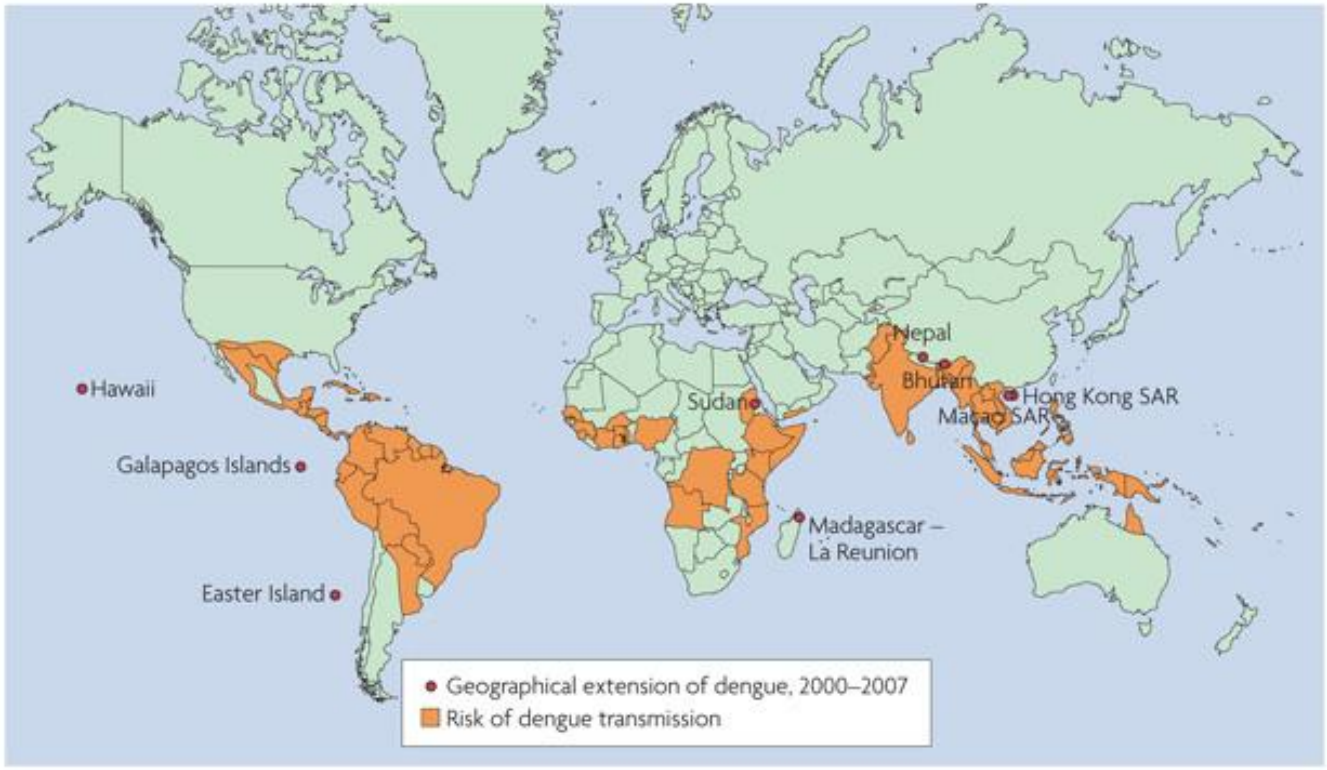
Dengue Fever Prediction

San Juan, Puerto Rico

Iquitos, Perú

JENN HAVENS & MADISON HOBBS



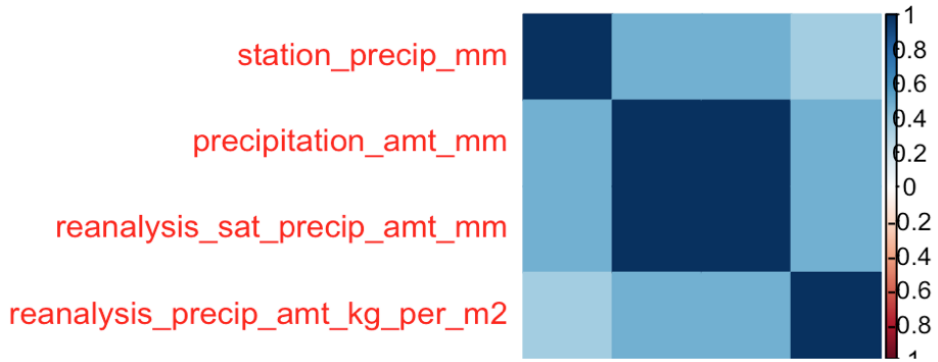
Dengue prediction

- WEATHER
  - TEMPERATURE
  - HUMIDITY
  - PRECIPITATION
- ENVIRONMENT
  - VEGETATION
- SEASON/TIME OF YEAR
