Case Summary

Case ID: tubbs_fire
Objective: Validate Tubbs fire spreading against VIIRS observation

0.1 Assumptions

List assumptions concisely:

- Homogeneous fuel; no spotting; steady uniform wind.
- 2D structured grid, constant $\Delta x = \Delta y$.
- Boundary conditions: specify.

0.2 Simulation Setup

Key parameters and configuration choices (in elmfire.data.in). Cite the specific ELMFIRE config and any pre/post processing steps.

0.2.1 Input Data

Describe input rasters, constants, initial conditions.

0.2.2 Numerical Controls

Mesh resolution, Time step(CFL), level-set solver options, etc.

0.3 Expected Results and Reasoning

Derive the expected behavior (analytical solution or literature correlations). Include equations and parameter substitutions.

0.4 Acceptance Criteria

Define quantitative pass/fail criteria (e.g., RMSE $\leq 5\,\%$).

0.5 Results

Metric	Value	t_{simu}	t_{observ}
κ(5.5 hr)	0.320381	19793.1	19800
κ(12.0 hr)	0.484716	43205.7	60660

Table 1: Cohen's Kappa values for available frames.

0.5.1 Key Metrics

Summarize metric values (auto-insert from JSON if desired in a later extension) and state Pass/Fail.

0.6 Discussion

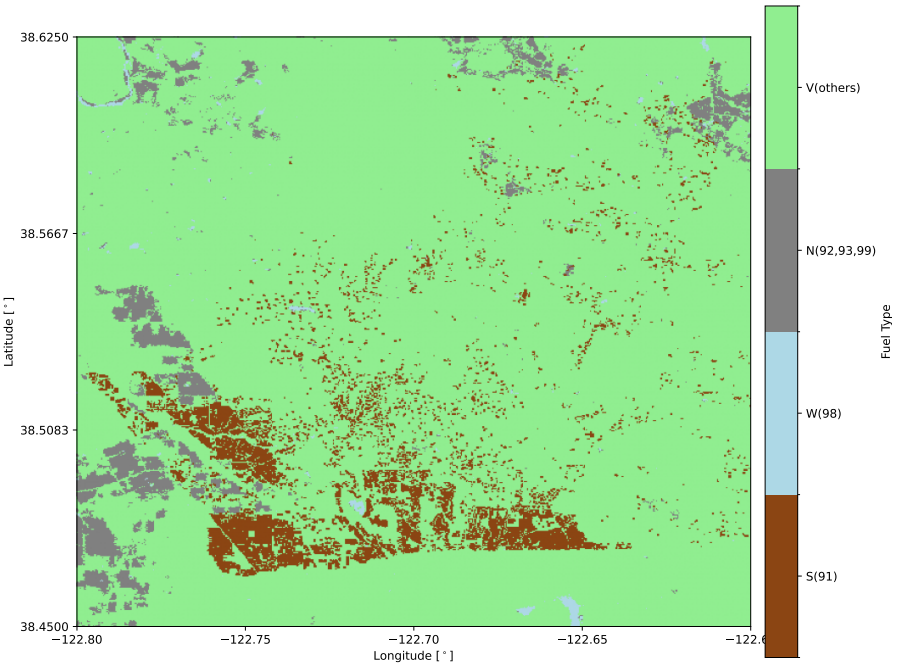

Figure 1: Categorical fuel map used in the simulation domain.

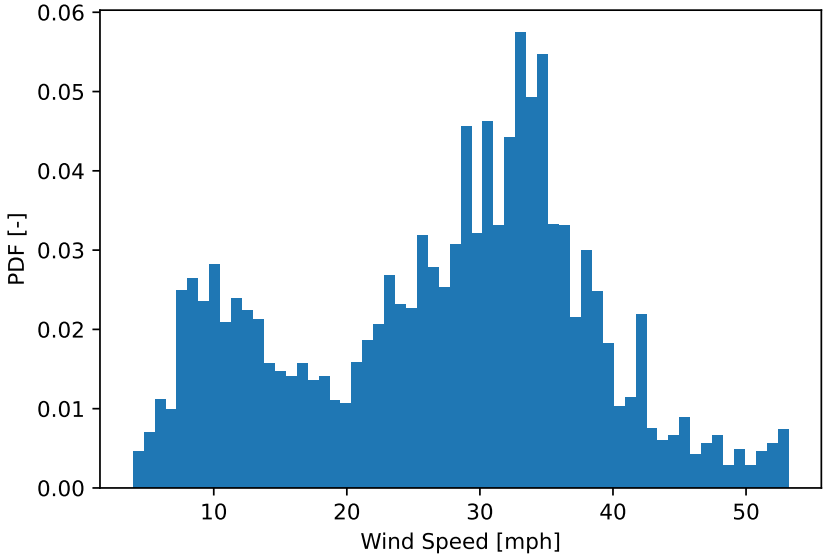

Figure 2: Histogram of wind speed samples used in the ensemble.

