1107-37-264 **D. Sanz-Alonso*** (d.sanz-alonso@warwick.ac.uk), **A. M. Stuart**, **A. Shukla** and **K. J.H. Law**. *Analysis of the 3DVAR Algorithm for Chaotic Systems and Implications for the Filtering Distribution.*

Predicting the state of a chaotic signal whose initial condition is slightly uncertain is problematic even in short time intervals. The question arises as to whether the initial uncertainty can be kept small in the infinite time horizon by using sufficiently frequent, but noisy and partial, observations of the system. We will show that, despite its simplicity, the 3DVAR filtering algorithm successfully tracks the signal for a range of chaotic systems; our analysis includes the Lorenz 63 and 96 models, as well as the 2D Navier Stokes equation. The initial analysis requires the observational noise to have bounded support. We will then introduce a modified 3DVAR algorithm for which we can prove similar results for any sufficiently small noise, removing the assumption of bounded support. We conclude by showing that these desirable properties of 3DVAR-like filtering algorithms can be used to establish properties of the true filtering distribution itself. Understanding the true filtering distribution is helpful in the design of algorithms to approximate it, and hence the analysis of the true filtering distribution is not only of theoretical interest, but also potentially of practical use. (Received January 17, 2015)