-time and data-driven simulation, prediction, and visualization of wildfire behavior. WIFIRE may be used by wildfire management authorities in the future to predict wildfire rate of spread and direction, and assess the effectiveness of high-density sensor networks in improving fire and weather predictions. WIFIRE has created a data model for wildfire resources including sensed and archived data, sensors, satellites, cameras, modeling tools, workflows, and social information including Twitter feeds for wildfire research and response.

The Data Model

This data model and associated wildfire resource catalog includes a detailed description of the internet network and remote streaming data being collected. Some datasets include weather data and web cameras from the UCSD High Performance Wireless Research and Education Network (HPWREN), weather sensors from SDG&E's Mesonet, and the NASA MODIS satellites. The WIFIRE data-model describes how to integrate the data from multiple heterogeneous sources to provide detailed fire-related information. The data catalog describes 'Observables' captured by each instrument using multiple ontologies including OGC SensorML and NASA SWEET. Observables include measurements such as wind speed, air temperature, and relative humidity, as well as their accuracy and resolution. We have implemented a REST service for publishing to and querying from the catalog using Web Application Description Language (WADL).



Entity-Relationship Diagram of Vaisala WXT-520 Weather Stations, as an example

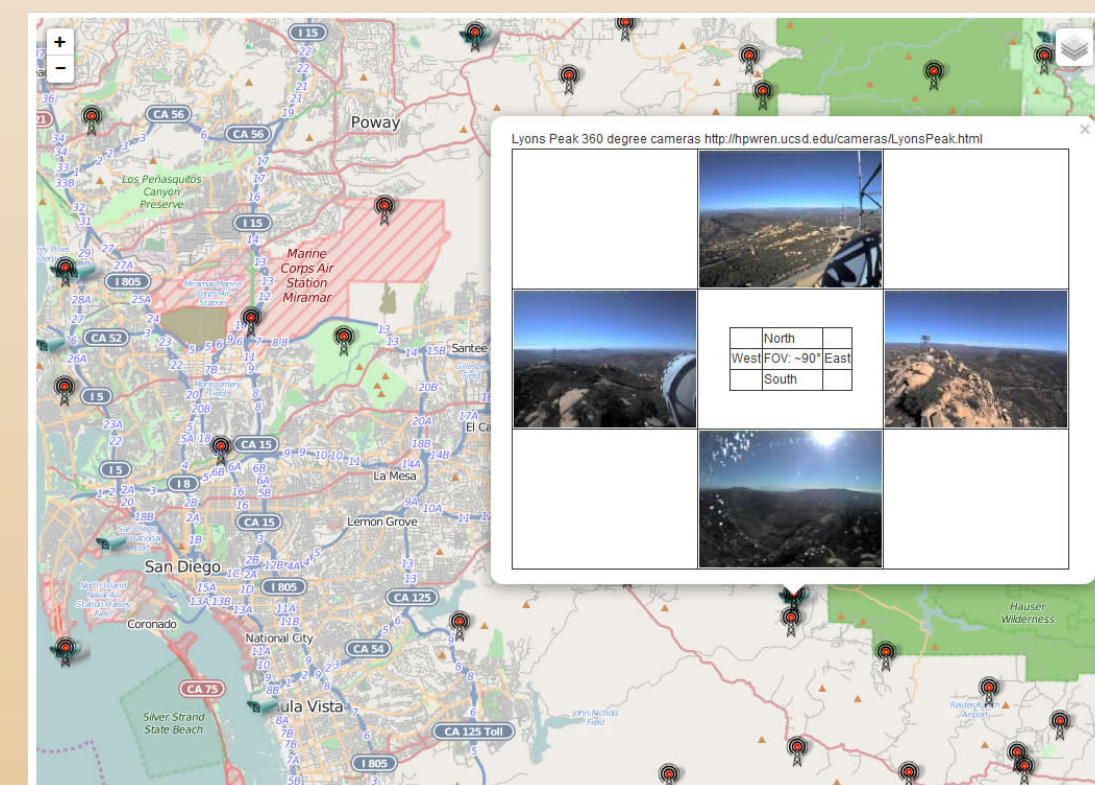
Interactive User Interfaces

We are creating web-based user interfaces and mobile-device apps that use our REST service for dissemination to the wildfire modeling community and our project partners.

