

Dust Storm Prediction using AI and Machine Learning. A Literature Review

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Abstract

Dust storms have garnered increased research interest in recent years as they can significantly influence human health, climate, air quality and socioeconomic factors. This literature review investigates the application of Artificial Intelligence (AI) and Machine Learning (ML) in predicting dust storms in order to identify the most effective methodologies. This literature review studies three main methodologies used in dust storm predictions: 1. Artificial Neural Networks (ANN) 2. Maximum Entropy (MaxEnt), and 3. combinations of various ML algorithms, among them, Support Vector Machines (SVM), Classification Tree Analysis (CTA), Generalized Linear Model (GLM), Multivariate Adaptive Regression Splines (MARS), Random Forest (RF), Stochastic Gradient Boosting (SGB), and Recursive Feature Elimination (RFE). ANN techniques appear to have very high accuracy in predicting patterns with complex geographical variables. MaxEnt is useful in presence only scenarios and Random Forest (RF) emerges as robust algorithm for handling large and complex phenomena.

Keywords: Dust Storms, Dust Storms Predictions, Maximum Entropy (MaxEnt), Artificial Neural Networks (ANN), Random Forest (RF)