- RECENT WEATHER CONDITIONS

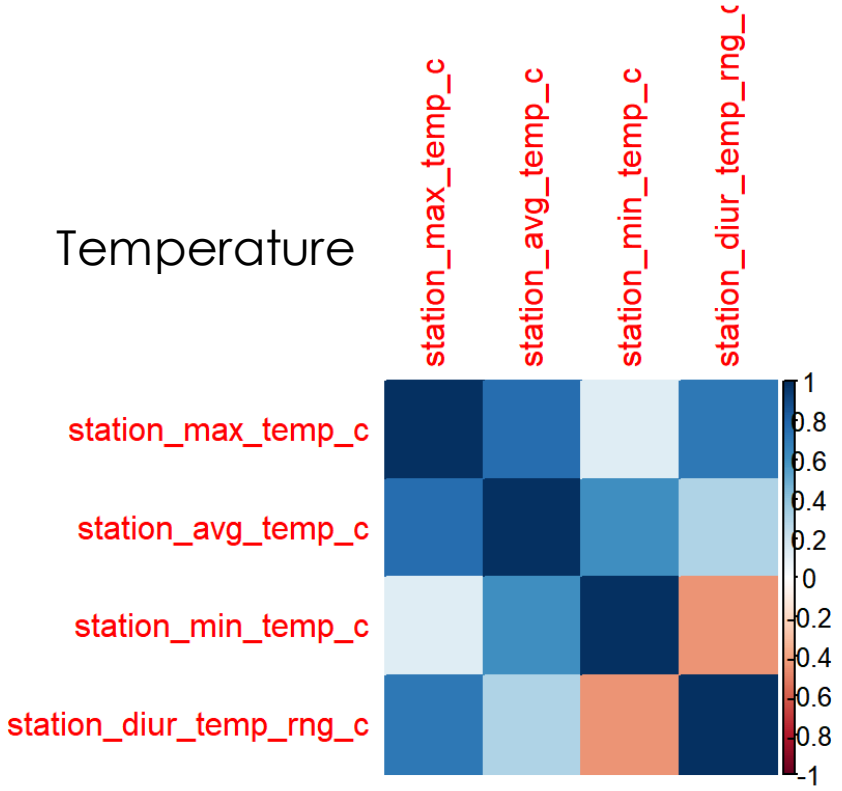
DrivenData - DengAI

- Tidy format
- Data sourced from the NOAA Dengue Fever Prediction Site
- There were missing values, so we used Imputation via Bagging (fits a bagged tree for each predictor as a function of all the others and predicts missing values)

