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UNIVERSITÀ DEGLI STUDI DELL'AQUILA

DSFC Dipartimento di Scienze Fisiche e Chimiche

I SEMINARI DEL CETEMPS

New particle formation and size-resolved particle microphysics: Implications for human health, climate forcing, and climate intervention.

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State University of New York at Albany

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Aula 0.5, edificio «Alan Turing» (Coppito 0)
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ABSTRACT

New particle formation (or nucleation), the molecular process that drives the formation of new particles in the nanometer size range, is a key source of atmospheric particles. Nanoparticles that grow to the sizes of cloud condensation nuclei contribute to the aerosol indirect radiative forcing of the climate system as well as air pollution. Exposure to high concentrations of ultrafine particles can lead to adverse health effects. In this presentation, I will describe several nucleation theories and a sized-resolved (sectional) advanced particle microphysics (APM) model developed by my research group and their applications. The APM model has been integrated into GEOS-Chem, WRF-Chem, and CESM2-CAM. We are also in the process of coupling APM with CMAQ. For the nucleation theories, I will focus on our recently developed kinetically-based H2SO4-H2O-NH3 ternary ion-mediated nucleation (TIMN) that agrees well with CLOUD laboratory measurements. For the APM model, I will summarize its key features and applications to a number of research topics, including particle formation and growth in the atmosphere, ultrafine particles and their health impacts, aerosol radiative forcing, development of machine learning algorithms to improve global climate models, and recently emerging issues related to climate intervention and aviation non-CO2 climate impacts.

BIO

Dr. Fangqun Yu has been a tenured faculty member and research professor at the State University of New York at Albany. He got his bachelor's and master's degrees from Peking University (1991) and the Chinese Academy of Sciences (1994) and earned his Ph.D. from the University of California at Los Angeles (1998). Current research projects include new particle formation, aerosol-cloud-climate interactions, health effects of ultrafine particles and co-pollutants, climate intervention, and aviation non-CO2 climate impacts. He has published about 175 peer-reviewed scientific journal papers with a Google Scholar h-index of 54.