In the first part of the talk, we will introduce spatial Gaussian processes. Spatial Gaussian processes are widely studied from a statistical point of view, and have found applications in many fields, including geostatistics, climate science and computer experiments. Exact inference can be conducted for Gaussian processes, thanks to the Gaussian conditioning theorem. Furthermore, covariance parameters can be estimated, for instance by Maximum Likelihood.

In the second part of the talk, we will introduce a class of iterative sampling strategies for Gaussian processes, called 'stepwise uncertainty reduction' (SUR). We will give examples of SUR strategies which are widely applied to computer experiments, for instance for optimization or detection of failure domains. We will provide a general consistency result for SUR strategies, together with applications to the most standard examples.