Spatial Regression (Part 1)
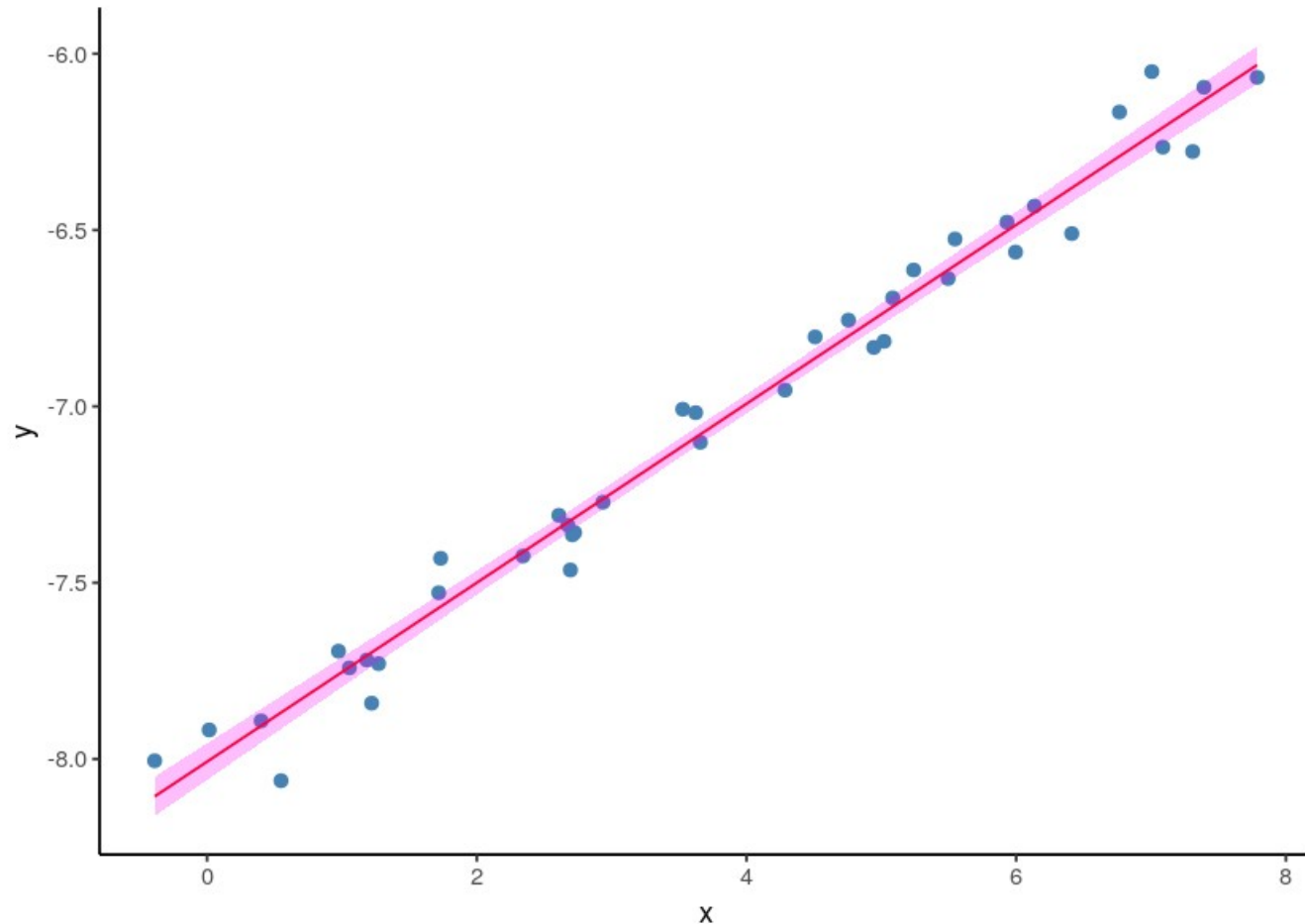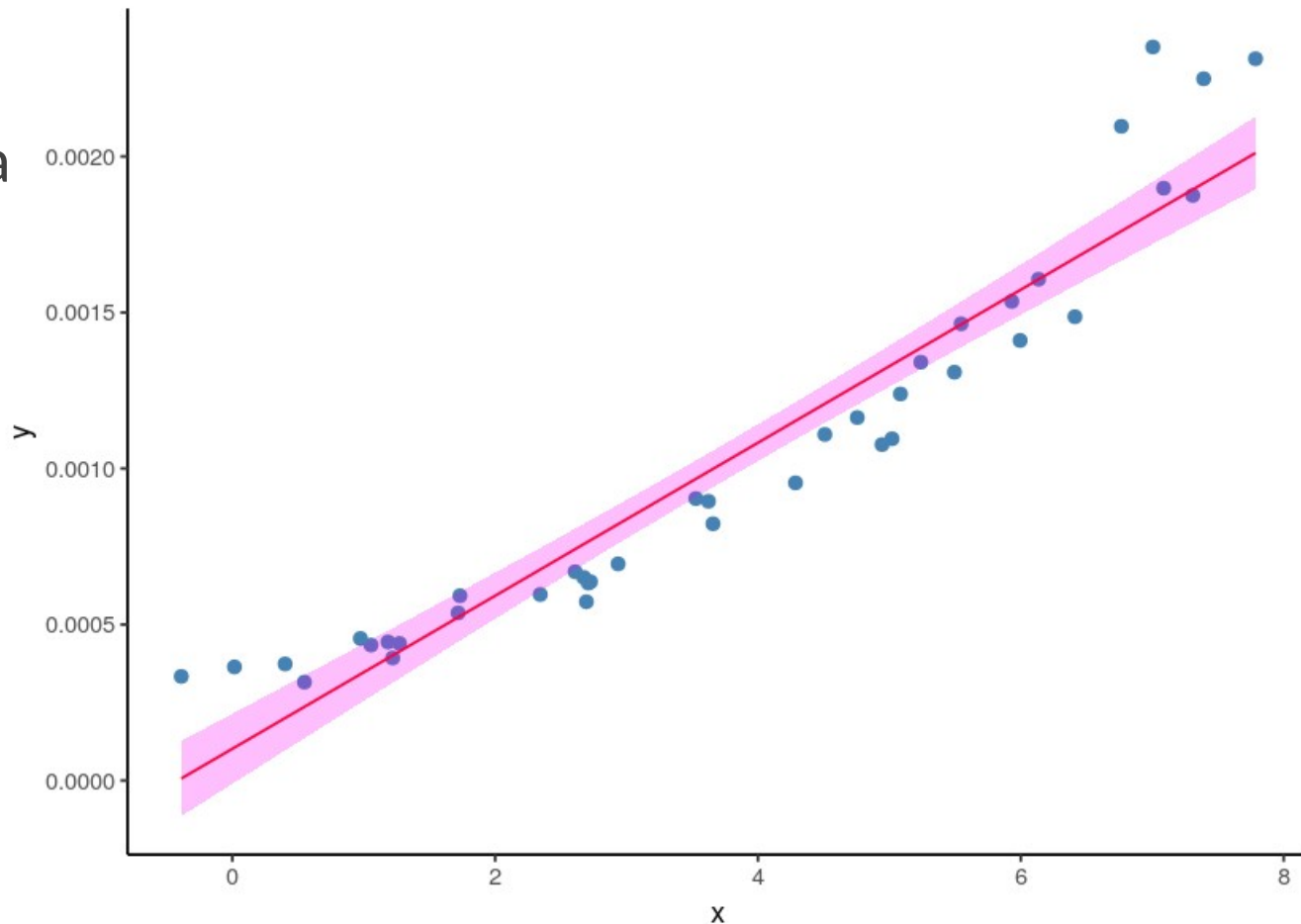
RICARDO ANDRADE