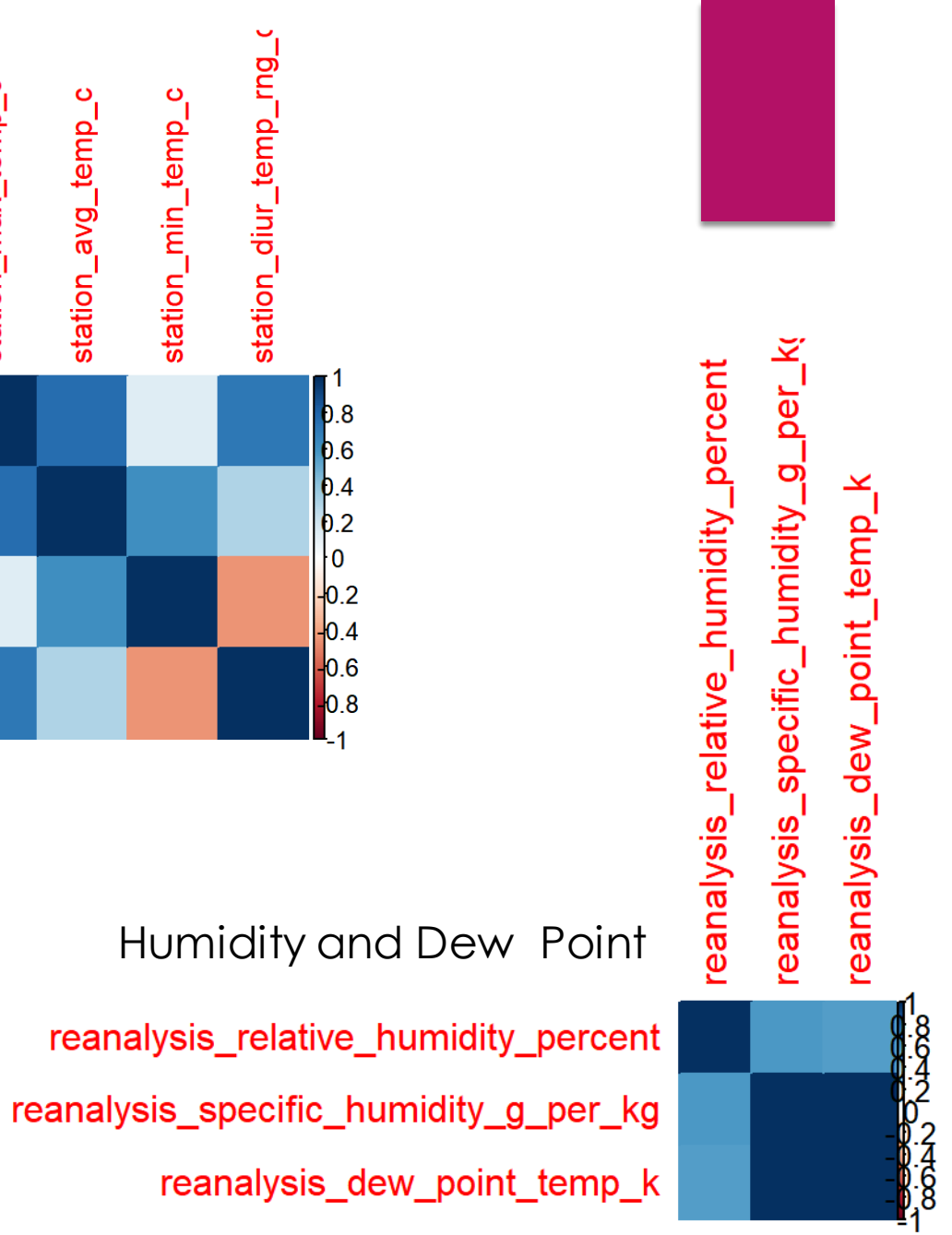
Total Precipitation



Temperature

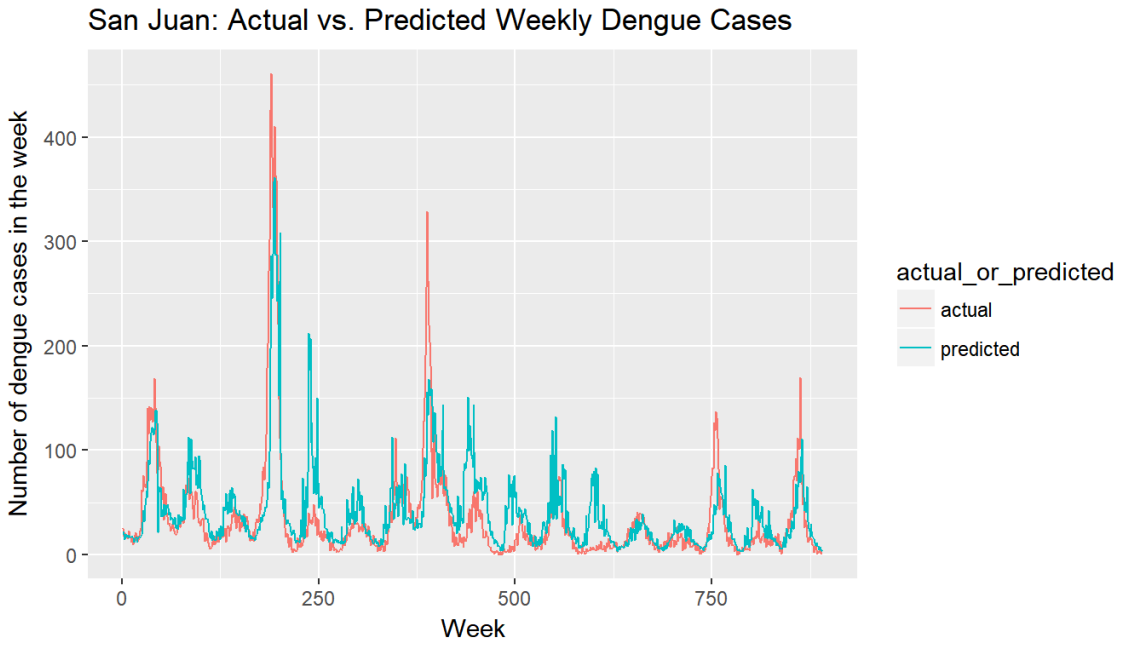


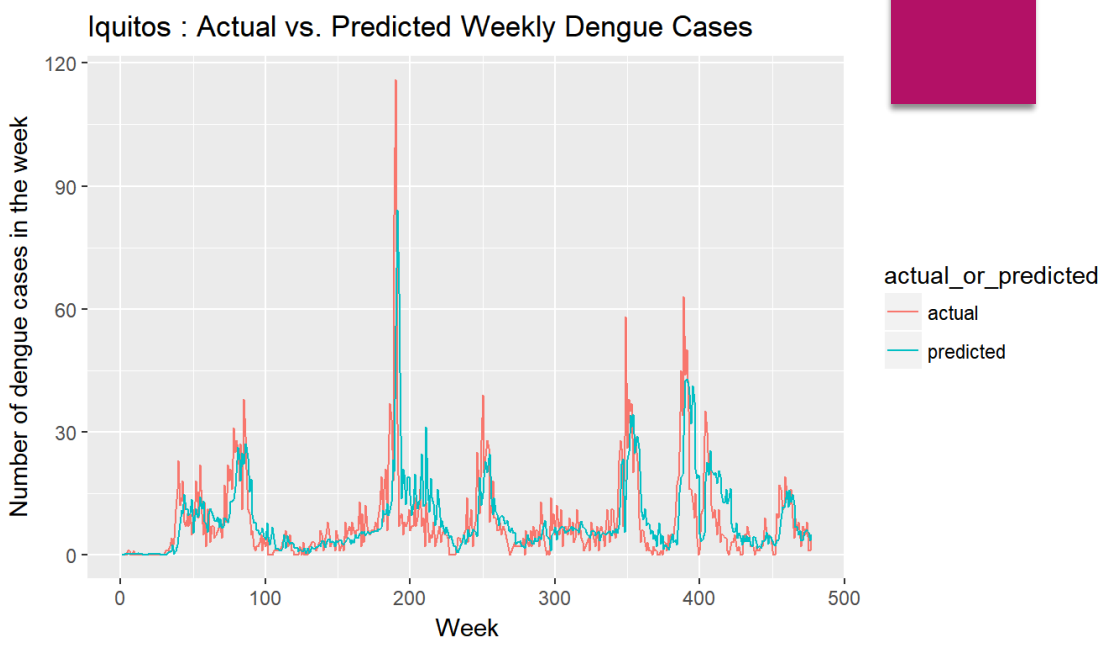
Humidity and Dew Point



Time Lagged Weather Variables

- Literature on dengue fever prediction suggested 2-3 month lag on weather data (precipitation, humidity, temperature)
- We implemented 12-week lagged variables on precipitation, humidity, and temperature