Web Cameras for Environmental Modeling

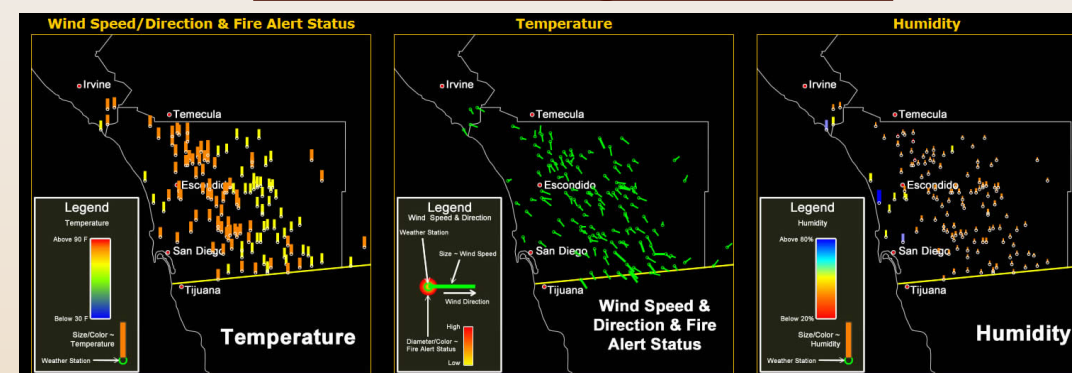


UCSD Red Mountain Web Cameras from May 14, 2014 in San Diego: Highway Fire (left), Poinsettia Fire (center), Tomahawk Fire (right)

