Spatial Reading Group

Optional Subtitle

February 9, 2017

Outline

Outline

First Slide Title

Optional Subtitle

- My first point.
- My second point.

Outline

Second Slide Title

- First item.

Second Slide Title

- First item.
- Second item.

Second Slide Title

- First item.
- Second item.
- Third item.

Second Slide Title

- First item.
- Second item.
- Third item.
- Fourth item.

Second Slide Title

- First item.
- Second item.
- Third item.
- Fourth item.
- Fifth item.

Second Slide Title

- First item.
- Second item.
- Third item.
- Fourth item.
- Fifth item. Extra text in the fifth item.

Preferential Sampling

The Problem

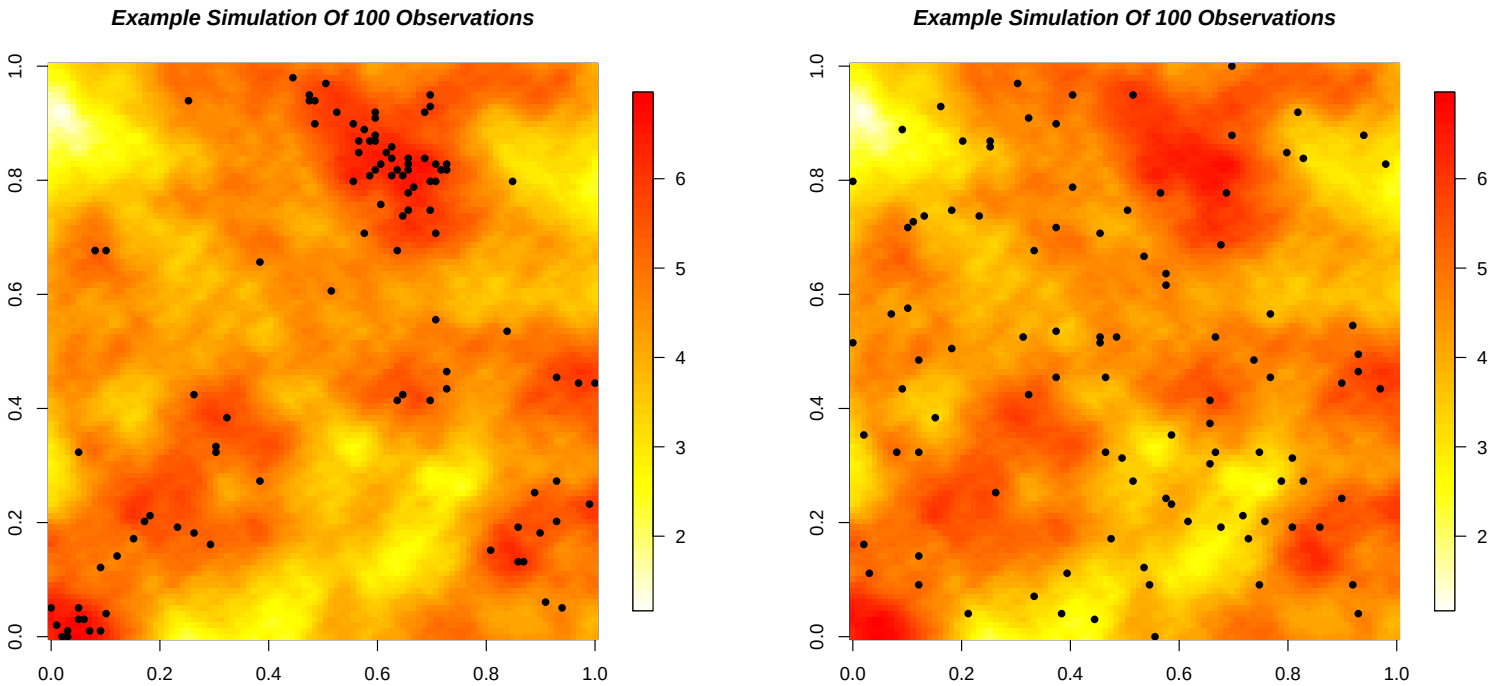
- So far we have assumed the sampling locations X are fixed, or assumed known.
- What if the sampling locations depend on the underlying field S?

Example

- Pollution data from measuring stations
- Ocean temperature data from marine mammals
- Lead concentration in Galicia (to be shown)

Preferential Sampling

Figure: Example of a single realisation of S and corresponding 100 sampling locations selected using a spatial Poisson Process with intensity $\lambda(x) = \exp(\beta S(x))$.



(a) Example of 100 preferentially sampled locations ($\beta = 2$)

(b) Example of 100 non-preferentially sampled locations ($\beta = 0$)

Preferential Sampling

Solution

- We must account for the dependence between X and S.

$$L(\boldsymbol{\theta}) = \int [X, Y, S] \, \mathrm{d}S. \tag{1}$$

- Diggle et al. 2010 - Monte Carlo
- Integrated Nested Laplace Approximation (INLA) - Joe
- Template Model Builder - Danny

Preferential Sampling

Results

Model	Parameter	Standard MLE	*TMB*
Preferential	Bias	(0.77, 1.36)	(0.41, 0.94)
Preferential	Root-mean-square error	(0.86, 1.40)	(0.60, 1.05)

Table: Comparison of approximate 95% confidence intervals for the root-mean-square errors and bias between standard MLE and *TMB* over 50 independent simulations for preferential ($\beta = 2$) at location $x_0 = (0.49, 0.49)$.

Summary

- The first main message of your talk in one or two lines.
- The second main message of your talk in one or two lines.
- Perhaps a third message, but not more than that.

- Outlook
  - Something you haven't solved.
  - Something else you haven't solved.

For Further Reading I

A. Author.
Handbook of Everything.
Some Press, 1990.

S. Someone.
On this and that.
Journal of This and That, 2(1):50–100, 2000.