

Date: April 25

Time: 11:00 AM

Location: Ames 234

Speaker: Dr. H.J.S Fernando
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Title: "Urban Fluid Mechanics: Air Circulation and Pollution Dispersion in Cities "

Abstract

Most of the world's cities are located in areas replete with mountains, valleys and escarpments (the so-called complex terrain airsheds), and airflow in these regions is characterized by up-valley and up-slope flow during the day and down-valley and down-slope winds at night. The down slope/valley winds strongly interact with stably stratified nocturnal boundary layers of cities, leading to important flow phenomena signified by instabilities, waves and turbulence that profoundly influence the dispersion of contaminants in urban areas. The transition from up to down slope/valley winds in the evening is also complex, and involves localized wave and mixing phenomena. The available atmospheric boundary layer models do not predict stably stratified periods with a reasonable accuracy nor do they adequately describe flow during the evening transition period, pointing to the inadequacy of the mixing parameterizations used in these models. The results of a combined field observational, laboratory, theoretical and numerical modeling program to understand the slope and valley circulation of urban airsheds will be presented, and the role of waves and turbulence in determining the air quality of complex terrain cities will be described.