1125-35-1089 **Vincent R. Martinez*** (vmartin6@tulane.edu), Tulane University, Mathematics Department, 424 Gibson Hall, New Orleans, LA 70118, and **Animikh Biswas**, **Michael S. Jolly**, **Eric J. Olson** and **Edriss S. Titi**. *Analytical studies for a Data Assimilation Algorithm: Surface data, Higher-order synchronization, and Time-averaged measurements.*

This talk will discuss recent studies in a data assimilation algorithm proposed by Azouani, Olson, and Titi. The algorithm exploits the finite-dimensionality of the dynamics of certain dissipative equations for which "determining quantities" exist, e.g. knowledge of sufficiently many Fourier modes of the solution for all time determines all higher modes asymptotically in time. By collecting a sufficient amount of such quantities, one can then define an algorithm to produce an approximating solution that converges to the reference solution corresponding to the collected data asymptotically in time and at an exponential rate. In this talk, we will discuss several joint works with A. Biswas, M.S. Jolly, E.J. Olson, and E.S. Titi in which we investigate the topologies that the synchronization takes place, its ability to accommodate the more physical case of time-averaged observables, and studies that support the idea that for vertically-constrained flows, one need only assimilate data collected at the boundary to synchronize the approximating flow with the reference flow in the domain's interior. In these works, we use the 2D Navier-Stokes and 2D subcritical surface quasi-geostrophic equations as our main examples. (Received September 14, 2016)