PAYNE INSTITUTE COMMENTARY SERIES: **COMMENTARY**

Satellite Data Reveals Scale and Intensity of Colorado's Front Range Fires

By Mikhail Zhizhin, Kristin Ziv, Christopher Elvidge, and Morgan Bazilian

Hundreds of firefighters are battling four separate wildfires that have erupted since Monday, July 29, along Colorado's front range foothills, consuming more than 8,300 acres. One person has died, and thousands have been forced to evacuate. On Wednesday, July 31, Gov. Jared Polis ordered the deployment of the National Guard to aid in the firefight.

The four fires are the Quarry fire in Jefferson County, the Alexander Mountain fire in Larimer County, the Stone Canyon fire in Boulder and Larimer Counties, and the newest fire – the Lake Shore fire – in Boulder County.

As of Wednesday night (July 31), two of the largest fires were 0% contained; the Stone Canyon fire was 20% contained. No cause has been cited for the fires, although hot, dry weather along with dry grasses and vegetation are fueling them. Investigators suspect the Lake Shore fire was caused by people.

The Earth Observation Group at the Payne Institute for Public Policy, Colorado School of Mines, has created a short video (Figure 1 below) based on an algorithm that can show both the scale and temperature of the fire. Figure 2 below shows a single frame with fire detections encircled. With data collected by NOAA's Visible Infrared Imaging Spectrometer Suite (VIIRS)*, nighttime fire activity was recorded.

CO_fires_2024-07-31.mp4

Figure 1: Satellite imagery from Payne Institute for Public Policy, Aug. 1, 2024

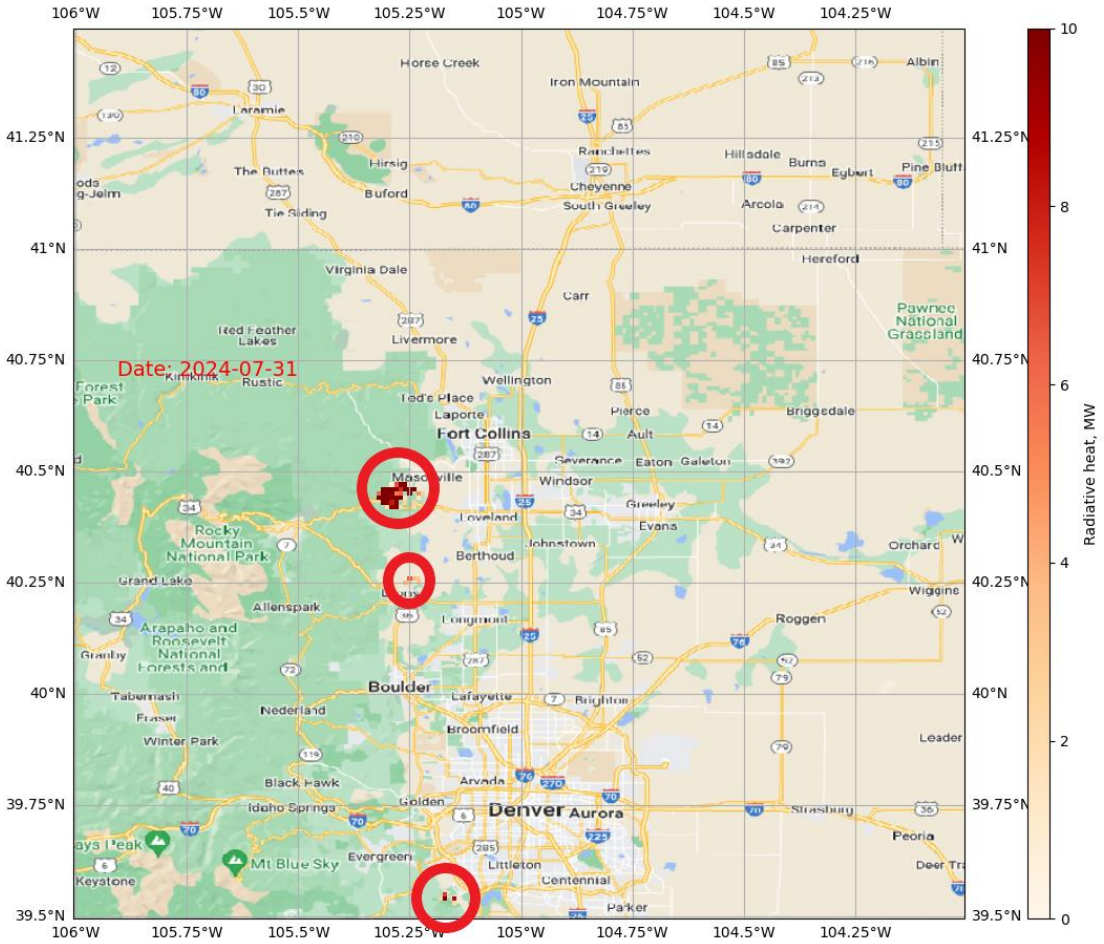

Figure 2: Satellite imagery from Payne Institute for Public Policy, Aug. 1, 2024

*** Notes:** VIIRS is the Visible Infrared Imaging Radiometer Suite which is flown jointly by NASA and NOAA. The VIIRS design was set by meteorologists, but other valuable products are also produced from VIIRS data. The Earth Observation Group developed the Nightfire algorithms in 2012 for quantifying natural gas flaring and biomass burning. It is the only global fire detection product that calculates fire temperatures, source sizes and heat output using physical laws.

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ABOUT THE AUTHORS

Mikhail Zhizhin
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Mikhail Zhizhin, M.Science in mathematics from the Moscow State University in 1984, Ph.D. in computational seismology and pattern recognition from the Russian Acad. Sci. in 1992. Research positions from 1987 to 2012 in geophysics, space research and nuclear physics at Russian Acad. Sci., later at NOAA and CU Boulder. Currently he is a researcher at the Earth Observation Group at Colorado School of Mines. His applied research fields evolved from high performance computing in seismology, geodynamics, terrestrial and space weather to deep learning in remote sensing. He is developing new machine learning algorithms to better understand the Nature with Big Data.

Kristin Ziv
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After receiving a master's degree in journalism from Northwestern University's Medill School, Kristin worked as a public relations professional in Chicago. She has both agency and non-profit experience. After raising a family, she campaigned for and was elected to public office, serving a term as a Village Trustee in Winnetka, IL, before moving to Colorado in 2019.

Christopher Elvidge
Senior Research Associate, Director of Earth Observation Group

Christopher D. Elvidge has decades of experience with satellite low light imaging data, starting in 1994. He pioneered nighttime satellite observation on visible lights, heat sources including gas flares and wildfires, as well as bright lit fishing vessels. He led the development of these nighttime remote sensed products with images from DMSP, JPSS, and Landsat satellites. These data are very popular and used globally in both public and private sectors. As of February 2018, he has more than 11,000 scholarly publication citations.

Morgan Bazilian
Director, Payne Institute and Professor of Public Policy

Morgan Bazilian is the Director of the Payne Institute and a Professor of public policy at the Colorado School of Mines. Previously, he wD.as lead energy specialist at the World Bank. He has over two decades of experience in the energy sector and is regarded as a leading expert in international affairs, policy and investment. He is a Member of the Council on Foreign Relations.

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The mission of the Payne Institute at Colorado School of Mines is to provide world-class scientific insights, helping to inform and shape public policy on earth resources, energy, and environment. The Institute was established with an endowment from Jim and Arlene Payne, and seeks to link the strong scientific and engineering research and expertise at Mines with issues related to public policy and national security.

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