



# Indian Institute of Technology Kanpur Chandrakanta Kesavan Lecture Series



Mar 17, 2023 (Friday)



12:00-1:00PM



DJ-306  
Diamond Jubilee

**Speaker : Dr. Ram Ramaswamy**

## **Climate Change: Lessons from the Past for the Future Temperature and Hydrologic Impacts**

### **About the Talk**



Theory and mathematical modeling indicate that radiative forcings by natural and human-influenced emissions over the past century have perturbed the atmosphere and surface radiation balance. The natural (solar irradiance, volcanic aerosols) and anthropogenic (well-mixed and short lived greenhouse gases, tropospheric aerosols, land-use) factors have together altered atmospheric composition, forcing changes in the surface and atmospheric heating. This results in perturbations to the thermodynamic budget, large-scale dynamics, temperature and precipitation. We use the NOAA/ Geophysical Fluid Dynamics Laboratory global climate models, including the most recent one (CM4) used for the World Climate Research Program Coupled Model Intercomparison Project (CMIP6), to investigate the response of the climate system to these forcings. We make use of the 20 - year satellite Earth Radiation Budget measurements and CMIP6 datasets to infer the role of forcings and feedbacks in the observed Earth's heat imbalance including explanations of observed climate trends. Anthropogenic aerosols have counteracted greenhouse gas effects to a significant extent in terms of radiative forcing, temperature, and precipitation, particularly in the Asian context. The manner in which this comes about is diagnosed through the effects upon atmospheric circulation, surface heat and moisture budgets. The thermodynamic and dynamical changes are significant for the occurrence of weather and hydrologic extremes driven by climate forcings. The 21st Century impacts in response to future emissions scenarios of greenhouse gases and aerosols will be discussed, including the consequences for continental, oceanic and coastal regions.

### **About the Speaker**

Dr. Ram Ramaswamy is Director of NOAA Oceanic and Atmospheric Research's Geophysical Fluid Dynamics Laboratory (GFDL), located in Princeton, NJ. Ram received his B. Sc. and M. Sc. degrees in Physics from Delhi University, and Ph. D. in Atmospheric Sciences from the State University of New York at Albany. He was a postdoctoral Fellow in the Advanced Study Program at the National Center for Atmospheric Research in Boulder. Ram joined GFDL in 1985, and was a Senior Technical (highest scientific rank in the US Federal system, 2000-2008), before becoming Director of GFDL and joining the Senior Executive Service. He is also a Lecturer with the rank of Professor in the Atmospheric and Oceanic Sciences Program at Princeton University where he teaches a graduate course in atmospheric physics and mentors students and postdocs. His principal interests are numerical modeling of the Earth System, and understanding of climate forcings, feedbacks, and responses using models and observations. Ram directs one of the world's premier climate modeling centers, addressing the NOAA mission to develop and apply numerical models for predicting and projecting global-to-regional climate. Applications with GFDL models touch upon a wide range of climate extremes and impacts of policy and societal concerns e.g., hurricanes, droughts, floods, sea-level rise, heat waves.

Ram has served on the Intergovernmental Panel on Climate Change (IPCC) Working Group I scientific assessments (1992-2021) and the Joint Scientific Committee of the World Climate Research Program (2003-2010). He is an author or co-author of over 180 peer-reviewed papers. He was co-chair of the Panel on Climate Variability and Change, Decadal Survey for Earth Science and Applications from Space (National Research Council, 2016-2017). Ram is a Fellow of the American Meteorological Society (AMS), American Geophysical Union (AGU), American Association for the Advancement of Science, and the American Physical Society. He was a member of the IPCC team that was co-awarded the 2007 Nobel Peace Prize with Al Gore. He is a recipient of AGU's Charney Lecture, AMS' Rossby medal and Houghton award, the Distinguished Executive Presidential Rank award, and three-time recipient of the WMO Norbert Gerbier MUMM International award. <https://www.gfdl.noaa.gov/v-ramaswamy/>

**Zoom Link :** <https://iitk-ac-in.zoom.us/j/95203655917?pwd=K0RLeVYvSHNCTEp4LzM3ZkFSTndPQT09>

**Meeting Id :** 952 0365 5917

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## **Organised By**

**Chandrakanta Kesavan Center for Energy Policy and Climate Solutions**

**Department of Sustainable Energy Engineering**