The aim of this presentation is to study the spatial distribution of different species from different perspectives and to analyse the different approaches to this problem. The goal is to better understand the relationships between species distribution, their behaviour and environmental factors.

We apply first the MaxEnt method, commonly used by ecologists, and then move to spatio-temporal models based on Gaussian processes, which have been successfully applied in other disciplines. In order to fit the bayesian model, instead of the common Markov Chain Monte Carlo (MCMC) method, we have used the novel integrated nested Laplace approximation (INLA), through the Stochastic Partial Differential Equation (SPDE) approach. This approach can be easily implemented, providing good results with less computations than MCMC. This model can be expanded to the spatio-temporal domain, including new parameters that reflect linear, nonlinear, autoregressive or more complex behaviours.

It is difficult to compare between the different approaches, but the Bayesian approach shows more flexibility, and the spatial, or the spatio-temporal, process can provide a proxy for unmeasured variables. Spatial and spatio-temporal Bayesian models are a really interesting approach for the understanding of environmental dynamics, not only because of the possibility to develop and solve more complex problems but also because of the transparent implementation.