March 29 Prof. Emeritus George Shaw, Union College. “Earth’s earliest atmosphere and surface, a new-old view.” The conventional wisdom about the composition of Earth’s early atmosphere conflicts with several lines of geological evidence: a lack of carbonate rocks; intense weathering of the oldest rocks; the long delay in surface oxygenation following the advent of oxygen-generating photosynthesis; the early carbon isotope record; and the difficulty of producing enough organics to lead to the emergence of life. These inconsistencies disappear if Earth’s earliest degassing contained copious reduced gases together with a surface environment rich in organics. Not only is this approach more consistent with the likely source of volatiles and the processes of early degassing, but it also solves the long-standing 'Faint Young Sun' problem. The gradual and slow evolution of the chemistry of Earth’s surface leads logically to the present highly oxidized state.

April 5 Prof. Volker Mohnen, Professor & Director Emeritus, ASRC, University at Albany. “Atmospheric Sciences: an "anecdotal" overview of its evolution and future outlook.” All scientific disciplines and certainly Atmospheric Sciences have basic and applied aspects. Basic scientists seek to discover new knowledge without primary concern for subsequent application. Applied science takes existing information and uses it to solve a problem. "Blue sky research" is scientific research in domains where "real world " applications are not immediately apparent (curiosity driven science, serendipity, etc.). Proponents of this mode of Science argue that unanticipated scientific breakthroughs are sometimes more valuable than the outcomes of agenda-driven research. Because of the inherently uncertain return on investment, blue-sky projects are politically and commercially unpopular. The emerging need for GLOBAL assessments (e.g., protection of the ozone layer) heralded a new focus-- namely science-driven AND policy-driven impact statements in response to international concerns. The Supersonic Transport Controversy (SST) is one of the first knowledge-based challenges resolved. Numerous other examples will be discussed in the presentation.

April 12 Prof. Kendra Smith-Howard, University at Albany, SUNY. “Antibiotics in American Agriculture: Understanding the Sources of an Emerging Public Health Problem”. Since 1945, antibiotics have come to play a central role to animal agriculture. Eighty percent of the nation’s antibiotics are consumed in farms and feedlots, by animals—not by humans. While scientists have expressed concerns about bacterial resistance to the drugs from their introduction to agriculture, use of antibiotics has increased sharply alongside these concerns. Why did farm audiences turn to antibiotics, and how has their incorporation of the drugs into widespread use? Providing some comparisons between the pathway by which veterinary drugs reach human and animal patients, this talk will discuss some of the often-ignored social and cultural forces that have shaped use of antibiotics in veterinary settings.

April 19 Dr. Robert Banta, NOAA Earth System Research Lab., Boulder CO. “Lidar Remote Sensing, Wind Energy, and Boundary-Layer Meteorology: Ingredients for Improving Weather Forecasting and Modeling.” For lead times more than a few hours, better weather forecasts require better current weather prediction (NWP) models. A major obstacle to improved models is at the upper levels of the atmospheric boundary layer (ABL) that cannot be conveniently measured by instrumented towers. Two developments over the past decade have the potential to overcome this obstacle: the availability of commercial Doppler lidars, and advancements in the design and development of wind energy systems. The lidar provides the capability to obtain high-quality wind measurements aloft several times per hour over a region of landscape. The latter provides a strong financial incentive for accurate data and forecasts, in the layer 150-400 ft. swept by wind turbine rotor blades. This region is weakly connected to the surface during much of the day, making standard surface measurements less useful. This talk will feature examples of the kind of vertical structure and time evolution of flow structures provided by Doppler lidar, and real-time results from two commercial Doppler lidars now operating in the DOE/NOAA-sponsored Second Wind Forecast Improvement Project in central Oregon and Washington.

April 26 Dr. Ralf Staebler, Environment and Climate Change Canada, Toronto. “Atmospheric Processes Research in the Arctic.” The Arctic environment is, in contrast to its tough appearance, actually a finely balanced system that is easily perturbed, as has been made clear by rapidly changing average temperatures and sea ice cover in recent decades. But because of the logistics and costs involved in conducting measurements in this harsh, remote environment, our scientific understanding of atmospheric processes specific to the Arctic is full of holes. This lecture will cover some of the research the Air Quality Research Branch at ECCC has done in the last decade to investigate such processes, with the objective of strengthening our capacity to predict future changes. Subtopics will include ozone and mercury chemistry at the atmosphere / sea ice interface, intricacies of turbulent mixing in the lower Arctic troposphere, black carbon deposition onto ice and snow, and the effect of increasing ship traffic on the air quality in Arctic communities.

May 3 Prof. Otávio Acevedo, Federal University of Santa Maria, Brazil. “Turbulent and non-turbulent flow in the stable boundary layer: observations and modeling.” Understanding the stable boundary layer is essential not only to improving climate models but also in understanding nocturnal transports of CO₂, a key element of global climate change research. The focus of this talk will be on the interactions between turbulence and non-turbulent modes of the flow. The transition between fully turbulent (coupled) and intermittent (decoupled) of the stable boundary layer will be discussed in terms of vertical profiles of mean quantities and of the budgets of turbulent kinetic energy and heat flux. Efforts to reproduce these transitions using simplified computer schemes will be presented. Observations of the distinct roles of turbulent and non-turbulent flow structures for canopy-atmosphere interaction taken at new tower sites in the Amazon forest will be highlighted.

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