

# Calibration of Precipitation Forecasts for nine cities in Brazil using Machine Learning

Waldenio Gambi de Almeida (1), Matheus Souza Ruiz (2),  
Renan Braga Ribeiro (2), Pedro Nazareno Ferreira da Costa (1) and  
Alexandra Franciscatto Penteado Sampaio (2)

*(1) National Institute for Space Research (INPE), Brazil*

*(2) Santa Cecília University, Brazil*

## Abstract

In this work, we used a machine learning (ML) technique to improve precipitation forecasts by postprocessing numerical weather prediction (NWP) data for nine cities located in litoral area of São Paulo State, Brazil.

A surface observational network of pluviometers from Brazilian Federal Organizations provided the dataset used to train and verify the random forest model. The numerical weather forecasts available for the study were a regional WRF run by the Brazilian National Institute for Space Research (INPE) and the global GFS from NCEP/USA. The range of the study covered almost two years of data and forecasts.

The focus of the work were the intense events of precipitation above 80 mm a day. For the verification we calculated index like ETS (equitable threat score), POD (probability of detection) and FAR (false alarm ratio).

Verification of the ML adjusted predictions exhibited better or similar skill to the uncalibrated predictions, with a better detection of intense precipitation events and decreasing model bias. These results were consistent for all stations and range of precipitation evaluated.

Keywords: NWP, Machine Learning, precipitation forecast