1096-VL-1071 **Thomas Bellsky*** (bellskyt@asu.edu), Arizona State University, School of Mathematical and Stat. Sciences, Physical Sciences, A-Wing, P.O. Box 871804, Tempe, AZ 85287-1804. *Reduced uncertainty by targeting observations with the Kalman filter.*

We demonstrate that targeting observations with various Kalman filter data assimilation techniques can significantly reduce analysis uncertainty for both linear and nonlinear dynamical systems. First, we investigate the traditional Kalman filter for a linear model, and prove an explicit formula for the analysis uncertainty, which describes the update to the analysis uncertainty with $m$ observations as $m$ rank-one corrections. Additionally, we show that increasing the number of observations will always reduce analysis uncertainty. Next, we provide numerical results for two nonlinear model problems of potential meteorological interest. These numerical results demonstrate that the local ensemble transform Kalman filter (LETKF) with targeted observations based on largest ensemble variance is more skillful in reducing analysis uncertainty than the LETKF with randomly located observations. (Received September 12, 2013)