INBRE: Comparing PM2.5 vs Predicted PM2.5 Using Linear Regression Models

By comparing actual and predicted PM2.5 values, we can gauge the accuracy of the prediction model. To accomplish this, we ran the data through a Google Earth Engine (GEE) program that compiled a .csv file of all the data from the DEQ database (actual) and the prediction model (predicted) for a given amount of time.

We started with one day, running the GEE program, then pulling a station’s specific actual and predicted values. We then found RMSE and R­­2 values by running a linear regression model. The *linReg* program will do this automatically because of the SciKit-Learn tool, however it can be done by hand on a graphing calculator if need be. Desmos Graphing Calculator is a great resource and is user friendly.

For a given station, enter the actual*(x)* and predicted*(y)* values, omit values if there is no given predicted value. Run a linear regression model to create the graphs. The formula to enter into Desmos is y1~ b1x1 +b0. The R2 value should be calculated by Desmos. RMSE can be calculated as follows:

where *Σ* means “sum of” for the difference of all *predicted* and *actual* values squared. *N* equals the number of *Actual* data points.

Going forward, this series of operations is scaled up, running the programs for a month’s worth of data compiled and predicted, and eventually a year’s worth of data compiled and predicted. Simply choose which program to run, enter dates at top, and run program to get .csv file of data. Then follow the above procedure, with either Desmos or the *linReg* program. The *linReg* approach is recommended if you have experience with programming, otherwise use the GEE programs to pull data points and use Desmos to graph and find R2 and RMSE values.

Resources:

linReg Program: https://github.com/abby-kabalin/dataCheck

Daily Program: https://code.earthengine.google.co.in/f7d0c636e2394155ade8ab3f460ba4ac

Monthly Program: https://code.earthengine.google.co.in/8879b06a2866ace1363122d71d79f4db

Yearly Program: https://code.earthengine.google.co.in/758db26fcc5fa333d21bc77c692c4452

Desmos Graphing Calculator: <https://www.desmos.com/calculator>