Linear Regression
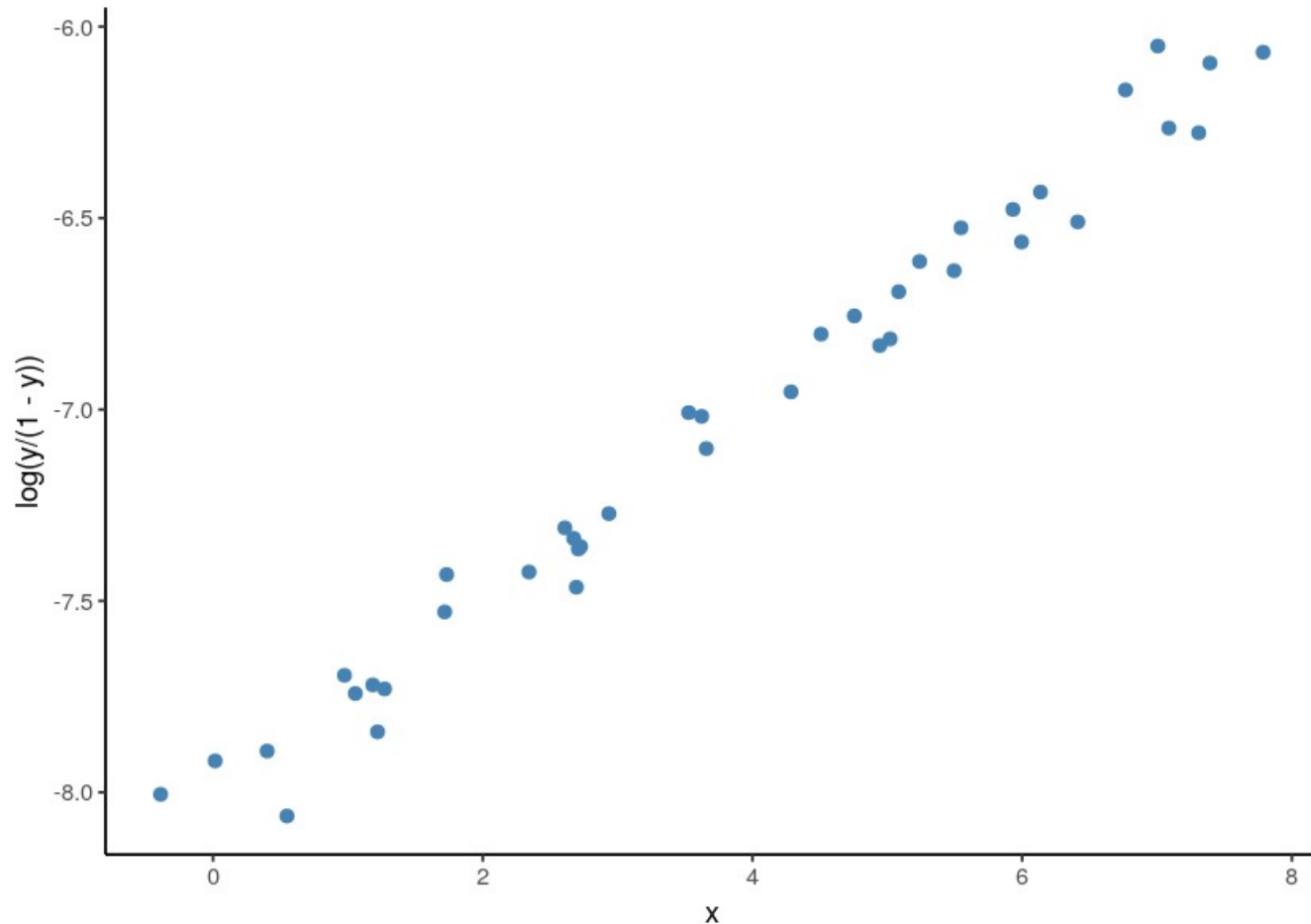
We try to explain Y in terms of X.

