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Some issues in modelling biodiversity using spatially modelled covariates

Hideyasu SHIMADZU[1] Scott D. FOSTER[2]

[1] *Geoscience Australia*
[2] *CSIRO Mathematical Information Sciences*

Australian Government
Geoscience Australia

CSIRO

Background: Statistical models have enhanced the understanding of the relationship between biodiversity and the environment. Typically, some sort of regression analysis is performed where physical variables are covariates. It is frequently the situation that the covariates are not observed; they are spatial predictions. This study indicates that this process may bias the statistical distribution and the resulting parameter estimates if the variance of the predictions is ignored.

Motivating question: What will happen when we use the spatially modelled covariates instead of the ones exactly measured at the site?

$$\mathsf{E}\left[Y_i\right] = h\left(\boldsymbol{x}_i^\top \boldsymbol{\tau}\right), \text{ and } \mathsf{E}\left[Y_i\right] = h\left(\tilde{\boldsymbol{x}}_i^\top \boldsymbol{\tau}\right),$$

at ith observation site.