

EGU2020-8814

<https://doi.org/10.5194/egusphere-egu2020-8814>

EGU General Assembly 2020

© Author(s) 2020. This work is distributed under the Creative Commons Attribution 4.0 License.



Modelling Seismicity in California as a Spatio-Temporal Point Process Using inlabru: Insights for Earthquake Forecasting

Mark Naylor¹, Kirsty Bayliss¹, Finn Lindgren², Francesco Serafini¹, and Ian Main¹

¹University of Edinburgh, School of GeoSciences, Edinburgh, United Kingdom of Great Britain and Northern Ireland
(mark.naylor@ed.ac.uk)

²University of Edinburgh, School of Mathematics, Edinburgh, United Kingdom of Great Britain and Northern Ireland
(mark.naylor@ed.ac.uk)

Many earthquake forecasting approaches have developed bespoke codes to model and forecast the spatio-temporal evolution of seismicity. At the same time, the statistics community have been working on a range of point process modelling codes. For example, motivated by ecological applications, inlabru models spatio-temporal point processes as a log-Gaussian Cox Process and is implemented in R. Here we present an initial implementation of inlabru to model seismicity. This fully Bayesian approach is computationally efficient because it uses a nested Laplace approximation such that posteriors are assumed to be Gaussian so that their means and standard deviations can be deterministically estimated rather than having to be constructed through sampling. Further, building on existing packages in R to handle spatial data, it can construct covariate maps from diverse data-types, such as fault maps, in an intuitive and simple manner.

Here we present an initial application to the California earthquake catalogue to determine the relative performance of different data-sets for describing the spatio-temporal evolution of seismicity.