

These data have been obtained using the MicroHH solver (<https://github.com/microhh/microhh> - van Heerwaarden et al. 2017, *Geoscientific Model Development, Copernicus GmbH*, **2017**, 10, 3145-3165). The file names indicate the Reynolds number (Re=...). The second parameter is either 10x SC=... (Neumann boundary conditions for buoyancy) or 1000x Rb=... (Dirichlet boundary conditions for buoyancy). The label 'run.' Refers to multiple runs of the same type with different initial conditions. The label 'init=' refers to the initialization. 'flux' means a Dirichlet case started from a weakly stratified case with Neumann boundary conditions. 'VSBL' means a Neumann case started from a strongly stratified case with stronger surface cooling.

The dataset contains profiles of 50-80 statistical quantities (velocities, Reynolds stresses, turbulent budget terms) describing the mean flow (up to 4rd order). The units are based on a length scale  $h$  (half-height of the domain) and a velocity scale  $U_0$  (driving velocity). They were obtained each  $dt=h/U_0$  by horizontally averaging the flow field. Below the quantities included are listed, e.g. 'b4' refers to  $\langle b'^4 \rangle$ , 'b2\_visc' to the viscous transport term in the  $\langle b'^2 \rangle$  budget. The detailed description of each quantity is included as attribute in each file.

'iter'	'b4'	'vw_turb'	'bw_rdstr'
't'	'ugrad'	'u2_diss'	'bw_buoy'
'z'	'vgrad'	'v2_diss'	'bw_pres'
'zh'	'bgrad'	'w2_diss'	'w2_pres'
'area'	'uw'	'tke_diss'	'tke_pres'
'areah'	'vw'	'uw_diss'	'uw_pres'
'u'	'bw'	'vw_diss'	'vw_pres'
'v'	'udiff'	'u2_visc'	'u2_rdstr'
'w'	'vdiff'	'v2_visc'	'v2_rdstr'
'b'	'bdiff'	'w2_visc'	'w2_rdstr'
'p'	'uflux'	'tke_visc'	'uw_rdstr'
'p2'	'vflux'	'uw_visc'	'vw_rdstr'
'pw'	'bflux'	'vw_visc'	
'pgrad'	'ke'	'w2_buoy'	
'u2'	'tke'	'tke_buoy'	
'v2'	'u2_shear'	'uw_buoy'	
'w2'	'v2_shear'	'vw_buoy'	
'b2'	'tke_shear'	'b2_shear'	
'u3'	'uw_shear'	'b2_turb'	
'v3'	'vw_shear'	'bw_shear'	
'w3'	'u2_turb'	'bw_turb'	
'b3'	'v2_turb'	'b2_visc'	
'u4'	'w2_turb'	'b2_diss'	
'v4'	'tke_turb'	'bw_visc'	
'w4'	'uw_turb'	'bw_diss'	