Ensemble methods for variational data assimilation and forecasting

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This talk provides an insight in the use of ensemble method within two important steps of numerical weather prediction system: data assimilation scheme and high resolution model forecasts.

First, we discuss two approaches of ensemble method that can be employed within a variational framework: a Monte Carlo approach and a dynamical based reduced rank approach. The former method attempts to provide an estimation of the background error covariance matrix using an huge ensemble of random states evolving with the dynamics. The latter method takes advantage of chaotic dynamical properties. It focuses the assimilation onto the unstable subspace of the system that is span by only a few directions.

Second, we propose how to better use outputs of high resolution numerical model outputs, creating meteorological objects. Such objects are defined from texture feature in place of the grid point values.