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Large-Eddy Simulation of the sea breeze over a Mediterranean peninsula

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Many mesoscale thermally induced atmospheric motions may be regarded as the result of the presence of gravity currents. For example, as the sea/land breeze forms near the coast, the head of the marine boundary layer intrudes into the inland ambient air, and the temperature stratification changes with the same time scale as that of the sea/land breeze itself.
The sea-breeze circulation is a complex phenomenon that can be modified by many processes such as the synoptic forcing, the shape of coastline, the presence of orography, the turbulence and the cloud cover. A realistic simulation of the sea-breeze would require a model that can simulate the mesoscale sea-breeze circulation together with the small scale turbulent convective boundary layer that is developed over the heated land.
A powerful tool for investigating the physics and dynamics of the changing gravity currents in the atmosphere is the large-Eddy Simulation (LES) numerical model. It defines three-dimensional meteorological fields with high-enough resolution (of the order of few tents of m) in the lowest few kilometers of the PBL and it may be used to examine separately a whole range of atmospheric parameters. The model is able to reproduce the required horizontal inhomogeneity in surface heat flux and drag coefficients as well as the turbulent eddies in the Planetary Boundary Layer.
Nonlinear interactions between the sea breeze and the convective turbulence overland are examined and preliminary results discussed.