

# New Challenges and Bayes: The world of computer models

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Computer models (or “simulators”), like rock and roll, are here to stay. They are numerical solutions to complex math/physical models which try to ‘mimic’ reality. Analyses using data from both computer models and field are very tricky, and abound on uncertainties that need to be quantified, transmitted and combined, and Bayes methods are ideally suited for these tasks.

In this talk, we concentrate in a natural area in which computer models fit naturally: the quantification of risks. Indeed, Because catastrophic events are fortunately rare, it is generally not appropriate to use purely statistical models for meaningful quantification of the risk of hazards. A promising approach uses computer models to simulate the phenomena under extreme conditions, thus allowing for extrapolation past the range of the data. Our proposed approach uses a combination of a state-of-the-art computer model, models for extreme events, statistical models to take into account the numerous uncertainties present, and spatial models to interpolate the output of the complex computer model at untried inputs. Uncertainties are combined through a Bayesian analysis. The methodology is exemplified for catastrophic pyroclastic flows of the Soufriere Hills Volcano on the island of Montserrat.

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