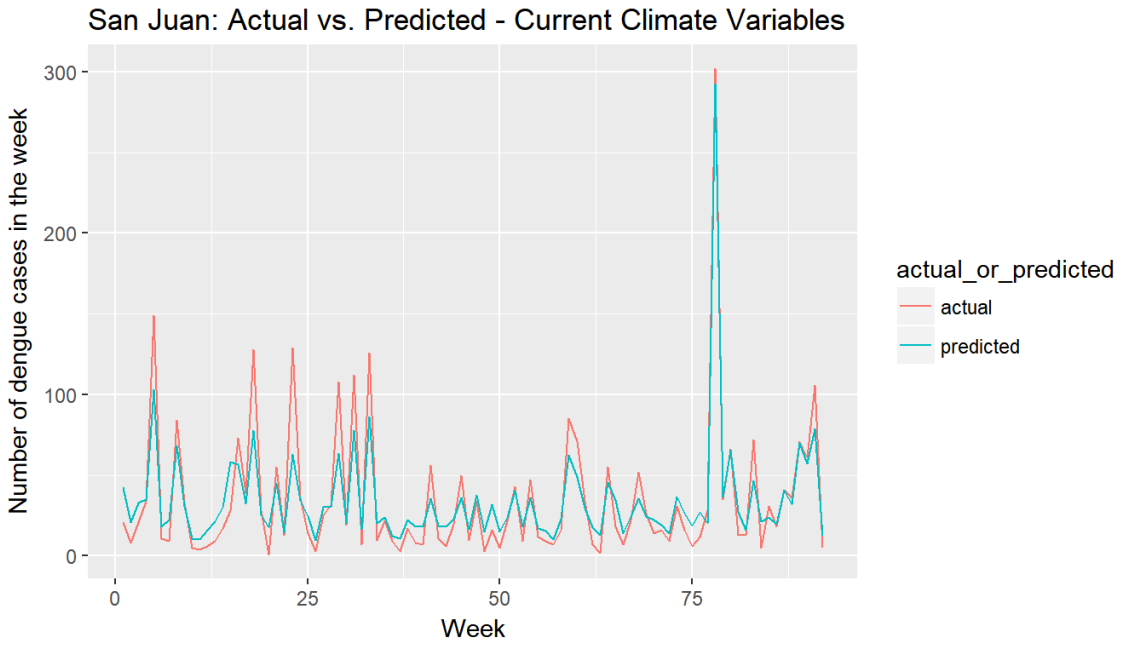


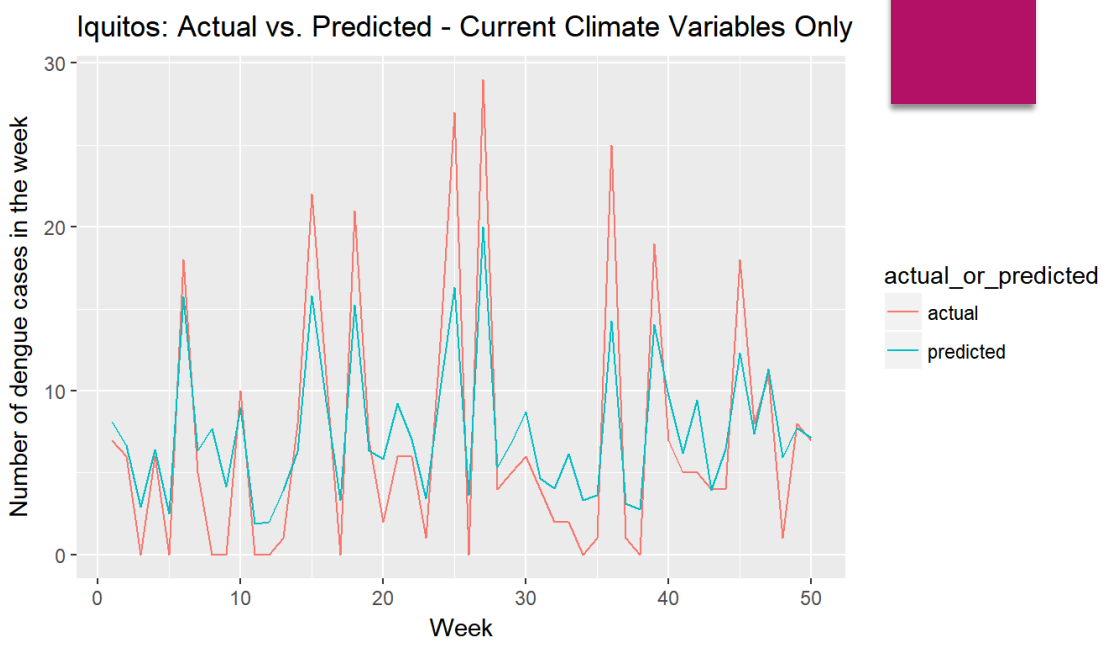


Random Forest with Time Variables as Predictors

