



Offline validation of Community Land Model v4.0: A case study for Toulouse (France) and Melbourne (Australia)

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The latest version of the Community Land Model v4.0 (CLM4.0) is extended with an urban canopy model of which several of the parameterizations of the model are based on those from the Town Energy Balance model (Masson, 2000). The urban land use module in CLM4.0 is simple enough to be compatible with structural, computational and data constraints of a land surface model coupled to a global climate model, yet complex enough to enable exploration of physically-based processes known to be important in determining urban climatology. Before the model is used in an online regional climate model setting, this study demonstrates offline simulations for 2 different sites: Toulouse (France) and Melbourne (Australia). These cities are good cases to study contrasting city planning, as Australia has done great efforts to increase usage of roof materials with high albedo values, which is in large contrast to the old West-European cities such as Toulouse.

Simulations are performed for the period February 2004 to February 2005, driven by meteorological boundary conditions of atmospheric wind, temperature, specific humidity, precipitation and solar and longwave radiation provided by the measurement site in Preston (Melbourne) and Toulouse (CAPITOUL). Flux measurements from the urban flux towers in both sites provide the necessary invaluable evaluation dataset. In this way, the strengths and weaknesses of the urban module in clm4.0 can be quantified. Furthermore, as urban characteristics do play an important role in considering e.g. the urban heat island phenomenon, the sensitivity of CLM4.0 with respect to the urban properties such as e.g. spatial extent, urban morphology, and thermal and radiative properties of building materials is demonstrated.