



Supplement of

The spatiotemporal evolution of atmospheric boundary layers over a thermally heterogeneous landscape

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S1 Large-Scale Forcing Sensitivity Study

MicroHH LES applies the large-scale forcing of the LES through applying advection and geostrophic wind to the outside of the domain. Furthermore, one can nudge the domain average to modeled/observed values of θ , q , and the wind velocity components u and v . We show a selection of the sensitivity cases that were done to best capture the LIAISE LES case in this chapter. Table S1 summarizes the experiments in order of large-scale forcing coming mainly from the ERA5 reanalysis (Hersbach et al., 2020) to coming mainly from observations. In these cases, all initial conditions and nudging come from the radiosondes from Els Plans fallow field. The large-scale forcing components are included via the method from van Stratum et al. (2023).

Figs. S1 and S2 show the resulting profiles averaged over the wet and dry landscape scales compared with observations from the radiosondes launched at La Cendrosa alfalfa and Els Plans fallow fields respectively.

Table S1. An overview of select LIAISE sensitivity studies for the large-scale forcing imposed on the LES domain. The observations (OBS) used in the initial conditions and nudging came from the hourly Els Plans radiosondes. The calculation of the advection terms was described in Mangan et al. (2023). Large-scale forcing terms from ERA5, including geostrophic wind and advection terms were computed with the LS2D python package (van Stratum et al., 2023).

Experiment Name	Initial Conditions	Geo Wind	Advection	Nudging
EEEE	ERA5	ERA5	ERA5	ERA5
OEEE	OBS	ERA5	ERA5	ERA5
OEE-	OBS	ERA5	ERA5	-
O-E-	OBS	-	ERA5	-
O-O-	OBS	-	OBS	-
OEO-	OBS	ERA5	OBS	-
O-OO	OBS	-	OBS	OBS