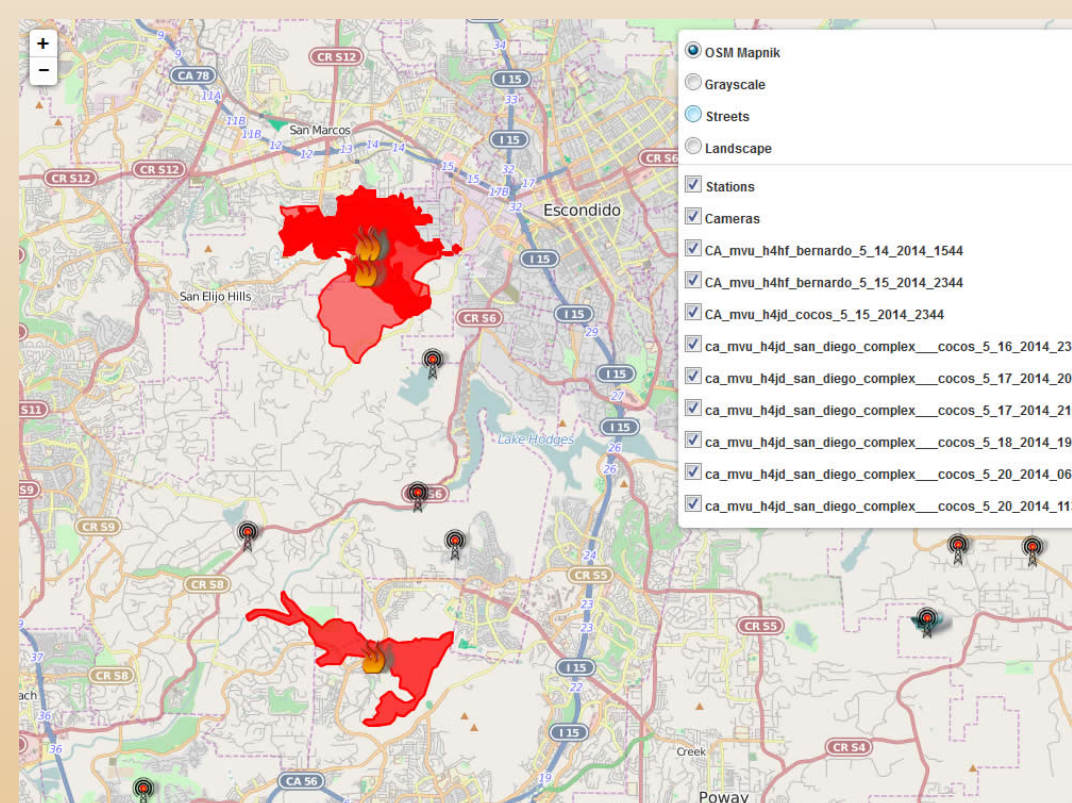


Fire fighters in San Diego County have often used the UCSD HPWREN mountain-top cameras. The Data Model allows for data integration of the camera intel with additional mapped environmental data.

Wind, Temperature, Humidity Fire Monitoring and Models



Web interface for monitoring current weather conditions and for querying historical weather, animated over time series.

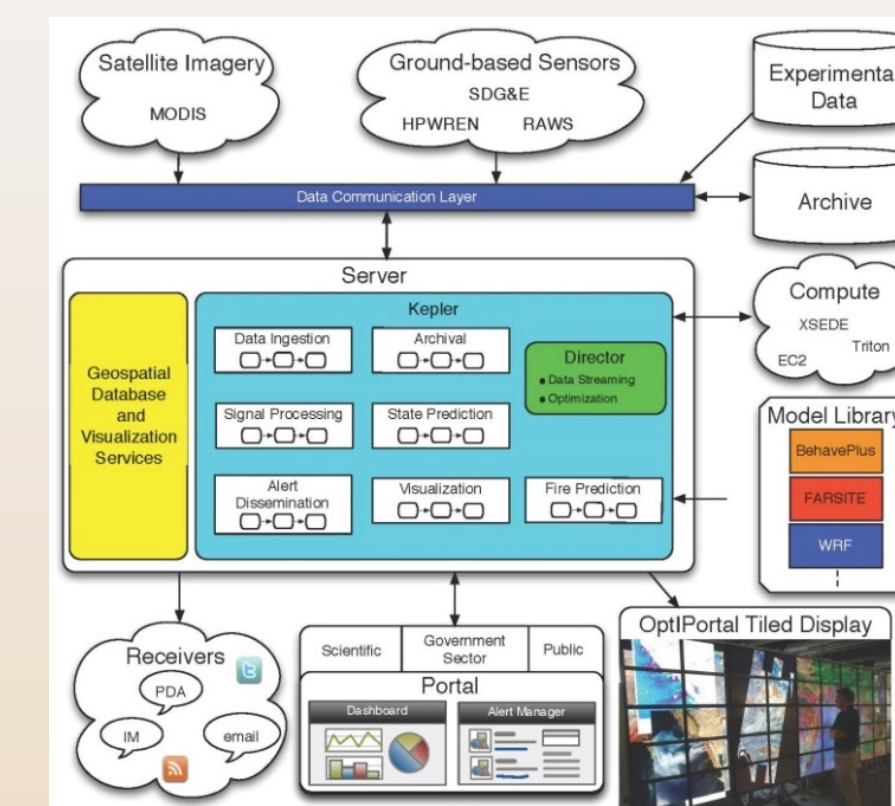


Ingesting and mapping fire perimeters to the Data Model from InciWeb and GeoMac allows us to track fire propagation while monitoring weather changes.

