PREDICTING WILDFIRE DANGER

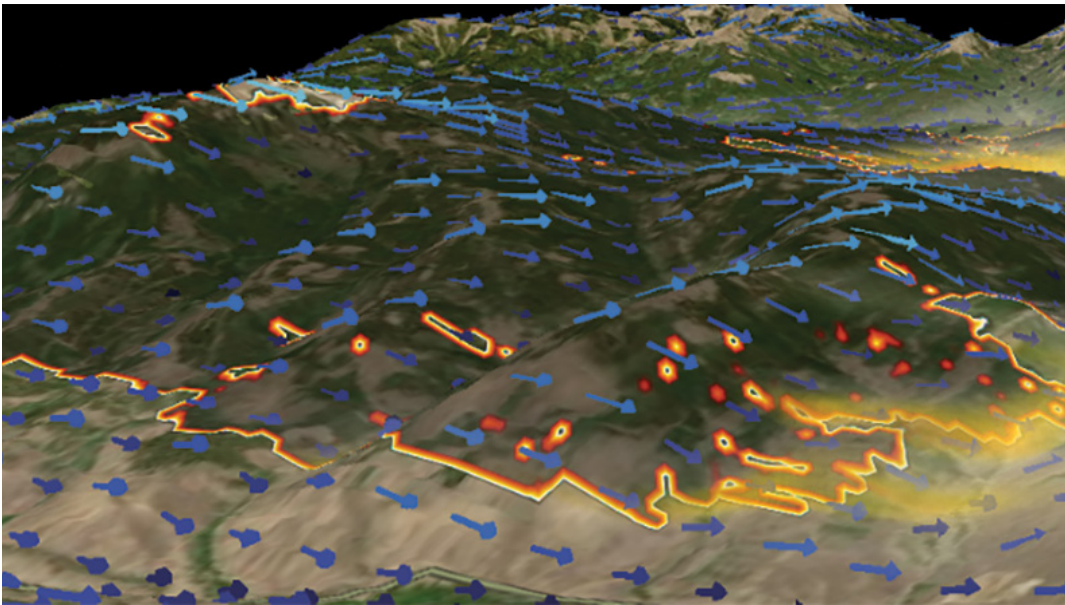## NSF NCAR'S "DERECHO" SUPERCOMPUTER FORECASTS FIRE-SPARKING WEATHER

About the Customer

The U.S. National Science Foundation National Center for Atmospheric Research (NSF NCAR) is a world-class research center leading, promoting, and facilitating innovation in the atmospheric and Earth systems sciences. NSF NCAR provides the science community with state-of-the-art resources, including supercomputers, sophisticated computer models, and extensive data sets. Its HPE Cray EX "Derecho" supercomputer — named after a powerful windstorm by an eighth-grade contest winner in Wyoming, where Derecho is located — delivers high-performance computing (HPC) to scientists and researchers at universities across the globe.

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U.S. Environmental Protection Agency (EPA)

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Their Challenge

Extreme weather events have always been an inevitable part of life for every species on Earth — and, due at least partly to climate change, they're both more frequent and more powerful today than they have been for all of human history. **One of the most visible, destructive types of extreme weather events are wildfires.** Wildfires often have a myriad of complex causes, but dry, hot conditions drastically increase the odds of powerful blazes. According to the U.S. Environmental Protection Agency (EPA), "**Heat waves are occurring three times more often than they did in the 1960s** — about six per year compared with two per year. The average heat wave season is 49 days longer, and individual heat waves are lasting longer and becoming more intense." Scientists have been using data about recent fires in the Western United States, dividing the blazes into regions, correlating them with observations of atmospheric conditions, and simulating how those conditions will change using a set of advanced regional and global climate models, including simulations from the NSF NCAR Wyoming Supercomputing Center.

Our Solution

To forecast and prepare for the weather conditions that lead to fire danger, supercomputers like NSF NCAR's 19.87-petaflops Derecho system — and the vital software that keeps them running efficiently — are paramount. To facilitate their world-renowned research on these incredible machines, the team at NSF NCAR uses Altair PBS® Professional®, a fast, powerful workload manager that improves productivity, optimizes utilization and efficiency, and simplifies administration for clusters, clouds, and supercomputers. Weather and climate prediction involves an ever-changing host of complex variables, and Altair knows firsthand that modeling the Earth's weather and climate is a massive, important challenge that requires powerful HPC systems and software that can orchestrate the most demanding workloads. NSF NCAR chose Altair in part because of its long history of providing leading institutions with technology that ensures that **climate modeling and simulation workloads run quickly and efficiently and maximize HPC resources**.

Results

The work at NSF NCAR has far-reaching real-world impacts. The results of modeling wildfires on NSF NCAR supercomputers have shown a steady increase in fires across all regions of the western U.S., especially during more severe fire seasons, and have predicted that the duration of peak fire seasons will grow longer. Knowing what to expect in advance enables informed future planning and wildfire mitigation. In a world where extreme climate events such as wildfires are increasingly common, technology like Derecho — and related simulation and data analytics tools — are invaluable. Ultimately, **supercomputers like Derecho and the software that powers them help to save land, lives, and ecosystems, and millions of dollars every year.**