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# Neural Partial Differential Equations for Simple Climate Models

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When predicting complex systems such as parts of the Earth system, one typically relies on differential equations which can often be incomplete, missing unknown influences or higher order effects. By augmenting the equations with artificial neural networks we can compensate these deficiencies. The resulting hybrid models are also known as universal differential equations. We show that this can be used to predict the dynamics of high-dimensional chaotic partial differential equations, such as the ones describing atmospheric dynamics, even when only short and incomplete training data are available. In a first step towards a hybrid atmospheric model, simplified, conceptual atmospheric models are used in synthetic examples where parts of the governing equations are replaced with artificial neural networks. The forecast horizon for these high dimensional systems is typically much larger than the training dataset, showcasing the large potential of the approach.