Geophysical Research Abstracts
Vol. 15, EGU2013-9744, 2013
EGU General Assembly 2013
© Author(s) 2013. CC Attribution 3.0 License.

Idealised large-eddy-simulations of thermally driven flows over complex terrain: model comparison and averaging methods

Johannes Wagner, Alexander Gohm, Daniel Leukauf, and Christian Posch
Innsbruck, Institute of Meteorology and Geophysics, Innsbruck, Austria (johannes.wagner@uibk.ac.at)

In this study thermally driven flows in complex terrain are examined. The WRF model is used to perform large-eddy-simulations of a heated valley-plain topography and to investigate the impact of the valley geometry on vertical exchange processes. Typical up-valley and up-slope winds develop in the warming valley atmosphere. The simulation results are compared to another LES-study, which uses the ARPS model for the same domain set-up (Schmidli, J., in preparation). Both models agree well in the averaged and resolved scale turbulent flow structures and in the heating of the valley atmosphere. This indicates that the different dynamic cores of both models are able to produce similar turbulent flows. As the definition of an averaging operator in complex terrain is not trivial, a special focus is set on the spatial and temporal averaging of the turbulent flow and the computation of resolved scale turbulent fluxes. The used averaging operator is dependent on both space and time. In order to obtain optimum averaging intervals, a spectral analysis of the turbulent flow is done. The results show that more than 99% of the power spectrum energy of the flow is contained in eddies with time periods larger than two minutes. If the sampling interval is set greater than 5 minutes, less than 95% of the turbulent energy is captured. A recommendation for optimal sampling and averaging intervals will be given.