ACINN Graduate Seminar, Innsbruck University
Location: Seminar Room on the 8th Floor of Bruno-Sander-Haus (60819SR)
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Investigating spatial heterogeneity of thermal circulations and turbulence in complex terrain

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Spatial heterogeneity of the earth's surface is a complexity that confounds both measurement and modeling of the atmospheric boundary layer, particularly at scales ranging from about a meter to several hundreds of meters. In this presentation, I will discuss several studies designed to investigate different aspects of surface-layer heterogeneity. In the first part of the presentation, I will present a proposal for a new method using infrared thermal imagery to compute spatially varying surface sensible heat fluxes. Preliminary validation of the technique has been performed using data taken over the very flat desert playa in western Utah, U.S.A. as part of the Mountain Terrain Atmospheric Modeling and Observations (MATERHORN) field program. While the desert surface is extremely smooth and uniform aerodynamically, there is significant near-surface soil moisture and surface temperature variability that plays an important role in the distribution of surface sensible heat fluxes. In the second part of the presentation, I will discuss results from the KASCADE (KAtabatic winds and Stability over CAdarache for Dispersion of Effluents) 2017 experiment, which was conducted in southeastern France (Cadarache) during winter 2017 with the overarching objective of improving prediction of dispersion in complex terrain during stable atmospheric conditions. The Cadarache Valley is embedded in the larger Durance Valley drainage system leading to multi-scale flow interactions. During the winter, winds are light and stably stratified leading to thermal circulations as well as complex near-surface atmospheric layering that impacts dispersion of contaminants. For this campaign, the general aim has been to use a large number of horizontally distributed sensors to improve our understanding of the spatial and temporal development, evolution and breakdown of topographically and thermally driven flows. The presentation will provide an overview of the experiment and characterization of the spatially variability of temperatures, winds, humidity and associated turbulence statistics.

Biography

Eric Pardyjak is a professor in the Department of Mechanical Engineering (ME) and an adjunct professor in the Department of Atmospheric Sciences at the University of Utah. He received a PhD in ME at Arizona State University in 2001. He worked in the Energy and Environmental Analysis Group at Los Alamos National Laboratory as a postdoctoral

researcher from 2000-01. From 2009-2010, he was a visiting professor at École Polytechnique Fédérale de Lausanne working in the Laboratory of Environmental Fluid Mechanics and Hydrology studying slope flows in the Swiss Alps. He is currently a visiting professor at Paul Sabatier Université working in the Laboratoire d'Aérologie at the Atmospheric Research Center in Lannemezan, France studying dispersion in complex terrain. His research interests include the study of turbulence in complex environmental flows (e.g., urban and mountain terrain) using experimental and computational approaches.