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Learning-based strategies for the modeling and reconstruction of dynamical systems

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Data-driven strategies for the modeling and reconstruction of dynamical systems emerge as promising alternatives to classical model-driven frameworks, especially when dealing with computationally-demanding models and modeling uncertainty. Data-driven strategies provide novel means to benefit from large-scale observation and/or simulation datasets.
In this talk, we will review data-driven representations of dynamical systems and their applications to the resolution of inverse problems (data assimilation). The focus will be given to analog and neural network representations and address applications to high-dimensional systems. Besides numerical experiments for chaotic systems, we will illustrate applications to the reconstruction of sea surface dynamics from satellite observations.

Some references:
R. Lguensat, P. Tandeo, P. Aillot, R. Fablet. The Analog Data Assimilation. Monthly Weather Review, 2017.
R. Fablet, P. Viet, R. Lguensat. Data-driven Methods for Spatio-Temporal Interpolation of Sea Surface Temperature Images. IEEE Trans. on Computational Imaging, 2017.
R. Lguensat, P. Viet, M. Sun, G. Chen, F. Tenglin, B. Chapron, R. Fablet. Data-driven Interpolation of Sea Level Anomalies using Analog Data Assimilation. https://hal.archives-

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