



On nudging time optimization in regional climate modelling: application to the Mediterranean basin

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A regional climate model (RCM) is driven by the ERA-40 reanalyses produced by the ECMWF general circulation model (GCM) to simulate the winter 1998 climate over the Mediterranean basin. In this paper, we consider the effects on internal variability of temporal nudging. This technique consists in relaxing the RCM's prognostic variables towards the GCM values within a predetermined time scale, with the aim of disallowing large and unrealistic departures between driving and driven fields. To interpret the significant effect of time nudging on the regional climate prediction, we develop a "toy model" basically consisting in resolving a linear transport equation with a Newtonian relaxation term. This model predicts the existence of an optimal nudging time which depends on the time scale over which numerical errors affect significantly the accuracy of the "regional" solution at the large spatial scales, and the typical time scale of the small-scale phenomena that are not resolved by the "GCM".