1106-37-1450 **Zhizhen Zhao*** (jzhao@cims.nyu.edu), Courant Institute of Mathematical Sciences, New York University, 251 Mercer Street, New York, NY 10012, and **Dimitris Giannakis** (dimitris@cims.nyu.edu), Courant Institute of Mathematical Sciences, New York University, 251 Mercer Street, New York, NY 10012. *Analog Forecasting with Dynamics-Adapted Kernels.* Preliminary report.

We introduce a suite of forecasting methods which improve traditional analog forecasting (Lorenz, 1969) by combining ideas from state-space reconstruction in dynamical systems and kernel methods developed in harmonic analysis and machine learning. The first improvement is using Taken's delay-coordinate maps to recover information in the initial data lost through partial observations. Then weighted ensembles of analogs are chosen according to similarity kernel in delay-coordinate space featuring an explicit dependence on the dynamical vector field generating the data. The eigenvalues and eigenfunctions of such kernels define diffusion coordinates and a diffusion distance on the data manifold, giving better estimation of the nearest neighbors than Euclidean distance, especially in noisy observation environments. As a result, forecasts based on the kernel-weighted ensembles have significantly higher accuracy than the conventional approach. We include several approaches for constructing the kernel weighted forecast and illustrate these techniques in applications to forecasting in a low-order deterministic model for atmospheric dynamics with chaotic metastability, and interannual-scale forecasting in the North Pacific sector of a comprehensive climate model and observations. (Received September 13, 2014)