

Development of an algorithm for predicting peat swamp forest fires using a machine learning

Rachane Malinee

Air Pollution and Health Effect Research Center, Prince of Songkla University, Songkhla, Thailand.
Department of Energy Technology, Prince of Songkla University, Songkhla, Thailand

Author list (excluding presenting author)

Narissara Nuthammachot (2); Racha Dejchanchaiwong (1,3); Perapong Tekasakul (1,4); Thanathip Limna (5); Dimitris Stratoulas (6); Chidchanok Choksuchat (7); and Korakot Wichitsa-nguan Jetwanna(7)

Abstract

The present study aims to predict the forest fire risk map in a peat swamp forest in southern Thailand using a combination of machine learning (ML) classification models, the Fuzzy Analytic Hierarchy Process (FAHP), and Geographic Information System (GIS) techniques. The five major factors and 17 sub-factors, including topography, meteorology, vegetation indices, land use and landcover (LULC), and built-up area, were analyzed using FHAP and GIS techniques. The prediction of peatland forest fires was investigated using the ML classification models, which used those datasets as input parameters and the fire risk map from the FHAP model as target data. Accuracy, precision, recall, F1 score, and Cohen's kappa (κ) were used to evaluate the performance of the ML model. The results showed that the light gradient boosting machine was the best model for predicting the peatland fire risk map for both El Niño and La Niña events, while the random forest classifier model was fitted for neutral years. This finding accurately evaluates the probability and risk of peatland fires for effective fire prevention and active risk resolution.

Early Career Scientist

YES, I am an early career scientist.

IGAC Activities

BBURNED: Biomass Burning Uncertainty: ReactionNs, Emissions and Dynamics