FIRE SIMULATION IN BOLINAS

Bolinas is a community located in Marin County, California, which faces a significant wildfire threat and potential traffic issues during fire emergencies due to its geographical location and limited escape routes.

In this study fire simulations are focused on three different scales: within the urban center (Scenario 1), a small-scale regional fire (Scenario 2), and a large-scale regional fire (Scenario 3).

The weather conditions, including wind speed, wind direction, humidity, cloud cover, and temperature, provide crucial information for conducting fire spread simulations. This information is primarily obtained from historical records of local weather stations. Specific high-risk days with the potential for dangerous fire development were identified from these records and used as the meteorological context for the simulations. For Scenarios 1 and 2, have been considered typical and average weather conditions, while Scenario 3 simulated the fire under the most extreme conditions recorded in the analyzed data. Scenarios 1 and 2 were also compared to a hypothetical scenario in which meteorological conditions were combined to create an ideal scenario for fire spread, while still adhering to the concept of common and probable scenarios.

In detail, the scenarios were characterized as follows:

Scenario 1 involves a small fire within a three-mile radius around Bolinas. Three different ignition points are strategically placed to expose the town to the fire in different directions.

Scenario 2 envisions a moderate-sized fire within a 15-mile radius of Bolinas, with increasing wind speeds. This larger fire occurs near the main evacuation route, potentially impacting evacuation efforts.

Scenario 3 simulates a large fire within a 25-mile radius of Bolinas, fueled by strong and dry east-to-west winds known as Diablo winds, a phenomenon in California. Consequently, the fire's propagation is rapid and extremely violent. Both ignition points for this large fire are located near two highways.

The simulations were conducted using the FARSITE computational model, which simulates fire spread over a period of 10 hours. The results obtained from these simulations were subsequently used to incorporate traffic simulations into the evacuation planning and to analyze how the fire affects the evacuation process.

Figure 1. October 3rd, 2009

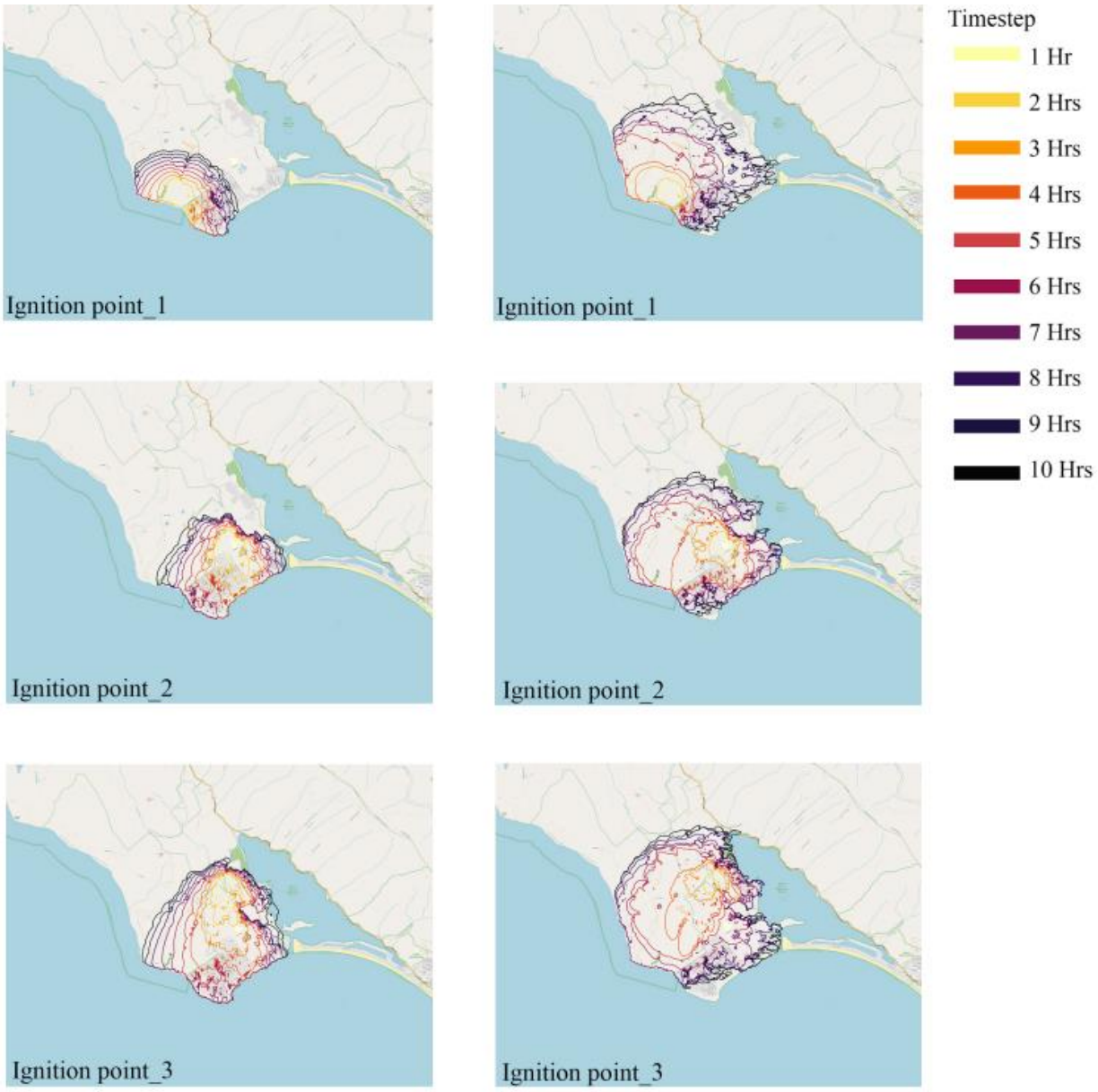

Figure 2. Hypothetical Scenario (Left) and Real Scenario (Right) – October 3rd, 2009