Linear Regression

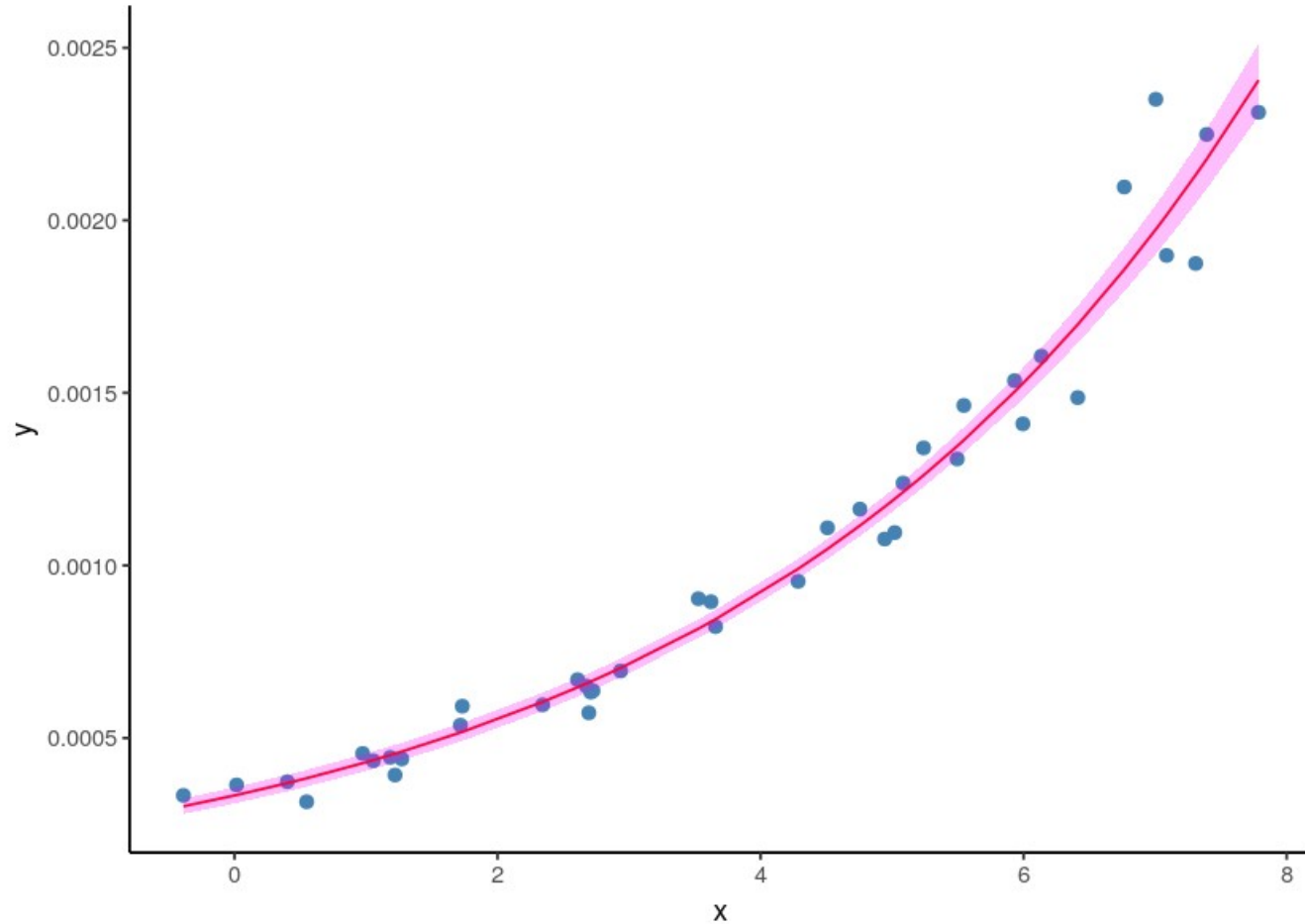Sometimes the standard linear regression is not a good assumption.

Generalized Linear Model

Find a transformation where the assumptions of the standard linear regression work.
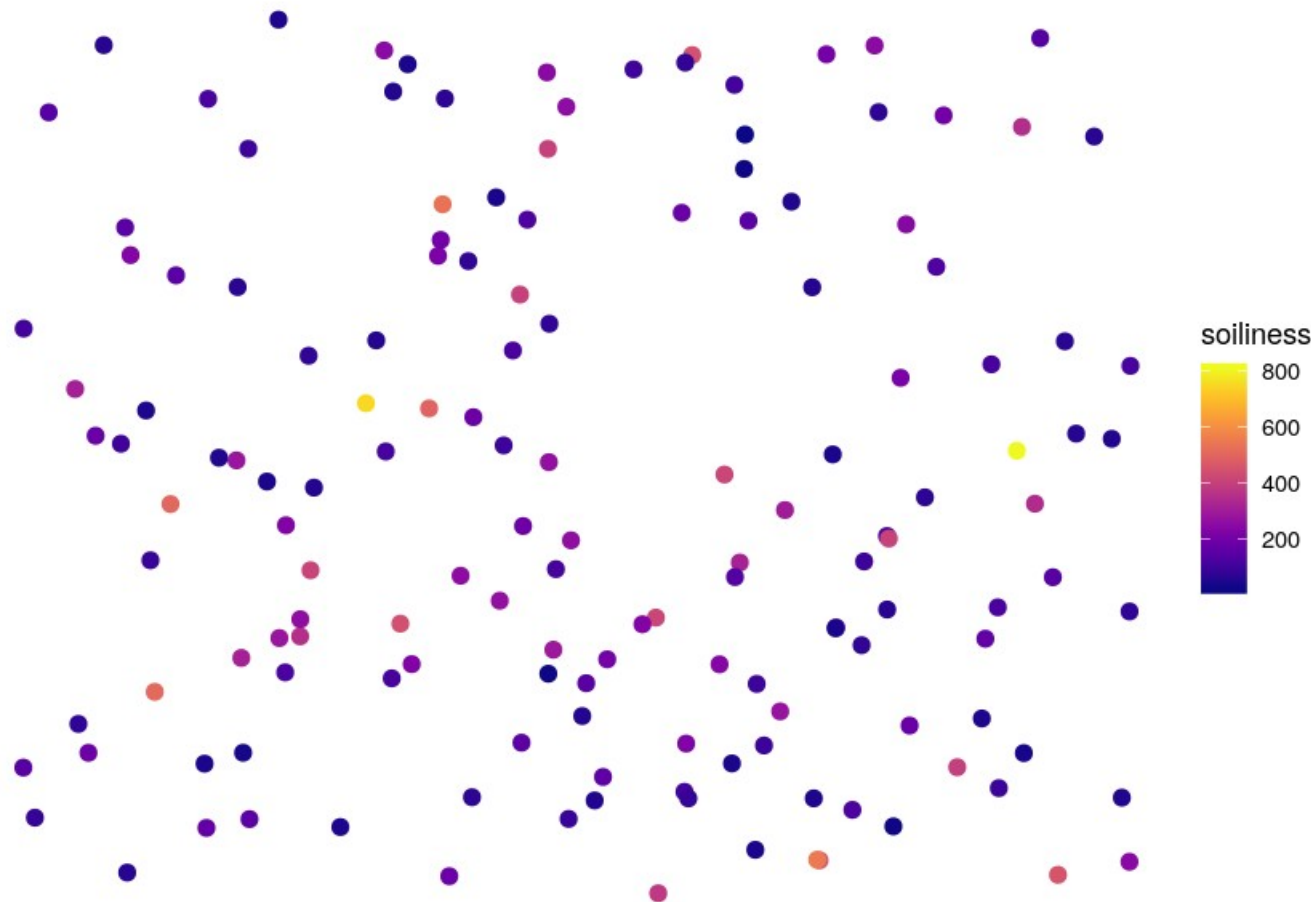
Generalized Linear Model

