1077-35-2575 **Mickael D. Chekroun*** (mchekroun@atmos.ucla), 405 Hilgard Ave/7127 Math Sciences Bldg, Los Angeles, CA 90095-15, and **Lionel Roques**, **Michel Cristofol**, **Samuel Soubeyrand** and **Michael Ghil**. *Parameter estimation for energy balance models with memory.* Preliminary report.

We study parameter estimation for one-dimensional energy balance models with memory (EBMMs) based on given localized and noisy temperature measurements. Our results apply to a wide range of nonlinear PDEs with integral memory terms. First, we show that a space-dependent parameter can be determined uniquely everywhere in the PDE's domain, using only temperature information in a small subdomain. This result is valid only when the data correspond to exact measurements of the temperature.

We propose a method for estimating a model parameter of the EBMM using more realistic, error-contaminated temperature data derived, for example, from ice cores or marine-sediment cores. Our approach is based on a so-called mechanistic-statistical model, which combines a deterministic EBMM with a statistical model of the observation process. Estimating a parameter in this setting is especially challenging because the observation process induces a strong loss of information. Aside from the noise contained in past temperature measurements, an additional error is induced by the age-dating method, whose accuracy tends to decrease with a sample's remoteness in time. Using a Bayesian approach, we show that obtaining an accurate parameter estimate is still possible in certain cases. (Received September 22, 2011)