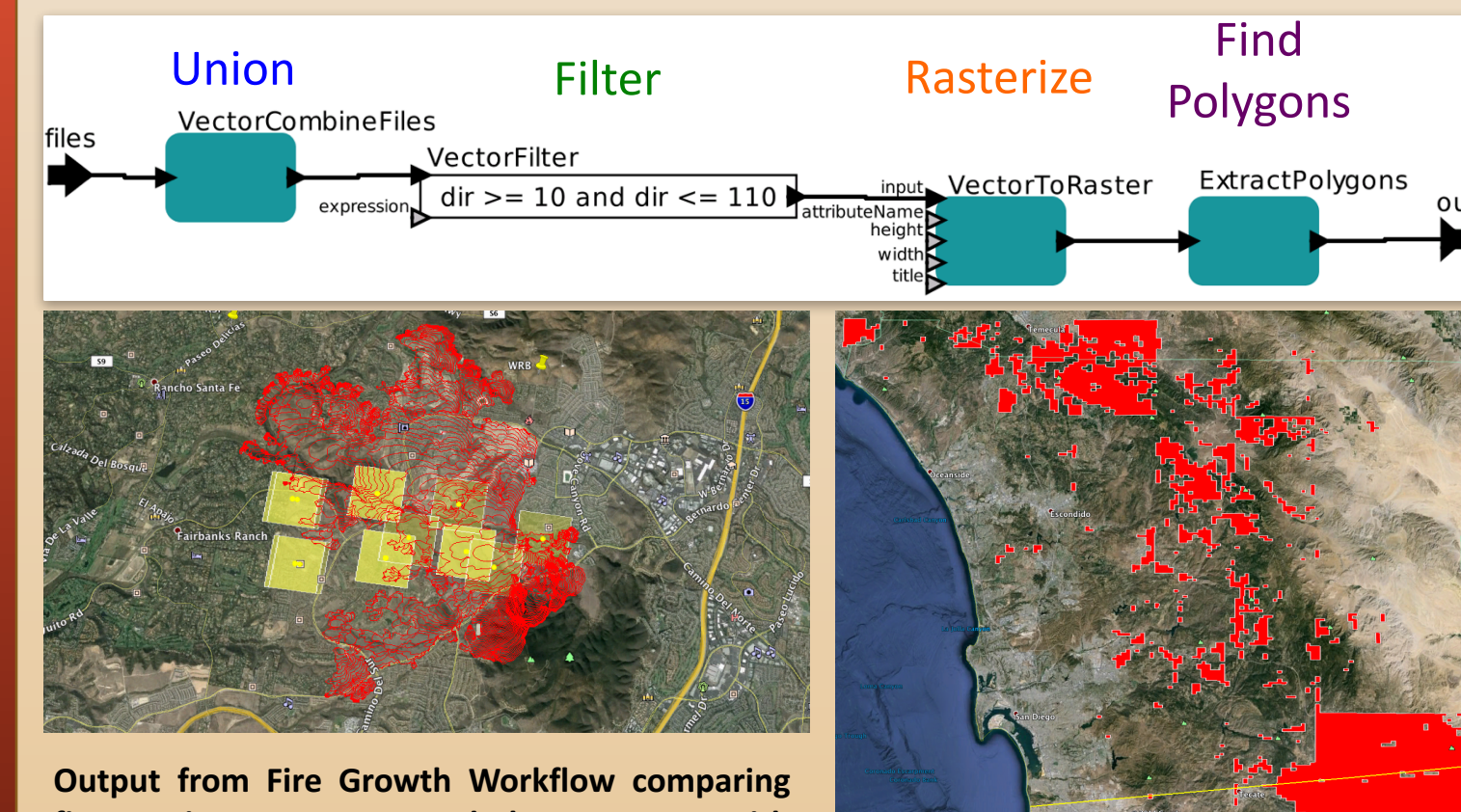
Programmable Workflows



The Kepler scientific workflow system is instrumented to interact with the data catalog to access real-time streaming and archived wildfire data and stream it into dynamic data-driven wildfire models at scale.



Kepler includes GIS actors that perform operations on vector and raster data sets. Below is an example workflow that calculates polygons matching a certain criteria.



Output from Fire Growth Workflow comparing fire perimeters generated by FARSITE with MODIS fire detections.

Output from Santa Ana Conditions Workflow for San Diego County.