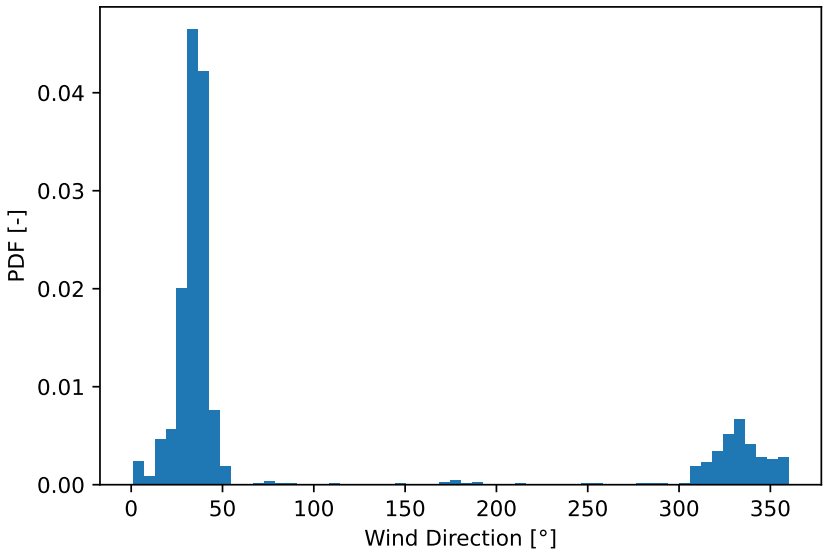

Figure 3: Histogram of wind direction samples used in the ensemble.

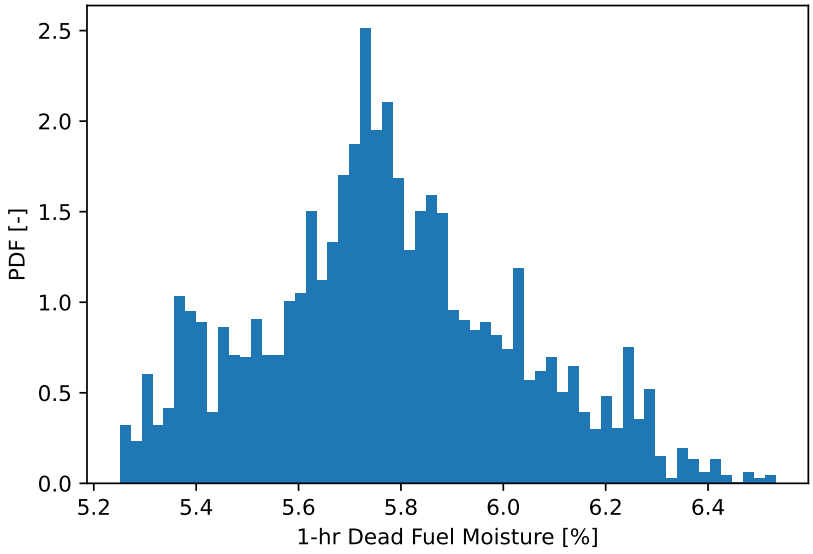

Figure 4: Histogram of 1-hour fuel moisture content (M_1) samples.

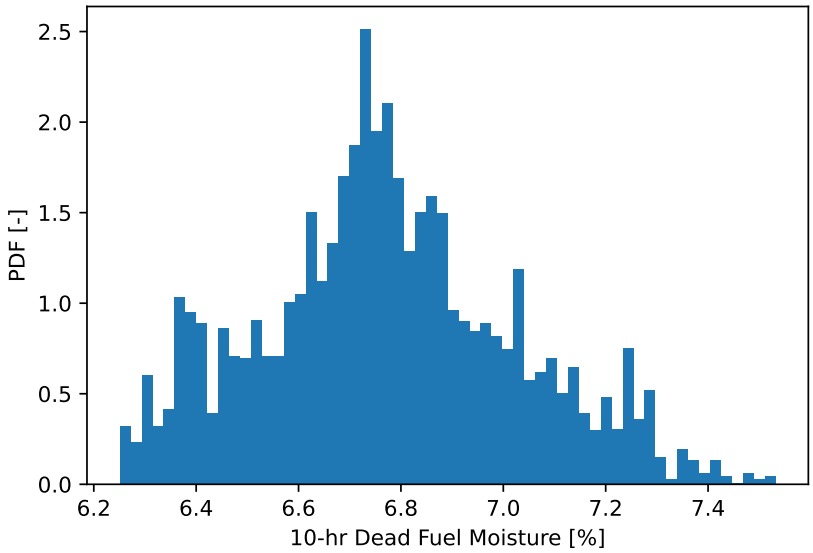

Figure 5: Histogram of 10-hour fuel moisture content (M_{10}) samples.