Example

Assumptions:

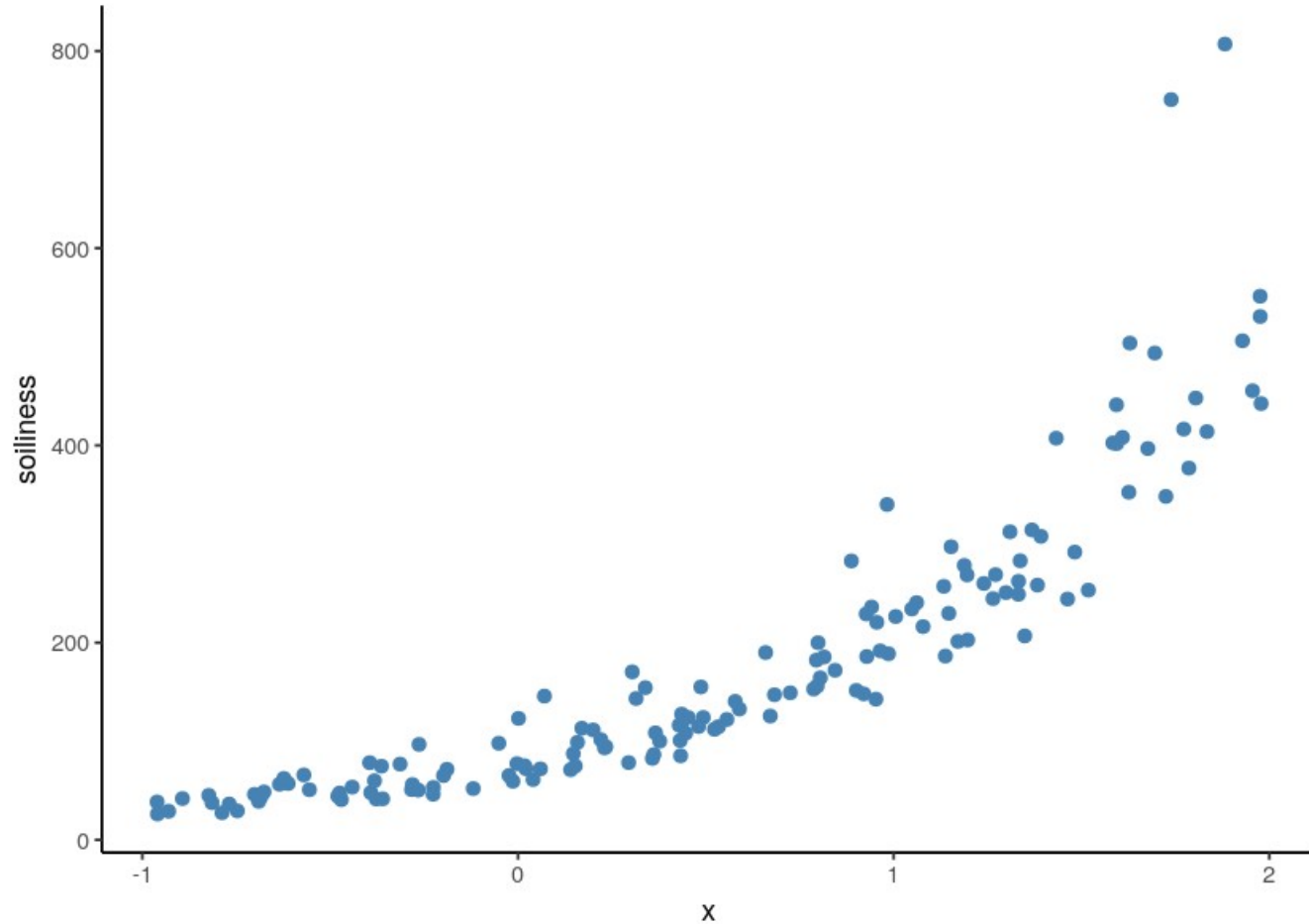We are interested in a property of the soil called soiliness.

We take samples at different locations in a parcel.
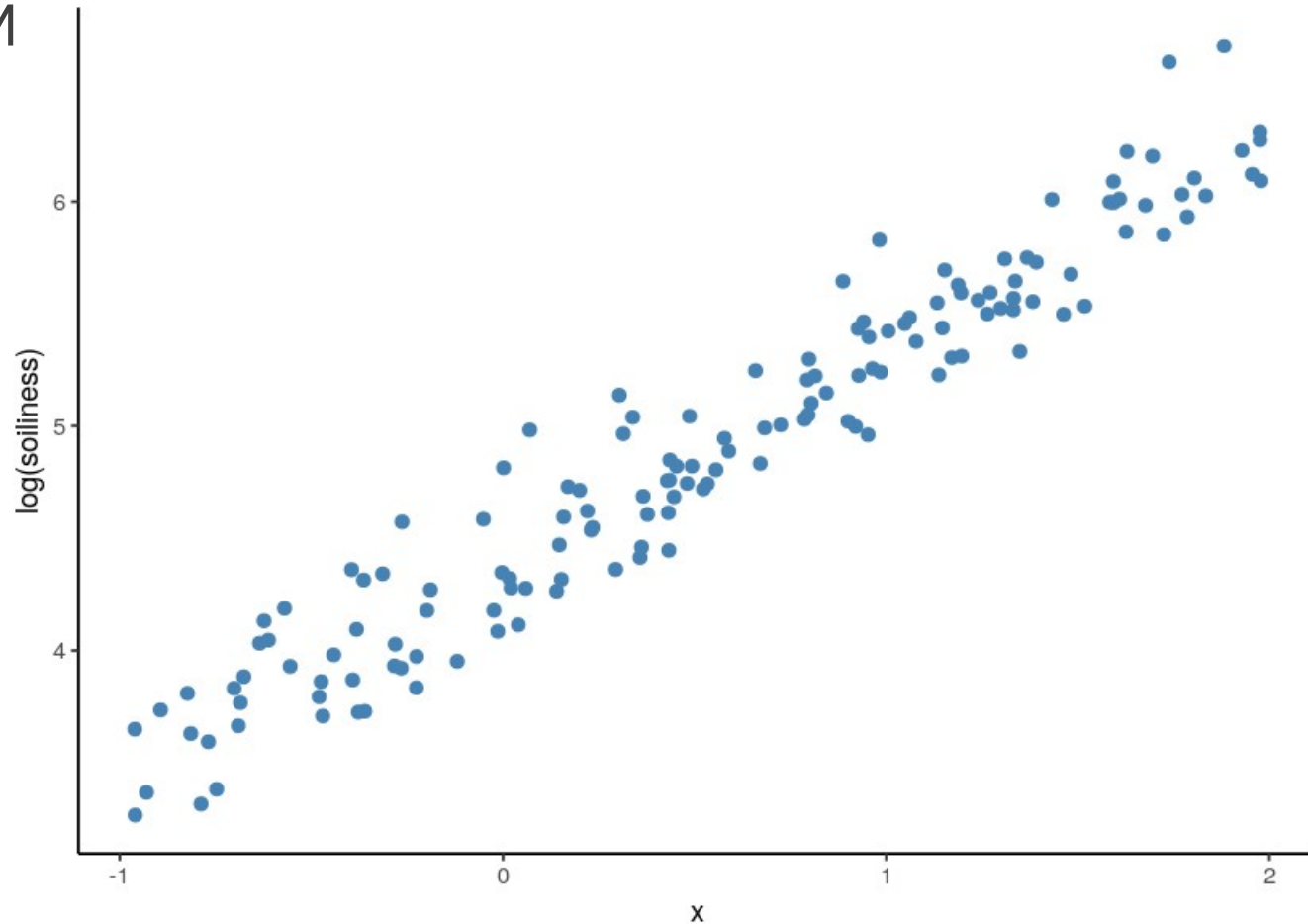
We have one covariate X.

