Promising new wildfire behavior model may aid fire managers in near real-time

December 27 2017, by Laura G. Shields

Firefighter works fire line at the Happy Camp Complex Fire in the Klamath National Forest in California, which began on Sep. 17, 2014 from lightening and has consumed 125, 788 acres to date and is 68% contained. Credit: U.S. Forest Service photo by Kari Greer

Wildfires continue to scar California beyond the normal fire season in what's been a particularly catastrophic year for natural disasters across the U.S. But a new big-data solution for predicting wildfire spread is also heating up, and it may become a useful tool in the firefighters' arsenal, according to wildfire researchers attending the 2017 American Geophysical Union Fall Meeting.

The more readily available updates of wildfire behavior are, the more informed the decisions of fire managers, according to the researchers. Fire managers need to know how a wildfire will spread as it affects evacuations, strategies to fighting the fire and safety of the firefighters. NASA's Active Fire dataset provides a high-resolution picture of wildfire spread, but that information is available only in about 12-hour snapshots.

A research team of geographers in Wyoming recognized that the behavior of a wildfire can change dramatically depending on the conditions during that long time interval, so they set out to close the information gap for wildfires in the U.S. They developed a computer model to simulate future fire spread in a matter of minutes, and they shared preliminary results from their model last week at the AGU Fall Meeting in New Orleans.

"The interesting part is most of the fires in the U.S. are wind-driven fires," said Bishrant Adhikari, a geographer at the University of Wyoming who presented the new research. "So if you can accurately model where the wind is going to go and how far it's going to blow, then you might just explain where the fire is going to go."

To get that perception of where a fire might go, Adhikari and his coauthors incorporated real-time weather information, fuel moisture data and land topography, among other variables, into a web-based Geography Information System portal. Then, they ran computer

simulations to predict the spread of the wildfire. By running multiple simulations, they could address uncertainties in the forecasted weather data – all in a matter of minutes.

The researchers tested their model's performance on three wildfires with different terrains that occurred in Wyoming and Montana in 2017. NASA's Visible Infrared Imaging Radiometer Satellite (VIIRS) provided 12-hour snapshots of the fire perimeters. When they compared their simulation results to the actual perimeters, the model did well. It predicted more than 86 percent of the area actually hit and under-predicted the fire perimeter by no more than 25 percent.

The model did tend to over-predict the area within the fire perimeter, but Adhikari said their learning-based approach to train the model with actual VIIRS observations will improve future predictions. He also said the model does not currently consider local fire suppression efforts – knowledge that fire managers will have.

The model does sacrifice some level of accuracy for speed, Adhikari said. The current tools fire managers use take two hours to run simulations. These models were developed in the 1990s and don't have the advances made in computations since then, according to Adhikari. Rather than trying to update the old models, he decided to "push it forward with new solutions."

"It's in early stages but seems promising," said Maria Hatzaki, a climatologist at the University of Athens in Greece who was not connected to the new research. Hatzaki works on the long-term problem of fires but knows the challenges of predicting wildfire spread. She sees value in the tool for forest fire services but less for academic research. Coming from a fire-prone country, she said she hopes the researchers will succeed in having accurate results in the future.

Adhikari plans to continue testing and calibrating his model. Next in his plan is to see how the model performs on the recent wildfires in California. He hopes to make the user-friendly tool available to the public in the early summer of 2018.

This story is republished courtesy of AGU Blogs (http://blogs.agu.org), a community of Earth and space science blogs, hosted by the American Geophysical Union. Read the original story here.

Provided by American Geophysical Union

Citation: Promising new wildfire behavior model may aid fire managers in near real-time (2017, December 27) retrieved 25 May 2024 from https://phys.org/news/2017-12-wildfire-behavior-aid-real-time.html