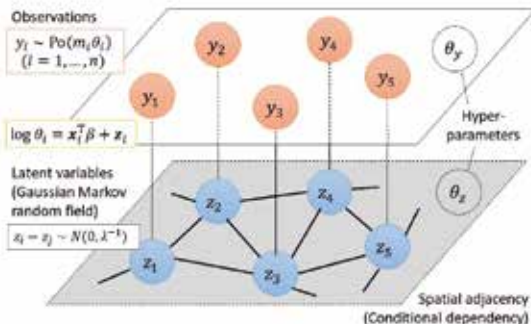## Statistical Science for environmental and life science

In modern society, we are required to have grounds for judgement in various situations. For example, in order to solve environmental issues, it is important to have calm discussions with showing scientific evidences, without being influenced by personal feelings.

The statistical science provides the most effective means of showing such grounds objectively. We wish to contribute to solving issues on environmental and life science through researches on statistical science, with making use of computer ability developing drastically.

RLRT for variance component
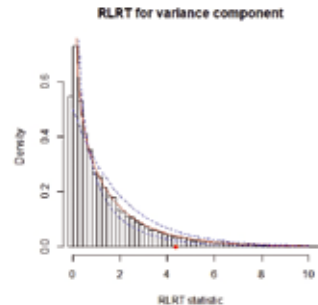
Statistical modeling and computation for analyzing environmental and epidemiological data

Spatial analysis of disease mapping data with latent Markov random field

Observations
$$y_i \sim \mathrm{Po}(m_i \theta_i)$$
$$(i = 1, \ldots, n)$$

$$\log \theta_i = x_i^T \beta + z_i$$

Latent variables
(Gaussian Markov random field)
$$z_i = z_j \sim N(0, \lambda^{-1})$$

Hyper-parameters

Spatial adjacency
(Conditional dependency)

We develop statistical models for analyzing complicated phenomena that occur in environmental and life science, such as penalized spline regression models, mixed effect models, and Markov random fields, and develop methods of selecting an optimal model.

The figure shows a graphical model for spatial analysis of disease mapping data.

■ **Prof.**
SAKAMOTO Wataru