1176-49-213 **Youssef Qranfal***, 550 Huntington Ave, Boston, MA 02115, and **Sam Pimentel**. *Data Assimilation? Apply Kullback-Leibler Divergence.*

Data assimilation is typically framed as a problem of minimizing an objective function of weighted L_2-norms. This objective function has two terms; the first includes the model-observation differences and the second is a regularizer involving an a priori estimate of the state. In this work we explore the use of an alternative "metric" for both residual minimizer and regularizer, namely the Kullback-Leibler divergence (or cross-entropy "distance"). Within this framework we formulate a Kullback-Leibler divergence based data assimilation approach. We present two iterative algorithms for minimizing functionals involving additive weighted Kullback-Leibler divergence terms. Simple numerical examples are used to demonstrate the application of the methods and comparisons are made to standard data assimilation approaches. We find that the Kullback-Leibler data assimilation method is computationally efficient and can naturally embed a constraint. These algorithms are shown to hold potential for data assimilation applications in geophysical fluid problems where we are interested in time-varying variables of large-scale systems and where physical constraints and computational resources present challenges. (Received January 23, 2022)