# A Machine Learning Model for Predicting Fire Probability in Global Peatlands

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Peatland fires are among the most detrimental types of fires toward global warming, and are capable of releasing 10 times more carbon per hectare into the atmosphere than typical forest fires. This makes predicting these dangerous fire events crucial toward fighting climate change. However, many communities worldwide are forced to rely on conventional fire danger systems that disregard peatland-specific fire conditions. This study introduces & evaluates the first global peatland fire prediction system that utilizes an Extreme Gradient Boosting (XGBoost) model that was trained on the years 2016-2022 to specifically predict peatland fires daily & worldwide. It inputs many hydrological, fuel, weather, and human factors relevant to peatland fires from multiple open-access satellite reanalysis datasets. The XGBoost model was tested globally and across multiple regions during 2023 against the “Canadian Fire Weather Index” (FWI), a system used today in dozens of countries worldwide. The XGBoost model identified peatland fire-prone conditions 11.1% better than the FWI globally, with increases of ~20% in certain regions. The model also demonstrated high reliability, with predicted chances of fire being accurate to within 0.04% on average. Overall, this study demonstrates that a global peatland-specific machine learning system is both feasible and more effective than conventional wildfire danger systems for predicting peatland fires. This novel approach could help improve fire preparedness in many more peatland regions worldwide, and help protect one of Earth's most important carbon sinks from becoming damaging carbon sources.

**Awards Won:**