1145-62-1702 **Fei Lu*** (feilu@math.jhu.edu). *Joint state and parameter estimation for non-linear stochastic energy balance models.*

We study the joint estimation of state and parameters of non-linear stochastic energy balance models (SEBMs) that arise in paleoclimate reconstructions of temperature. Since the data are sparse and noisy, there is large uncertainty in the estimation and we represent the uncertainty by the posterior distribution, i.e. following a Bayesian approach. We investigate particle MCMC methods for the inference. These methods combine sequential Monte Carlo methods with MCMC techniques and exploit the forward structure of the SEBM to efficiently approximate the posterior distribution. Results from a 1d example, which models global-mean temperature as a non-linear SDE, as well as from a spatially distributed version in terms of a parabolic SPDE, are presented. We focus on identifiability of model parameters within physically reasonable ranges and the ability to reconstruct the climate state from sparse and noisy observations. Joint work with Nils Weitzel and Adam Monahan. (Received September 25, 2018)