

Covariate measurement error and species distribution models: an important source of bias?

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Abstract: As is well known for linear and nonlinear regression models, covariate measurement error in species distributions models (SDMs) may lead to biased regression coefficient estimates and biased predictions (e.g., Carroll et al. 2006). However, understanding the direction and level of bias requires that the structure of measurement error is well known (e.g., Reeves et al. 1998). In particular, measurement error rarely has a simple structure: it often has a systematic component, is not additive and does not have a constant variance. Taking the example of climatic data from the Alps and northern Norway, we first describe the structure of measurement error for temperature and precipitation. We then show that bias in SDMs is likely to be much more severe for precipitation than for temperature, due to the difficulty in interpolating precipitation in mountainous areas. We finally evaluate if different methods (e.g., Reeves et al. 1998, Carroll et al. 2006) correct the observed biases of regression coefficients and predictions.

References

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