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Forecasting the weather
- ensemble techniques
in probabilistic weather prediction

Large eddy simulation of atmospheric boundary layer flow over heterogeneous terrain: Surface Temperature Transition

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Predicting the spatial distribution of surface fluxes of momentum, sensible heat and water vapor over heterogeneous surfaces is one the main open issues in hydrology and atmospheric sciences. Understanding land-air exchange requires detailed knowledge of turbulence over a wide range of spatial and temporal scales, and the complexity of such flows makes it difficult to obtain all the needed information through field experiments alone, and often necessitates high resolution eddy resolving numerical studies.
In this study, large-eddy simulation (LES) with a scale dependent dynamic SGS model is used to simulate turbulent flows over heterogeneous terrain. Surface heterogeneity is added to the simulation in the form of streamwise transitions in surface temperature. The effect of surface heterogeneity on the average surface heat flux and stress for neutral, stable and convective boundary layers is assessed. The growth of thermal internal boundary layer (IBL) after transitions for different stability conditions is analyzed and compared with the available analytical formulations. In addition, the validity of the similarity theory for estimating of surface fluxes in heterogeneous terrain will be discussed in detail.