

Abstract 25 – Paper ID: 061**Retrieval of Cloud Optical Depth for INSAT-3DR Using Machine Learning
XGBoost Model**

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Abstract

The study aims to retrieve the cloud optical depth for INSAT-3DR primarily from its L1 Sounder IR channels brightness temperature data of 11 μm , 12 μm , 12.6 μm , 3.79 μm , and radiance data of the visible channel at 0.695 μm using a machine learning model. The brightness temperatures, visible channel radiance, and MERRA-2 reanalysis products such as specific humidity, air temperature, surface pressure, and surface skin temperature, which govern the atmospheric thermodynamic conditions, are used to train the model. Cloud optical depth from MERRA-2 is used as the output. This study is carried out over the central Indian region for pre-monsoon and monsoon seasons of 2024. The XGBoost model is used for training. Feature analysis and correlation coefficients are obtained to understand the influence of radiance and meteorological conditions in retrieving cloud optical depth. The study is a preliminary analysis to design a retrieval technique for cloud properties retrieval for INSAT-3DR sounders using machine learning-based models.

Keywords: INSAT-3DR, cloud optical depth, brightness temperature, XGBoost model, MERRA-2, retrieval