Example

Example

We can use a GLM with log transformation.

Example
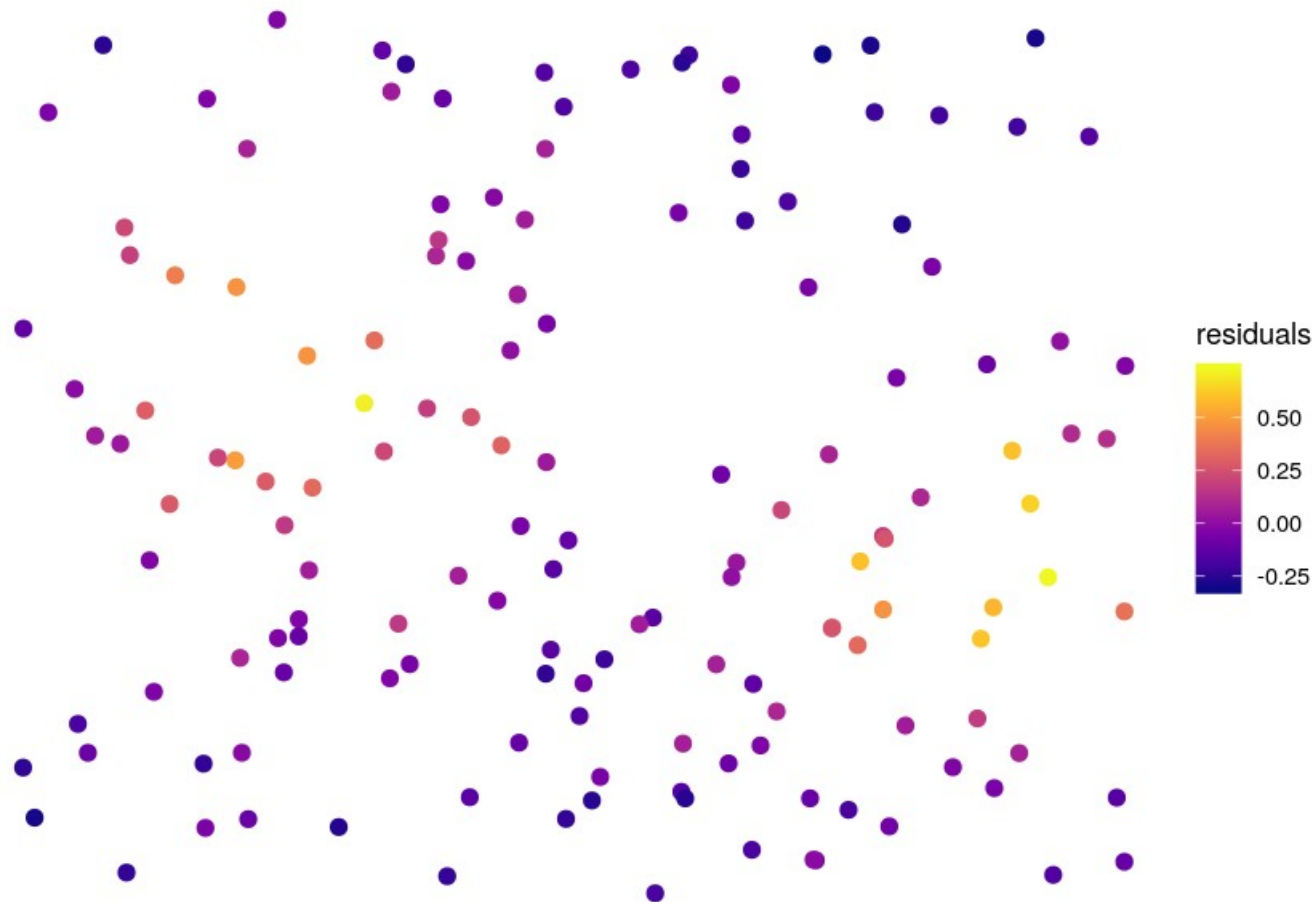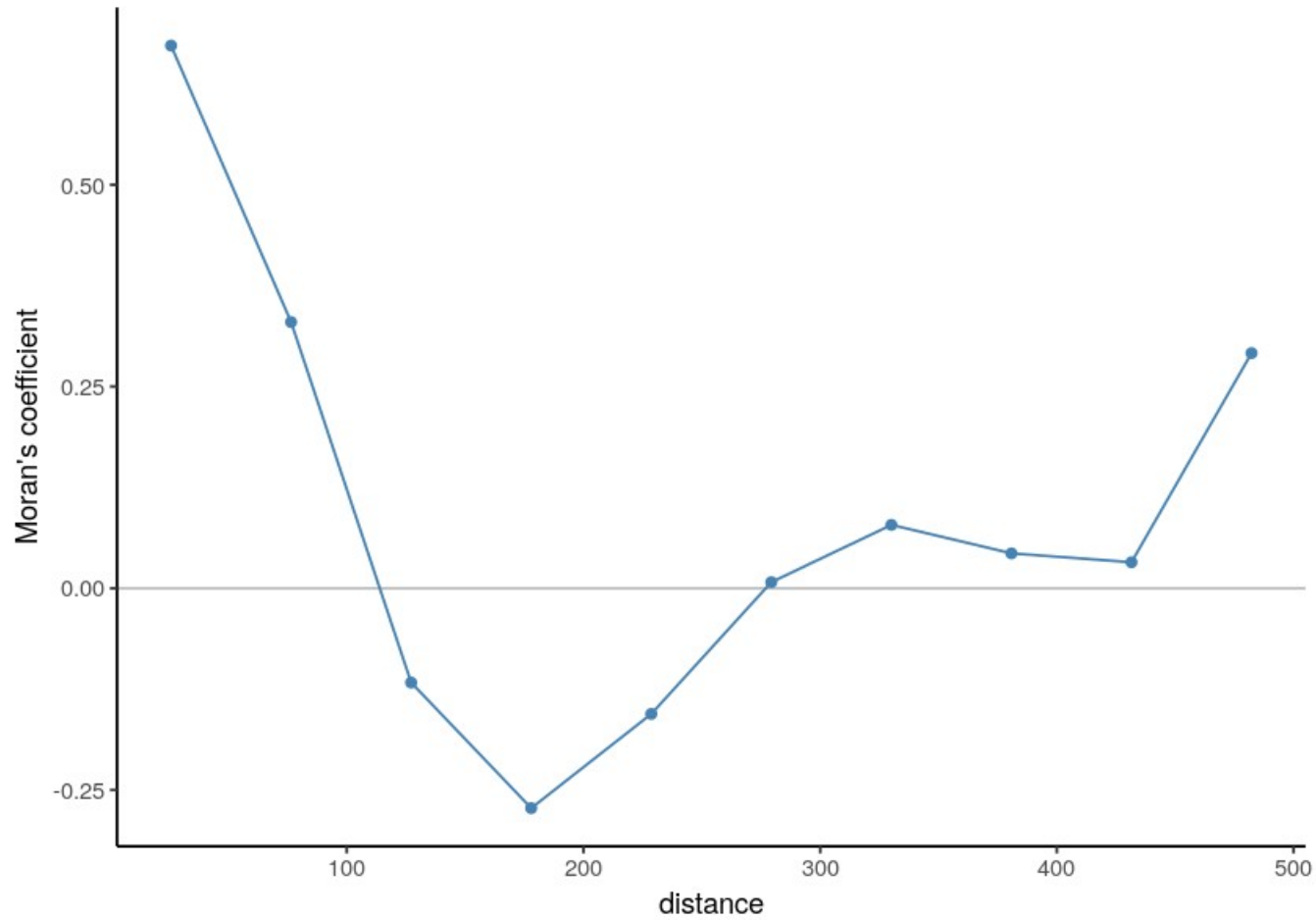
Now look at the residuals.

