

# Boosting performance in Machine Learning of Turbulent and Geophysical Flows via scale separation

*mercredi 22 janvier 2020 16:30 (25 minutes)*

Recent advances in statistical learning have opened the possibility to forecast the behavior of chaotic systems using recurrent neural networks. In this letter we investigate the applicability of this framework to geophysical flows, known to be intermittent and turbulent. We show that both turbulence and intermittency introduce severe limitations on the applicability of recurrent neural networks, both for short term forecasts as well as for the reconstruction of the underlying attractor. We test these ideas on global sea-level pressure data for the past 40 years, issued from the NCEP reanalysis dataset, a proxy of the atmospheric circulation dynamics. The performance of recurrent neural network in predicting both short and long term behaviors rapidly drops when the systems are perturbed with noise. However, we found that a good predictability is partially recovered when scale separation is performed via a moving average filter. We suggest that possible strategies to overcome limitations should be based on separating the smooth large-scale dynamics, from the intermittent/turbulent features.

**Auteur principal:** FARANDA, Davide (Davide)

**Orateur:** FARANDA, Davide (Davide)

**Classification de thématique:** ML algorithms : Machine Learning development across applications