



Offline Data Assimilation of Pseudo-time-averaged observations into a Regional Climate Model

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Simulation of climate of the past using Regional Climate Models (RCMs) is a challenging approach due to their high computational costs and dependency of such models on their driving General Circulation Model (GCM). Using a very cheap Data Assimilation (DA) approach, we assimilate the pseudo-time-averaged observation into an RCM. The sensitivity of state-of-the-art high resolution RCMs to the initial conditions is highlighted. Pseudo-observations are assimilated within an ensemble of RCM simulations using an “offline” approach, where the ensemble members differ in boundary and initial conditions. We conclude that the “offline” DA is promising for creating high resolution analysis quantities. This method can be applied to improve the climate model simulation estimates constrained by available observations, especially for the time-averaged observations (proxies) and the long-term paleo-climate simulations. Given the computational costs of RCMs, previous studies using the time-slice simulation method could conduct only a single climate run which can not provide a sophisticated measure of uncertainty and is only one random draw of infinite possible climate states. In this study, we will introduce the basics of offline DA in an ensemble of RCM simulations and test the performance of this method.