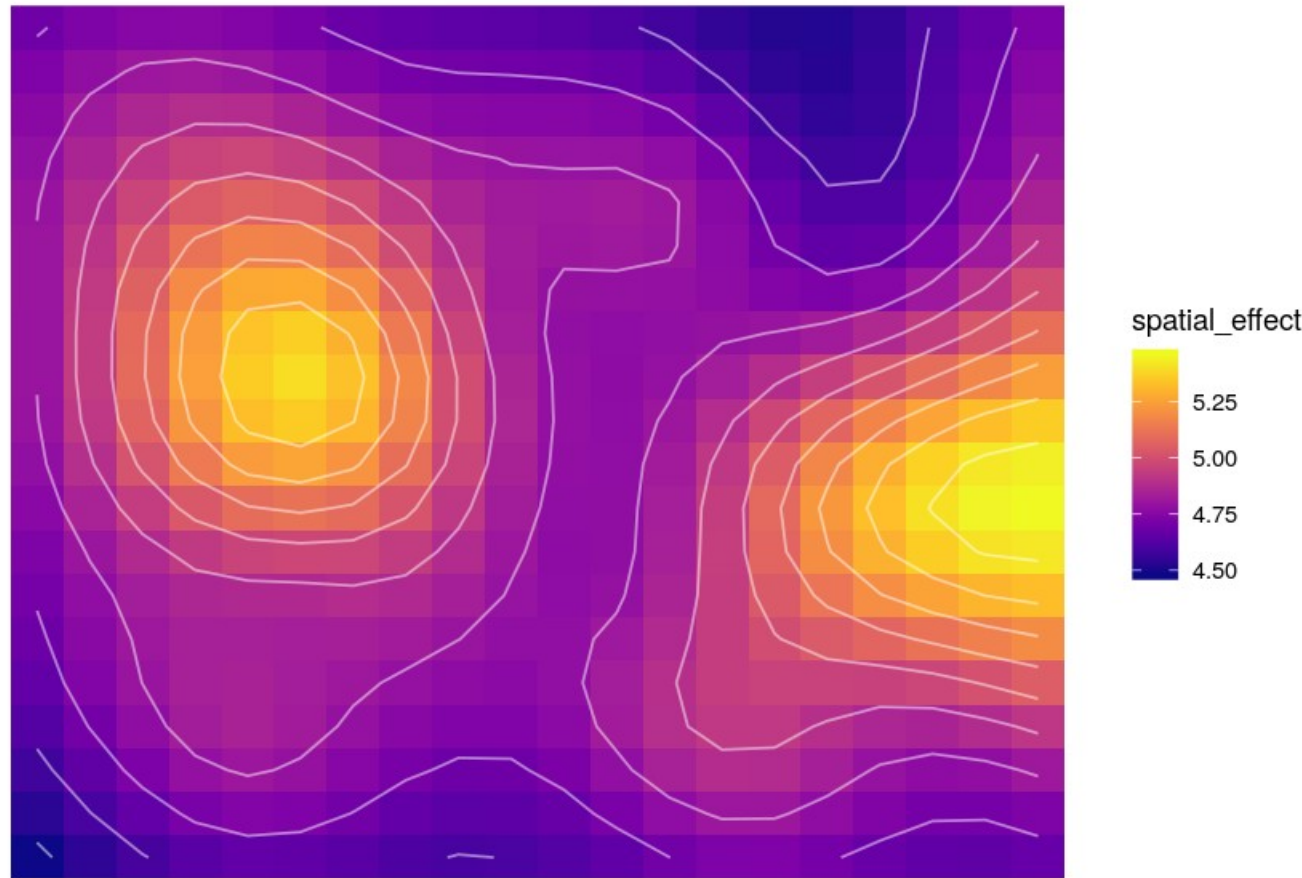Then don't look like iid.

