A stochastic, data-driven approach to subgrid scale modeling

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I will discuss a stochastic, data-driven approach for the representation (parameterization) of subgrid scale processes in numerical models. Unresolved processes are represented by a network of (data-inferred) Markov processes that depend on resolved model variables. The properties of these processes are estimated from data of e.g. highly resolved simulations. To keep computation and estimation straightforward, the stochastic processes take the form of small Markov chains. This approach leads to hybrid stochastic-deterministic models consisting of differential equations coupled to Markov chains.