

The 2020 Statistical Science Lecture

Sally Cripps

Professor of Mathematics and Statistics
at the University of Sydney Australia

Date: Wednesday 18 November 2020

Time: 2.45 for 3pm start. Lecture is followed with refreshments.

Venue: UOW Build. 43, Room G01.

Title:

Zen and the Art of Bayesian Geology/Hydrology/Ecology

Abstract:

The rigorous quantification of uncertainty in phenomena associated with natural resources is a challenging problem, but critical for optimal decision making. Typically, data on the quantity of interest are sparse and constructing probabilistic models capable of integrating information from deterministic physical models, information from multiple sensors and other data, as well as information from expert opinion is needed to constrain the parameter space. In addition, the posterior surfaces of the model parameters are often irregular, discontinuous, and multi-modal, making the exploration of these surfaces problematic. This irregularity has a variety of sources; for example, the discretisation of continuous physical models leads to discontinuities in the posterior, the solution to the inversion problem is often genuinely multi-modal, and so forth. Exploring these posterior surfaces presents enormous computational challenges. We present a unified framework for modelling such phenomena and a methodology for accurately quantifying uncertainty. We evaluate the efficiencies of several types of proposal distributions in Markov chain Monte Carlo (MCMC) sampling schemes for two examples: (i) the three-dimensional structure and composition of a region in the Cooper Basin of South Australia, (ii) the evolution of landscapes in New Zealand.

Bio on Statistical Science Lecturer

Sally Cripps is a Professor of Mathematics and Statistics and Director of the ARC Centre in Data Analytics for Resources and Environments (DARE Centre), at the University of Sydney. Sally's research focus is the development of new and novel probabilistic models which are motivated by the need to solve an applied problem with the potential for impact. She has particular expertise in the use of mixture models for complex phenomena, modelling longitudinal data, nonparametric regression, the spectral analysis of time series, and the construction of transition kernels in MCMC schemes that efficiently explore posterior distributions of interest. Sally is also Chair of the International Society for Bayesian Analysis' section, Bayesian Education and Research in Practice.



Registration for Covid-19 requirements on campus:

<https://www.eventbrite.com.au/e/2020-statistical-science-lecture-tickets-121491374973>

Registration for the virtual event through the Statistical Society of Australia

<https://statsoc.org.au/event-4011807>

Statistical Science Lecture Web Page:

<https://niasra.uow.edu.au/news/UOW263397.html>

Campus Map

<https://maps.uow.edu.au/app/1/home/113>