SAN JUAN NRMSE - 67

IQUITOS NRMSE - 83





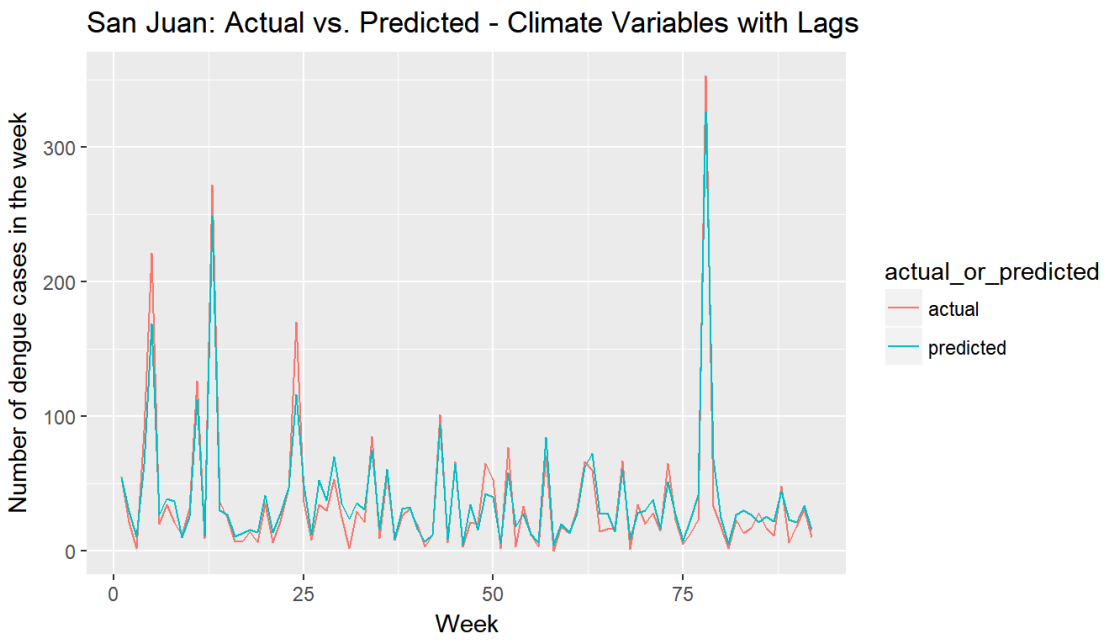
Random forest with current environmental variables only

