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**Uncertainty Quantification for atmospheric flows: natural terrain and urban area applications** CLARA GARCÍA-SÁNCHEZ, von Karman Institute for Fluid Dynamics / Antwerp University / Columbia University, CATHERINE GORLÉ, Civil & Environmental Engineering, Stanford University — Modeling Atmospheric Boundary Layer (ABL) flows is an important concern for a wide range of applications, including the assessment of air quality and wind energy resources. The complexity of these ABL flows, whether in urban areas or over natural terrain, still poses a challenge for Reynolds-averaged Navier-Stokes models. In the present research, the effect of uncertainties in the inflow boundary conditions on the prediction of the flow patterns is investigated, considering two test cases for which field measurements are available: the Askervein Hill experiment (natural terrain) and the Joint Urban 2003 campaign (urban environment). The uncertainty in the inflow boundary conditions is represented by three uncertain parameters, and a non-intrusive polynomial chaos method is used to propagate these uncertainties to the quantities of interest, namely the prediction of the velocity at the locations of the different measurement stations. The results highlight some differences between ABL flows over natural terrain and those in an urban environment, in particular regarding the influence of the different uncertain parameters on the prediction of the velocity field. The implications for evaluating the effect of inflow uncertainties in these different types of ABL flows will be discussed.

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