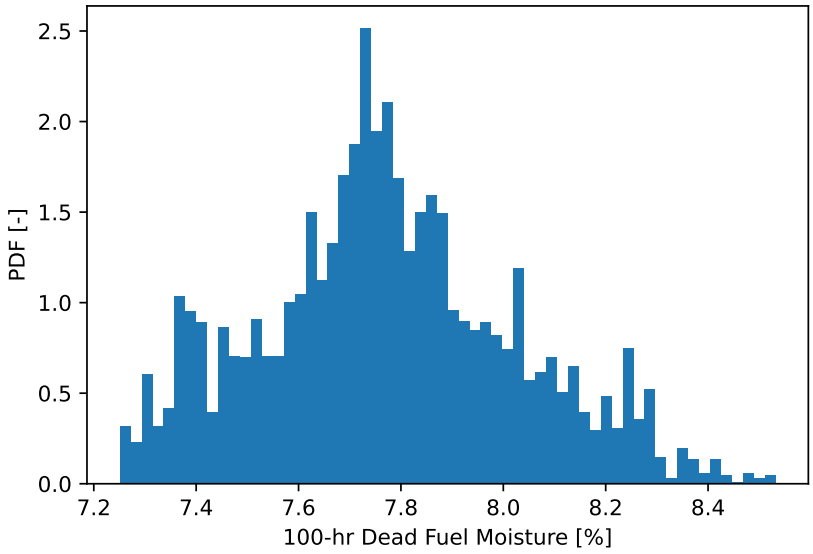

Figure 6: Histogram of 100-hour fuel moisture content (M_{100}) samples.

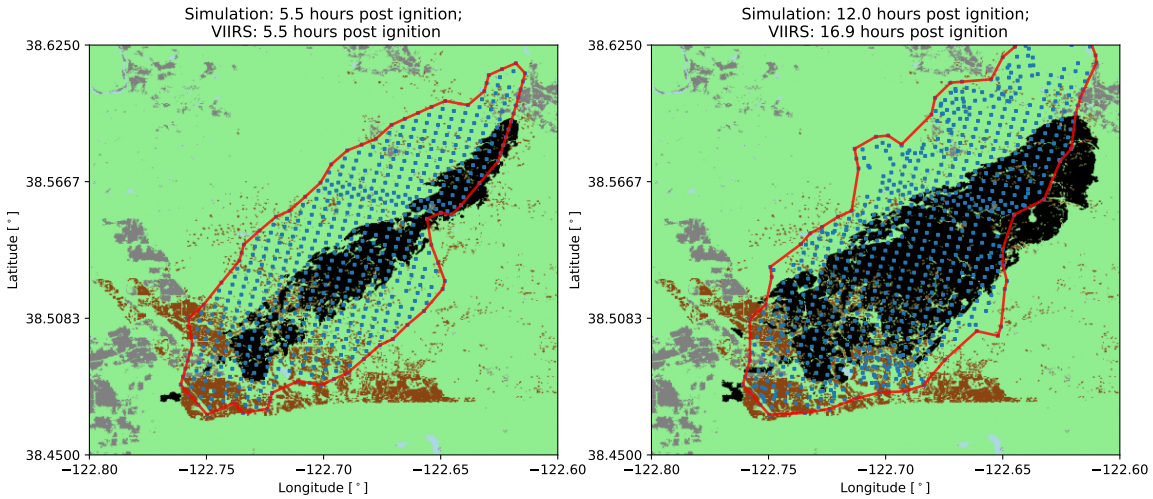

Figure 7: Examples of fire perimeter comparisons between simulations and VIIRS detections.

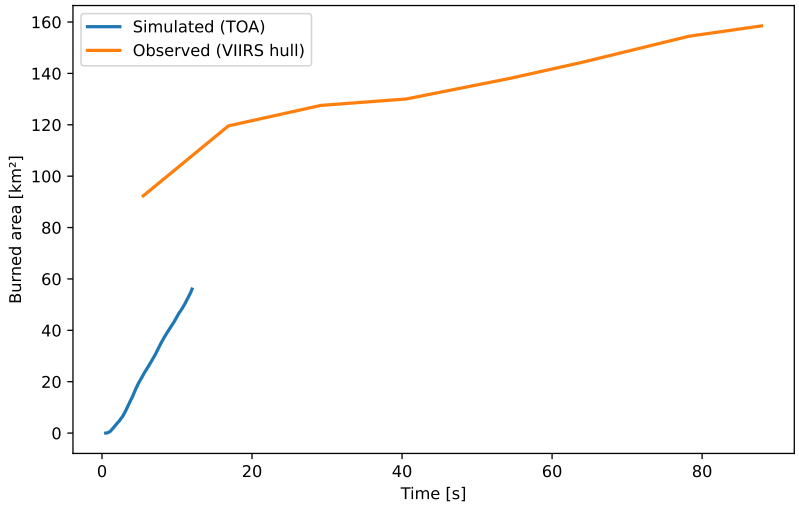

Figure 8: Time history of cumulative burned area from the ensemble simulations.