

# Spatial Reading Group

## Optional Subtitle

February 7, 2017

# Outline

## First Main Section

First Subsection

Second Subsection

## Extension - Preferential Sampling

The Problem

# Outline

## First Main Section

### First Subsection

### Second Subsection

## Extension - Preferential Sampling

### The Problem

# First Slide Title

Optional Subtitle

- ▶ My first point.
- ▶ My second point.

# Outline

## First Main Section

First Subsection

Second Subsection

## Extension - Preferential Sampling

The Problem

## 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.

# Outline

## First Main Section

First Subsection

Second Subsection

## Extension - Preferential Sampling

The Problem

# Preferential Sampling

## The Problem

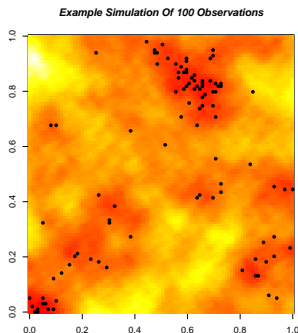
- ▶ So far we have assumed the sampling locations  $X$  are fixed, or assumed known.
- ▶ What if the sampling locations depend on the underlying field  $S$ ?

## Example

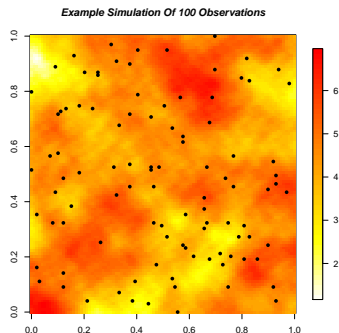
- ▶ Pollution data from measuring stations
- ▶ Ocean temperature data from marine mammals
- ▶ Lead concentration in Galicia (to be shown)

# 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  $S$ .

$$L(\theta) = \int [X, Y, S] dS. \quad (1)$$

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

# 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.