



Graduate School of Information Science, University of Hyogo 18th International Research Seminar

GROWTH OF CLOUD DROPLETS IN NATURAL AND LABORATORY CLOUDS: THE ROLE OF CLOUD TURBULENCE

Wed. 15 Oct. 2025 (13:00 ~ 14:00) JST

IN-PERSON/ONLINE SEMINAR

Formation of precipitation in warm (ice-free) clouds involves both diffusional and collisional growth of cloud droplets. For both, cloud turbulence has been argued to play an important role. In this talk, I will review recent research in this area and show how cloud turbulence can explain observed features of natural and laboratory clouds. For the diffusional growth of cloud droplets, the focus will be on droplet growth in adiabatic (i.e., undiluted) cloud volumes. The focus on such regions is justified by observations and numerical modeling showing that rain and drizzle formation is typically initiated in undiluted and weakly diluted cloud volumes. At the same time, however, in-situ aircraft observations show that droplet spectra in such regions are often significantly wider than predicted by a simple adiabatic ascent from the cloud base. Observed spectral broadening in a laboratory cloud chamber featuring turbulent moist Rayleigh-Bénard convection will also be used to argue about the key role of cloud turbulence in shaping droplet size distributions. For the collisional droplet growth, the key mechanism of rain formation in natural ice-free clouds, computational studies applying turbulent collision kernel can explain observed rapid onset of precipitation in natural clouds.

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<https://shorturl.at/jRXjx>

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Guest Speaker



Wojciech W. Grabowski

Senior Scientist Emeritus,
National Center for Atmospheric
Research, Colorado, USA



Dr. Wojciech Grabowski is a Polish-American cloud physicist. He obtained his MSc and PhD degrees in Poland (from the University of Warsaw's Physics Department and Polish Academy of Sciences, respectively) in the 1980ies. He moved to the National Center for Atmospheric Research (NCAR) in 1987 after receiving a prestigious NCAR's Advanced Study Program Postdoctoral Fellowship. He has been at NCAR since then, most recently as a Senior Scientist (since 2005) at the Mesoscale and Microscale Meteorology Laboratory. He retired in 2025 and is now NCAR Senior Scientist Emeritus. His main areas of interest include computational fluid dynamics and numerical modeling in general, and more specifically modeling of cloud dynamics and microphysics, interactions of clouds with radiation and surface processes, and representation of these processes in numerical models of small-scale dynamics, weather and climate. He obtained habilitation [a post-PhD degree, equivalent of the Doctor of Science (DSc)] from the Institute of Geophysics, Polish Academy of Sciences, Warsaw, Poland, in 1999. In 2013 he received the title of Professor of Physical Sciences of the Republic of Poland. He was a member of the Committee on Cloud Physics of the American Meteorological Society between 1995 and 1998, and a member of the International Commission on Clouds and Precipitation between 2000 and 2008. He is a Fellow of the Royal Meteorological Society and of the American Meteorological Society. Dr. Grabowski published close to 200 papers in atmospheric science journals and similar number of papers in conference proceedings. His papers attracted close 15,000 citations (H=63). He served as a member of editorial boards for the Quarterly Journal of the Royal Meteorological Society (2001-2008), Atmospheric Science Letters (2000-2011), Journal of the Atmospheric Sciences (2006-2019), and the Journal of Advances in Modeling Earth Systems (JAMES, 2008-2011).

For more details:

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