Dispersion of a passive scalar around Gaussian hills in the atmospheric boundary layer simulated with LES and stochastic modeling.
SERGE SIMOENS, IVANA VINKOVIC, Ecole Centrale de Lyon/UMR CNRS 5509, France, CESAR AGUIRRE, Universidad Nacional de Entre Rios, Argentina — Because of environmental concerns, considerable attention has been given to the prediction of concentration levels downwind of polluting sources. A large Eddy-Simulation (LES) with a Smagorinski/Germano subgrid scale (SGS) model was used to simulate the velocity field of an atmospheric boundary layer (ABL) with Gaussian hills at the surface. The LES was combined with a Lagrangian stochastic model in order to simulate dispersion of a passive scalar released at various locations with respect to the hills. The first case studied is used to validate both the computation of the velocity and concentration fields. The second case shows the behavior of fluid particles carrying the scalar around the relief of the hill. Vertical and horizontal profiles of velocity and concentration are shown upwind and downwind of the hills. The recirculating zone downwind of the hill is of particular interest. The potential of such an approach for more complex simulations of real pollution sites will be discussed.

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