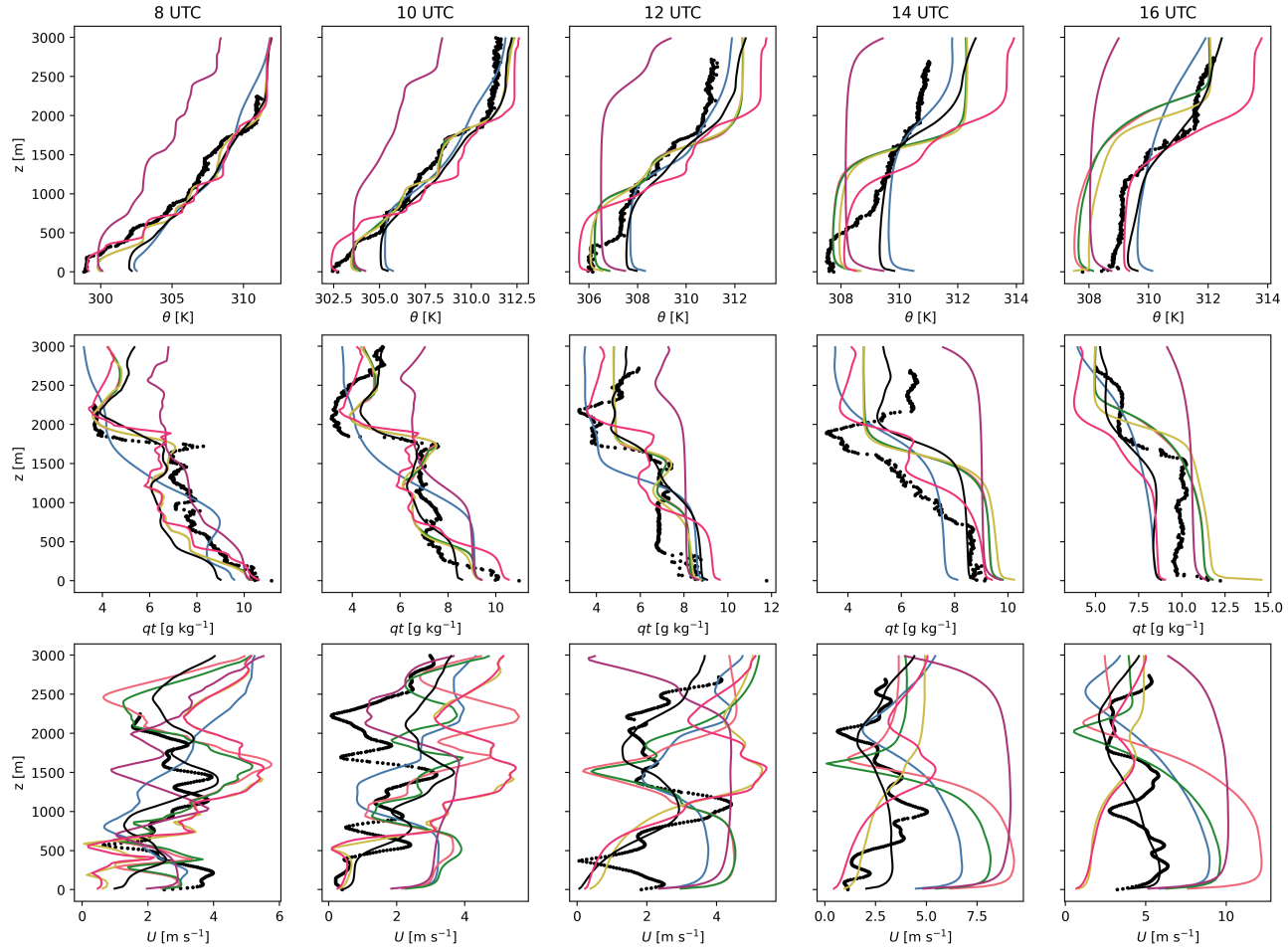


Figure S1. Profiles of sensitivity cases for the LIAISE LES experiments for times 8-16 UTC for the wet landscape (model) and radiosonde observations from La Cendrosa alfalfa (dots). Observational data is from 21 July 2021. Top row is potential temperature, middle row is specific humidity, and bottom row is wind speed. The cases and case names are found in Table S1.

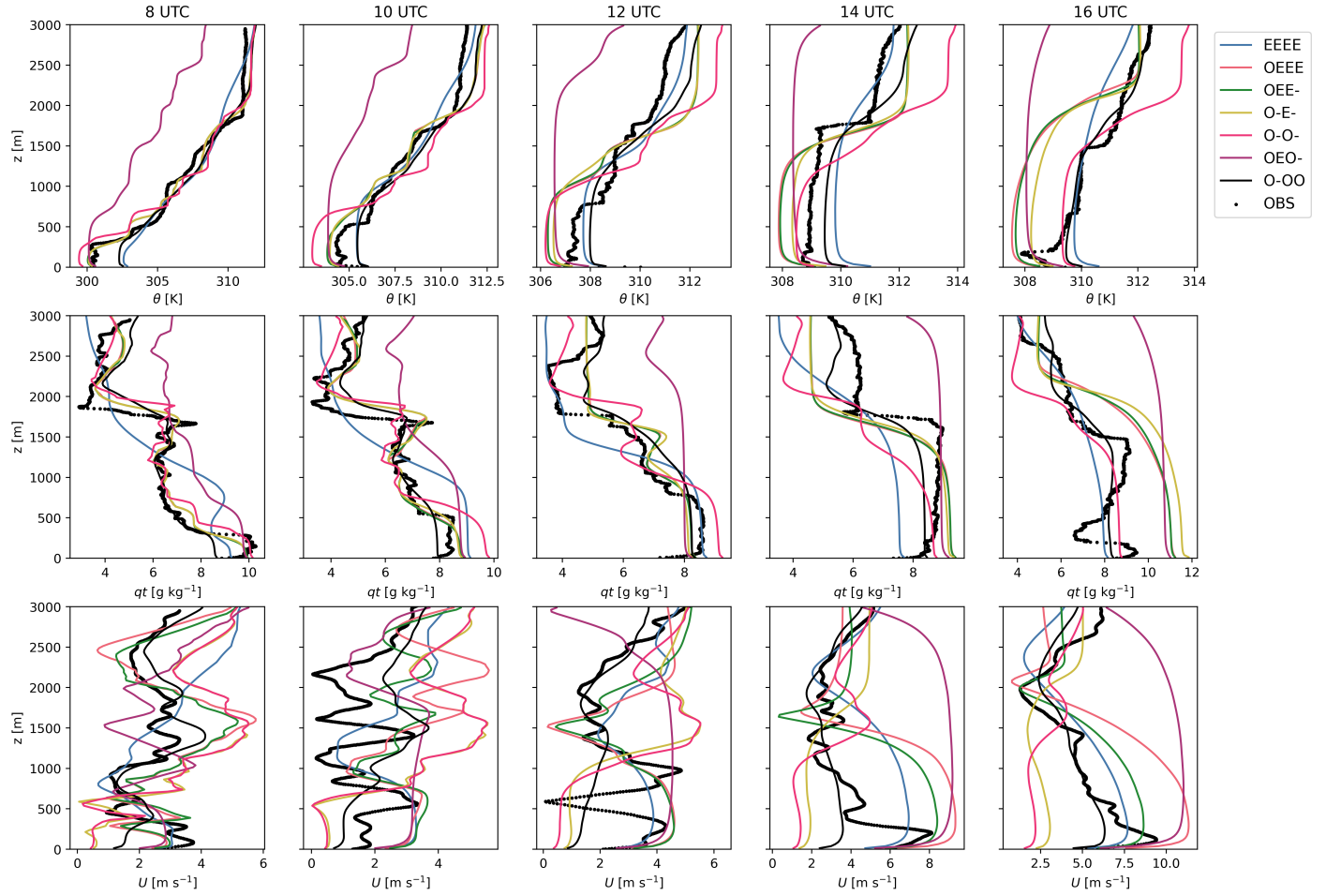


Figure S2. Profiles of sensitivity cases for the LIAISE LES experiments for times 8-16 UTC for the dry landscape (model) and radiosonde observations from Els Plans fallow (dots). Observational data is from 21 July 2021. Top row is potential temperature, middle row is specific humidity, and bottom row is wind speed. The cases and case names are found in Table S1.

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