Ref: 301/1754

Oral

Investigating RCM's internal variability using an ageing tracer

Philippe Lucas-Picher[1], Daniel Caya[2], René Laprise[1], Ramon de Élia[2] and Sébastien Biner[2]

[1]Université du Québec à Montréal, Montréal, Québec, Canada (e-mail: picher@sca.uqam.ca)
[2]Ouranos Consortium, Montréal, Québec, Canada

Regional climate models (RCMs) have been used for more than a decade to generate small-scale regional climate features that cannot be obtained by general circulation models (GCMs). To provide high-resolution climate information on their limited area domains, RCMs need information at their boundaries, which usually comes from GCMs or reanalyses. This information controls the RCMs simulations. The degree of constraint of the lateral boundary forcing on a RCM simulation depends on the domain size and the flow regime. In spite of this control, the RCM solution yields a certain level of internal variability. Therefore, differences in the RCM circulations are possible for a given set of lateral boundary condition (LBC). RCM simulations launched with small differences in their initial conditions, but fed by the same set of LBC, will diverge one from another leading to different states after few days.

In this work, pairs of simulations with the Canadian RCM started with different initial conditions for various domain sizes were realized. Statistical analysis of the simulations shows that lateral boundary forcing is less effective as the domain expanded, increasing the internal variability. An attempt is made to investigate the cause of this dependence. With this objective, an ageing tracer is used to measure the residency time of the atmospheric parcels into the limited area domain. This tool can serve to determine the flow regime properties and to evaluate in a certain way the degree of constraint by the lateral boundary information on the RCM simulation. In this perspective, a relation between the residency time and the RCM's internal variability is sought.