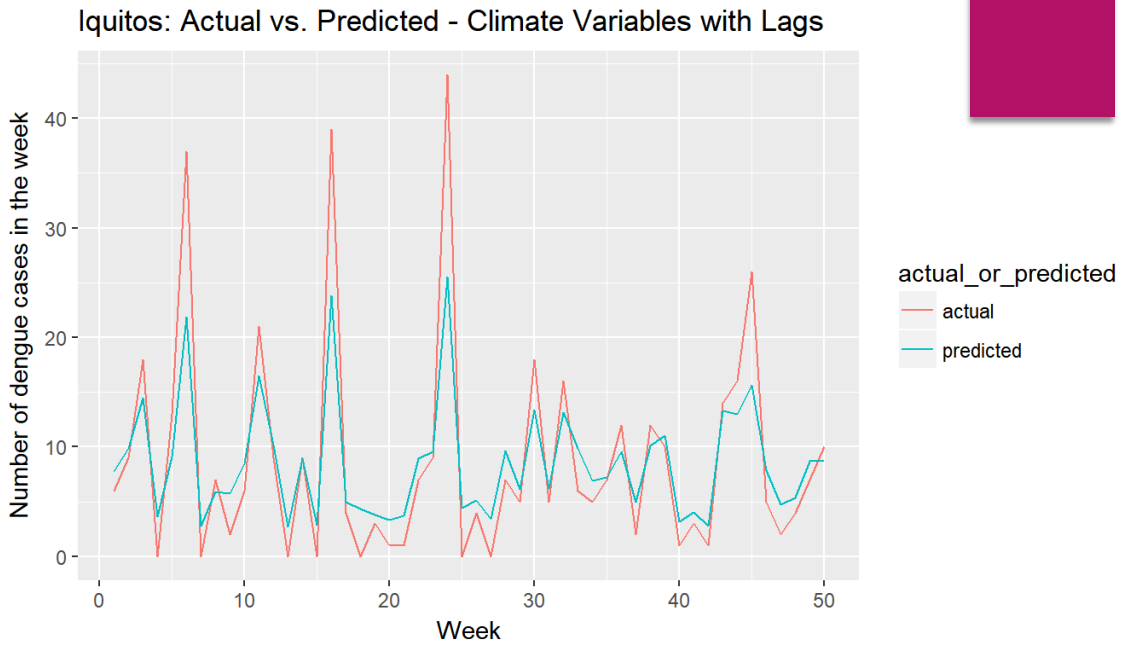
SAN JUAN NRMSE – 36.9

SAN JUAN RMSE – 27.5

IQUITOS NRMSE – 50.4

IQUITOS RMSE – 3.87





Random forest with current environmental variables and weather time lags

SAN JUAN NRMSE – 32.3

SAN JUAN RMSE – 24.1

IQUITOS NRMSE – 49.2

IQUITOS RMSE – 3.26

Variable Importance in Final Models

- San Juan Variable Importance
-
- temp_lag 100.000
- ndvi_nw 57.415
- ndvi_ne 39.394
- ndvi_sw 26.728
- humidity_lag 23.739
- ndvi_se 23.299
- station_avg_temp_c 22.128
- relative_humidity_percent 16.212
- precipitation_amt_mm 5.744
- precip_lag 0.000

- Iquitos Variable Importance
-
- ndvi_ne 100.00000
- ndvi_sw 97.20262
- station_avg_temp_c 95.35292
- ndvi_se 82.72649
- relative_humidity_percent 66.77428
- temp_lag 55.12644
- humidity_lag 27.43751
- ndvi_nw 25.90321
- precipitation_amt_mm 0.07198
- precip_lag 0.00000