

# **Bayesian Inference for Multivariate Spatial Models with R-INLA**

*Francisco Palmí-Perales<sup>1</sup>, Virgilio Gómez-Rubio<sup>2</sup>, Roger S Bivand<sup>3</sup>, Michela Cameletti<sup>4</sup>,  
Håvard Rue<sup>5</sup>,*

<sup>1</sup>Francisco.Palmi@uv.es, Department d'Economia Aplicada, Universitat de València

<sup>2</sup>Virgilio.Gomez@uclm.com, Departamento de Matemáticas, Universidad de Castilla-La Mancha

<sup>3</sup>Roger.Bivand@nhh.no, Department of Economics, Norwegian School of Economics

<sup>4</sup>Michela.cameletti@unibg.it, Department of Economics, Università degli studi di Bergamo

<sup>5</sup>Haavard.rue@kaust.edu.sa, King Abdullah University of Science and Technology

The joint analysis of different variables is continuously increasing in these day and age. Bayesian methods and software for spatial data analysis are generally now well established in the scientific community. However, multivariate spatial analysis can be computationally demanding. Thus, the main aim of this work is to show that R-INLA is a convenient toolbox to analyse different types of multivariate spatial datasets.

Interesting details such as the choice of the prior distribution and the appropriate data structure have been discussed. Additionally, three different datasets have been analysed step by step to illustrate the main goal. The chosen datasets are available in different R packages or can be downloaded from Github. The necessary code to replicate and reproduce the different examples are also available. Finally, it has been shown that R-INLA is a suitable alternative to straightforwardly analyse multivariate spatial datasets.

**Keywords:** INLA, Bayesian statistics, Multivariate spatial models