1152-35-435 **Aseel Farhat** (afarhat@fsu.edu), **Evelyn Lunasin*** (lunasin@usna.edu) and **Edriss S. Titi** (titi@math.tamu.edu). *Methods for Prediction and Control of Complex Systems.*

I will introduce a continuous data assimilation (downscaling) algorithm for the two-dimensional Navier-Stokes equations employing coarse mesh measurements of only one component of the velocity field. This algorithm can be implemented with a variety of finitely many observables: low Fourier modes, nodal values, finite volume averages, or finite elements. Using a similar type of data assimilation algorithm one can recover the exact full reference solution (i.e. velocity and temperature) of the 3D Planetary Geostrophic model, at an exponential rate in time, by employing coarse spatial mesh observations of the temperature alone. This provides a rigorous justification to an earlier conjecture of Charney which states that temperature history of the atmosphere, for certain simple atmospheric models, determines all other state variables of the system. (Received September 09, 2019)