Example

Generalized Additive Model

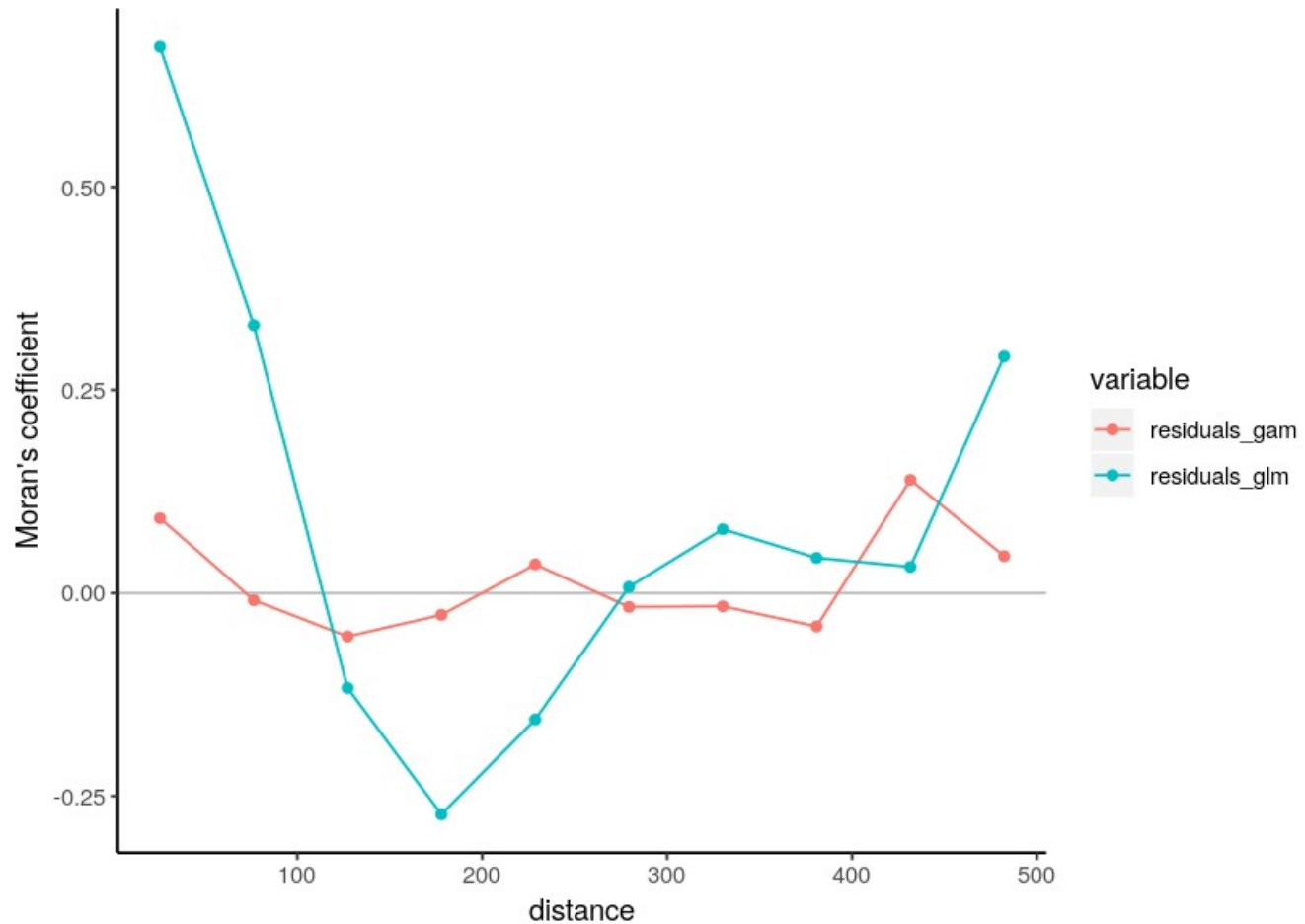Like a GLM, but we can add smooth functions as explanatory variables.

