Distinguished Alumni Award Presentation

Jim Fleming

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The Emergence of Atmospheric Science

Hosted by ATS Department

Friday, April 17, 2015

ATS room 101; Discussion will begin at 11:15am
Refreshments will be served at 11:00am in the weather lab

Atmospheric researchers have long attempted to untie the Gordian Knot of meteorology — that intractable and intertwined tangle of observational imprecision, theoretical uncertainties, and non-linear influences — that, if unravelled, would provide perfect prevision of the weather for ten days, of seasonal conditions for next year, and of climatic conditions for a decade, a century, a millennium, or longer. This big picture history examines the first six decades of the twentieth century, from the dawn of applied fluid dynamics to the emergence, by 1960, of the interdisciplinary atmospheric sciences. Using newly available archival sources, it documents the work of three interconnected generations of scientists. Vilhelm Bjerknes initiated a neo-Laplacian program — to measure atmospheric conditions with sufficient accuracy and to calculate the future state of the weather with sufficient precision using the equations of hydrodynamics and thermodynamics. Falling short of analytic solutions to the non-linear equations of atmospheric motion, he founded the Bergen school of meteorology, where graphical methods prevailed. His protégé, Carl-Gustaf Rossby, established the graduate schools of meteorology at M.I.T., Chicago, and Stockholm that focused on upper-air dynamics and, after 1947, on atmospheric environmental issues. Rossby identified upper-air planetary waves as the keys to long-range forecasting, treating them as idealized cases suitable for computation by digital computers. Rossby's student Harry Wexler and his colleagues prepared the foundations for the emergence of the interdisciplinary atmospheric sciences and introduced a number of transformative technologies into meteorology including radar, nuclear tracers, digital computers, sounding rockets, and weather satellites, that helped cut into, if not through, the Gordian Knot. In 1960, using a simple computer and a simple, but profound, non-linear model, Edward Lorenz introduced chaos theory into meteorology and demonstrated that the forecasting "knot," if it even existed, could never be untied, at least not by mortals. The atmospheric sciences are still coming to terms with this limitation.

The Emergence of Atmospheric Science will be published by M.I.T. Press in 2015.

Link to colloquium videos and announcement page: http://www.atmos.colostate.edu/dept/colloquia.php