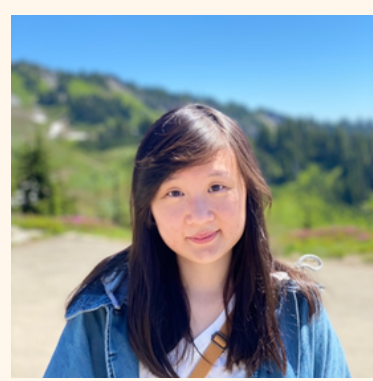


October 12, 2023

Measuring, Modeling, and Mimicking Atmospheric Turbulent Processes



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ABSTRACT:

Atmospheric turbulence is at the core of many weather phenomena such as rain, fog, storms, and tornadoes, as well as numerous biological interactions such as the dispersion of pollen, tracking of odors, and predator-prey behavior. Despite its ubiquity, the role of turbulence in these atmospheric surface layer (ASL) processes remains unclear, largely due to the complexity of the ASL and the wide range of temporal and spatial scales present. Resolving all these scales continues to be a daunting challenge to field and laboratory settings and to numerical simulations. To address this issue, I present a new pipeline of measurement platforms and experimental facilities that are tailored for capturing, replicating, and modeling atmospheric turbulent processes. First, I detail a unique and economically scalable measurement system leveraging nano-scale sensors that was deployed over the salt flats of Utah, and show that the resulting data allowed for an examination of high Reynolds number turbulent boundary layer processes. Then, I show that relevant fog-turbulence interaction mechanisms are uncovered by the “super combo probe,” where for the first time simultaneous velocity and temperature measurements were made down to the microscales in the field. Lastly, I detail the design of an active grid with individually controlled paddles that aims to mimic atmospheric features in controlled laboratory settings.

BIOGRAPHY:

Kelly Huang is joining the University of Houston as an assistant professor of Mechanical Engineering. Her research focuses on investigations of the turbulent processes that drive the atmospheric surface layer and the development of novel and high-resolution sensing techniques. Prior to arriving at UH, Prof. Huang had a postdoctoral appointment at the University of Notre Dame and received her PhD in Mechanical and Aerospace Engineering at Princeton University, where she received the NDSEG Fellowship, the Engineering Council’s Excellence in Teaching Award, and first prize at the department Bake-Off. Prof. Huang grew up in Sugar Land and is excited to be back in Houston with her partner and two cats.