Chair: Physics of Fluids Group

Wind farms in Stratocumulus-Topped Boundary Layers

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Description

This is a Master thesis which studies the interaction between wind farms and large scale clouds, in particular Stratocumulus Clouds (SC), which are the most common clouds on Earth, and which are still poorly understood. The study will be performed using our Large Eddy Simulation code, which has been extensively used in our group to study wind farms in neutral and convective boundary layers, and the simulations will be run on EU supercomputers.

At the beginning of this project and in collaboration with the supervisors, the student will delve into the physics of SC from both physical and numerical perspectives. Then, simulations will be performed to study the effects of SC on wind farms. The specific focus of the thesis will be jointly determined in this phase and personal insights and suggestions will be highly encouraged and appreciated throughout the whole project.

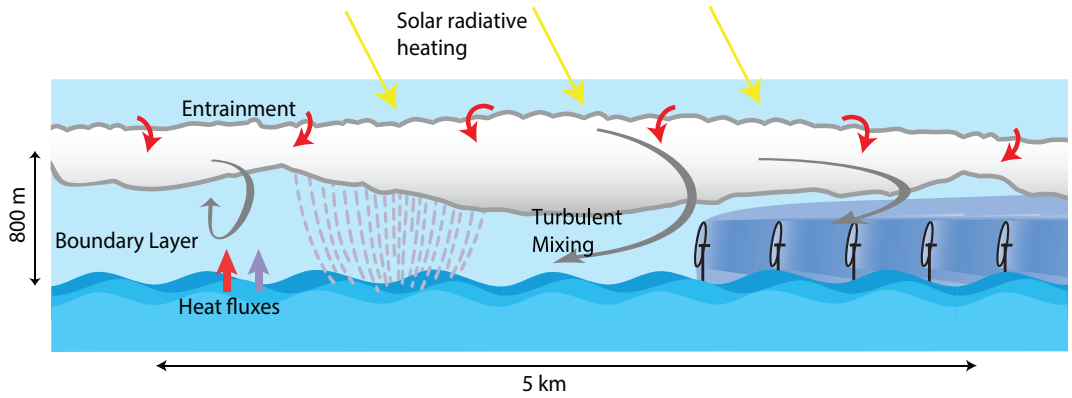

Figure 1: Sketch of the STBL. Adapted from Wood, Mon. Weather Rev., 2012.

Suggested readings

- Mellado, J.P., *Cloud-Top Entrainment in Stratocumulus Clouds*, Annual Review of Fluid Mechanics, 2017.
  DOI: https://doi.org/10.1146/annurev-fluid-010816-060231.
- Wood, R., *Stratocumulus Clouds*, Monthly Weather Review, 2012.
  DOI: https://doi.org/10.1175/MWR-D-11-00121.1.
- Paul Veers et al., *Grand challenges in the science of wind energy*, Science, 2019.
  DOI: https://doi.org/10.1126/science.aau2027.