



## MILITARY ACTIONS AND CLIMATE CHANGE AS DRIVERS OF WILDFIRES IN NORTHERN REGIONS OF UKRAINE IN 2022-2023

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### **Abstract**

The large-scale Russian military aggression has led to a number of serious and dangerous consequences for the environment and the population of Ukraine. Our research focuses on the impact of military actions on the natural ecosystems of Ukrainian Polissia. The most common consequences of this impact in 2022-2023 were fires. Almost 70% of forest fires in this region were caused by active combat, missile strikes, mine explosions, artillery shells, etc. While the majority of fires in Ukrainian Polissia during these years were triggered by war, their spread was influenced by many other factors. These include regional climate change and weather patterns, the topographical features of the region (slope steepness and aspect, elevation above sea level), the types and properties of natural components that served as fuel (grass, grass-shrub, shrub, timber-understory, timber litter, slash-blowdown), settlement density in the Wildland-Urban Interface zone, wood damage by pests and diseases, and the presence of non-native invasive plants, which added complexity to forest and grassland fire behavior.

The last decade has been the warmest in the past 100-120 years in Ukraine. Warm, low-snow winters, along with dry and abnormally warm spring and summer seasons, are the current climate realities. Abnormally high temperatures and periods without rainfall create favorable conditions for fire spread. In the spring of 2022 and 2023, a slight increase in the climate norm for near-surface temperatures was recorded. At the same time, a deficit of atmospheric precipitation was observed in March and May, with only 70% of the typical rainfall. In contrast, April saw 30-50% more precipitation than usual. The weather conditions in the spring of 2022 and 2023 were less dry compared to 2020. However, due to active military operations in 2022 and missile strikes in 2023, large parts of the Kyiv, Chernihiv, Zhytomyr, and Sumy regions were affected by fires. The number and spread of fires in Ukrainian Polissia in 2022-2023, established based on satellite monitoring data from the FIRMS, correlate with weather conditions and climate trends.

The fires caused gas-aerosol pollution of the atmosphere over these regions. Daily variations in the aerosol absorption index (AAI) in the vertical air column over Zhytomyr and Chernihiv regions, as well as the Chornobyl Exclusion Zone in the spring of 2022 and 2023, were recorded based on data from the Sentinel-5P satellite and used in this research.

### **Keywords**

military actions, climate change, forest fires, satellite observations