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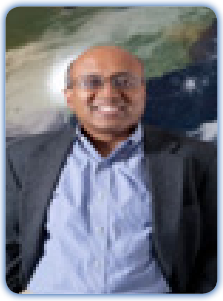

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The earth's variable and changing climate system: Past to present to future

The Earth's climatic system comprises the components of atmosphere, oceans, land and ice. The processes occurring in the system and the interactions across the components, yields the climate as we know it. Climate comprises an array of variables, with the most commonly known and experienced temperature at all heights in the atmosphere and depths in the ocean and precipitation including vapor, liquid and solid forms. These are linked to factors such as atmospheric composition in the form of gases, aerosols and clouds, winds at different altitudes in the atmosphere, salinity in the oceans, land-surface vegetation and soil features, ice on the surface of the land and oceans and marine and terrestrial ecosystems. Observations from different platforms, together with mathematical modeling governed by laws of physics and chemistry, form the basis of a robust understanding of the Earth's climate system. In the Industrial era (since 1860), human influences such as emissions of well-mixed greenhouse gases and aerosols have affected the planet's climate, competing with or even dominating over periods the natural drivers of climate change such as solar irradiance changes, volcanic eruptions and internal variability. Observations over the 20th century reveal that several climate variables of direct interest to society have undergone substantial changes e.g., temperature, rainfall and sea-level. Using the NOAA/GFDL state-of-the-art global climate model, numerical simulations of climate change are conducted. These results enable us to analyze the mechanisms that have forced changes in climate. The degree to which the observed phenomena and changes in temperature and rainfall over the different continents can be explained constitutes an advance of the frontiers of knowledge. The detection and attribution of climate changes over the past century establish the foundation for making credible projections of climate e.g., forecasting the extremes and/or shifts in climate over the 21st century including characterization of uncertainties.

Biography

Venkatachalam Ramaswamy is the Director of NOAA's Geophysical Fluid Dynamics Laboratory (GFDL) and Professor in the Atmospheric and Oceanic Sciences Program at Princeton University. He has completed his PhD in Atmospheric Sciences from the State University of New York at Albany. His research interests are the mathematical modeling of the global climate system, advancing the understanding of atmospheric physics and chemistry and investigating the climatic variations and changes due to natural and human-influenced factors. He directs one of the world's premier climate research and modeling centers with the goal to develop advanced numerical models for understanding weather and climate. He has published over 160 papers on atmospheric sciences and climate in refereed journals and has been a lead author on several international and national scientific assessments e.g., Intergovernmental Panel on Climate Change (IPCC). He was a Member of the IPCC team and was a co-recipient of the 2007 Nobel Peace Prize.

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