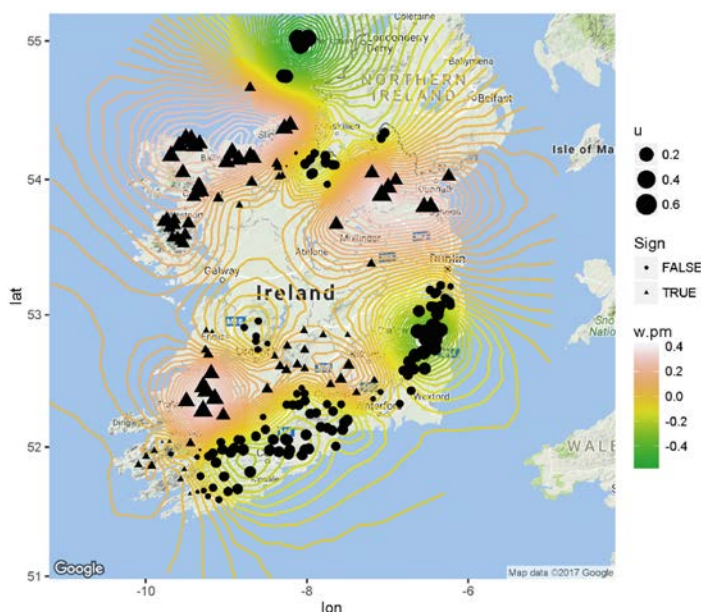


# Introduction to Regression Models with Spatial and Spatial-Temporal Correlation

Provided by: **Highland Statistics Ltd**

In cooperation with: Susan Doka & Simon Fung ([simon.Fung@dfm-mpo.gc.ca](mailto:simon.Fung@dfm-mpo.gc.ca))  
Great Lakes Laboratory for Fisheries and Aquatic Sciences (GLLFAS)  
Fisheries and Oceans Canada. 867 Lakeshore Rd, Burlington, ON



## Date & Venue

Date: Monday 28 October -  
Friday 1 November 2019

Venue: CCIW building,  
CCIW, 867 Lakeshore Rd,  
Burlington, ON, Canada

Price: 1,050 CAD + 13%  
GST

Instructors: Dr. Alain Zuur  
Dr. Elena Ieno

Authors of 11 books and  
providers of over 250  
courses

We begin with an introduction how to add dependency to regression models using frequentist tools. After discussing the limitations of this approach we switch to Bayesian techniques. R-INLA is used to implement regression models, generalised linear models (GLM) and generalised linear mixed models with spatial, temporal and spatial-temporal dependency. We will also discuss how to deal with dependency and islands and fjords.

During the course several case studies are presented, in which the statistical theory is integrated with applied analyses in a clear and understandable manner.



## KEYWORDS

Adding spatial, temporal and spatial-temporal correlation to regression models, GLMs and GLMMs using R-INLA. Introduction to Bayesian analysis. Diffuse versus informative priors. Mixed effects models with spatial/temporal dependency. Barrier models.

**COURSE CONTENT**

**Monday:**

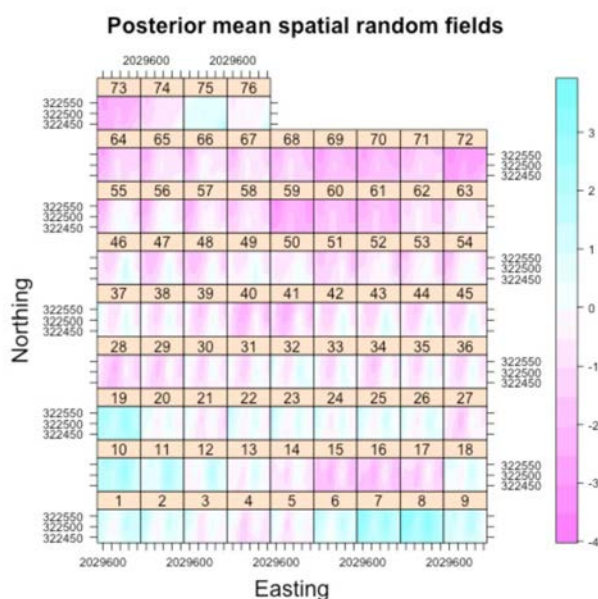
- General introduction.
- Theory presentation on options and limitations of adding dependency to a regression model using frequentist techniques: Temporal correlation, spatial correlation, mixed effects models.
- Short introduction to mixed effects models.
- Various exercises.
- Short introduction to Bayesian analysis.
- Conjugate priors.
- Diffuse versus informative priors.

**Tuesday and Wednesday:**

- Theory presentation on INLA.
- Fitting linear regression, mixed effects models and GLMs in R-INLA.
- Theory presentation on adding spatial correlation to regression models in R-INLA.
- Various exercises showing how to add spatial correlation to linear regression models, Poisson, negative binomial and Bernoulli GLMs. Solution files for applying gamma and binomial GLMs in R-INLA are provided.

**Thursday - Friday:**

- Short theory presentation on temporal correlation in R-INLA.
- One exercise.
- Theory presentation on adding spatial-temporal correlation in R-INLA.
- Various exercises showing how to add spatial-temporal correlation to GLM and GLMMs.



## GENERAL INFORMATION

### COURSE FEE: 1,050 CAD + 13% GST tax

- Credit card payments are charged in CAD currency.

### COURSE TIMES:

- Monday - Thursday: 09.00am to 16.00pm including 1 hour lunch break and a 20 minutes break both morning and afternoon.
- Friday: 09.00am to 13.00pm including a 20 minutes break.

### COURSE MATERIAL:

- Pdf files of all powerpoint presentations are provided
- The powerpoint files are based on various chapters from:
  - Zuur, Ieno, Saveliev (2017). *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA*.
  - This book is not included in the course fee. The course can be followed without purchasing this book.

### PRE-REQUIRED KNOWLEDGE:

Good knowledge of R, data exploration, linear regression, GLM (Poisson, negative binomial, Bernoulli). Working knowledge of mixed effects is recommended (though not required). This is a non-technical course. Short revisions will be provided.

### CANCELLATION POLICY:

What if you are not able to participate? Once participants are given access to course exercises with R solution codes, pdf files of certain book chapters, pdf files of powerpoint files and video solution files, all course fees are non-refundable. However, we will offer you the option to attend a future course or you can authorise a colleague to attend this course. Terms and conditions see: <http://highstat.com/index.php/courses>

### RECOMMEND LITERATURE:

- Zuur, Ieno, Saveliev (2017). *Beginner's Guide to Spatial, Temporal and Spatial-Temporal Ecological Data Analysis with R-INLA*.
- This book is exclusively available from [www.highstat.com](http://www.highstat.com)

### GENERAL

- You need to bring your own laptop.
  - Please ensure that you have system administration rights to install R and R packages on your computer.
  - Instructions what to install will be provided before the start of the course.
- You will be given access to a course website with around 20 - 25 fully worked out R exercises. These are all based on published papers and real data sets.

### REGISTRATION

<http://highstat.com/index.php/courses>  
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