Example

Spatial effect
incorporated as
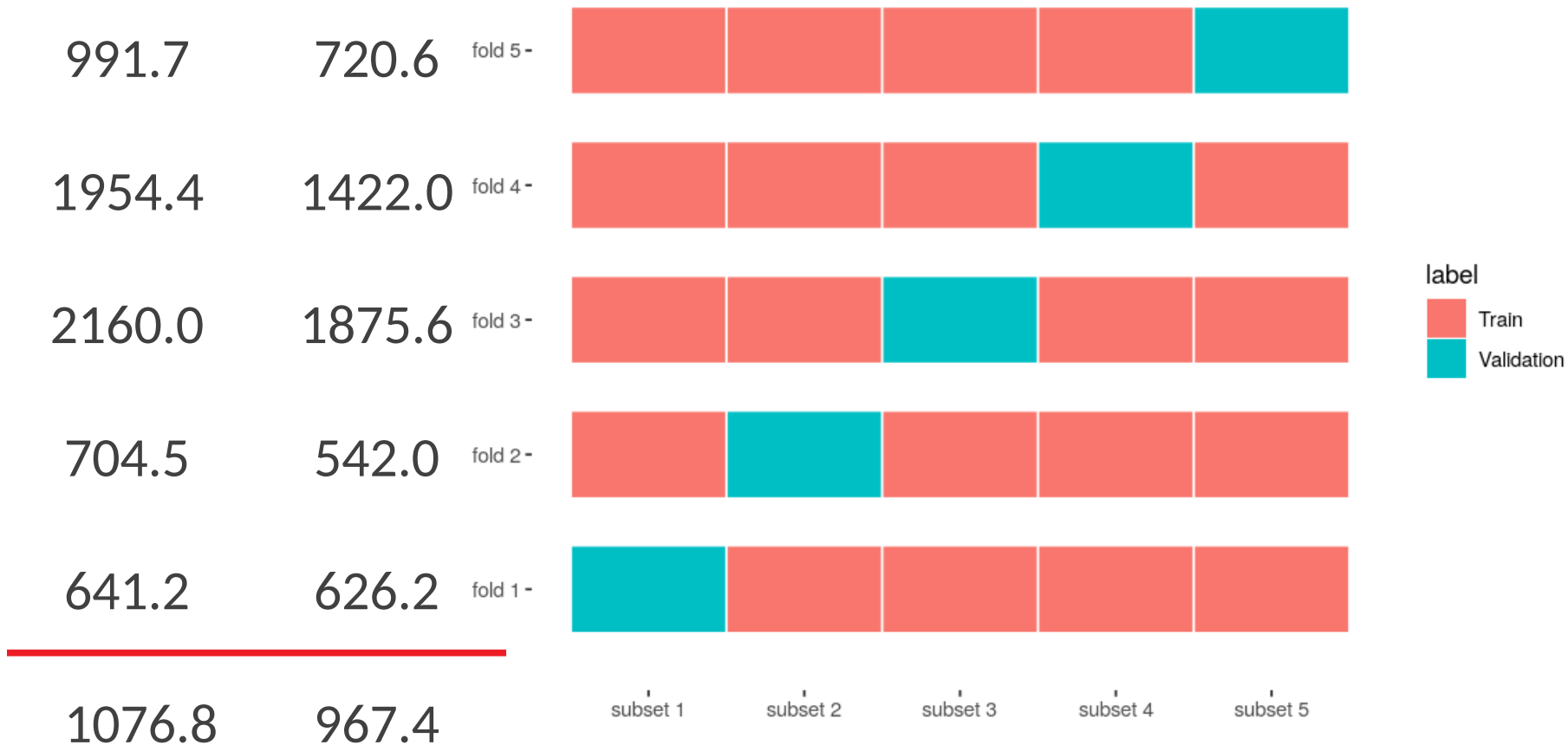smooth function.

Example

Cross-Validation

Can be used for model selection.

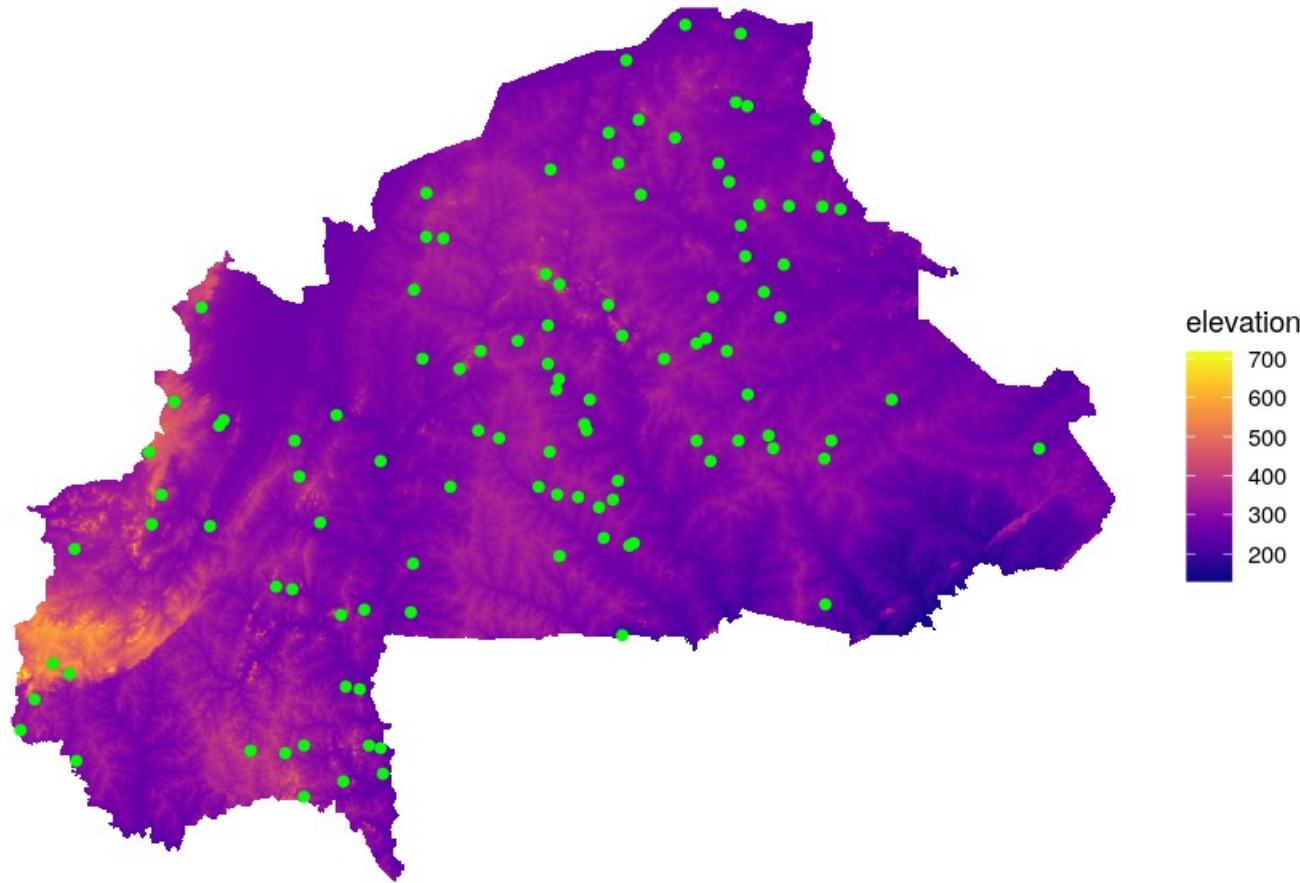Compute MSE or a different metric of performance with competing models.

Cross-Validation

MSE of competing
models

991.7	720.6	fold 5
1954.4	1422.0	fold 4
2160.0	1875.6	fold 3
704.5	542.0	fold 2
641.2	626.2	fold 1
1076.8	967.4	

label
Train
Validation

subset 1   subset 2   subset 3   subset 4   subset 5

Burkina Faso

We have
prevalence data
and elevation.

Burkina Faso

GAM with
Binomial family
and logit
transformation.