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# Impact of lateral boundary conditions on regional analyses

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Regional and global climate models are usually validated by comparison to derived observations or reanalyses. Using a model in data assimilation results in a direct comparison to observations to produce its own analyses that may reveal systematic errors. In this study, regional analyses over North America are produced based on the fifth-generation Canadian Regional Climate Model (CRCM5) combined with the variational data assimilation system of the Meteorological Service of Canada (MSC). CRCM5 is driven at its boundaries by global analyses from ERA-interim or produced with the global configuration of the CRCM5. Assimilation cycles for the months of January and July 2011 revealed systematic errors in winter through large values in the mean analysis increments. This bias is attributed to the coupling of the lateral boundary conditions of the regional model with the driving data particularly over the northern boundary where a rapidly changing large scale circulation created significant cross-boundary flows. Increasing the time frequency of the lateral driving and applying a large-scale spectral nudging improved significantly the circulation through the lateral boundaries which translated in a much better agreement with observations.