

3rd International Conference on Geology & Earth Science

April 10-11, 2019 Valencia, Spain

Frontiers of Geosciences: Atmospheric Science and Climate

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The emissions of greenhouse gases due to human influences has caused perturbations in the Earth system, initiating major changes in the greenhouse effect, atmospheric circulation and leading to global warming. Other factors such as atmospheric aerosols and land-use change also due to human activity, along with changes in solar radiation and volcanic eruptions causing aerosol increases, have also affected the planetary heat balance. In this presentation, we discuss how each of the natural and anthropogenic factors has contributed to alteration of the Earth system from global to continental to regional scales. We also discuss feedbacks due to the atmosphere and ocean in climate variations and change. The climate variables of particular interest for societal impacts are temperature, precipitation and weather extremes. We use state-of-the-art numerical models of the climate system, together with observations drawn from multiple platforms (surface, satellite and aircraft). We analyze the key drivers over the 20th century, the impacts they have generated and the unresolved issues. We then explore the impacts that are expected in the 21st century. In the context of both the 20th and 21st centuries, we discuss the impacts expected due to global warming and the significance of the resulting atmospheric and climate change for extremes in weather e.g., heat waves, tropical storms, sea-level rise, forest fires, droughts, excess rainfall. This brings to the fore the connection between the scientific understandings of global warming based on rigor and the manner in which climate change impacts society, including that arising due to the nonstationary behavior of the changes.

Biography:

Dr. Ramaswamy is Director of NOAA's Geophysical Fluid Dynamics Laboratory and Professor in the Atmospheric and Oceanic Sciences Program at Princeton University. His research interests are the mathematical modeling of the global climate system and advancing the understanding of the physics and chemistry of the atmosphere. He directs one of the world's premier climate research and modeling centers, developing advanced numerical models for understanding and predicting weather and climate. Ram has been a lead author on the major scientific assessments and was a member of the Intergovernmental Panel on Climate Change team that was a co-recipient of the 2007 Nobel Peace Prize.