भौतिक अनुसंधान प्रयोगशाला, अहमदाबाद

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46_PRL Ka Amrut Vyakhyaan

Wednesday, 15 June 2022

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"A Historical Journey to Discover the Mysteries of Air"

Prof. Guy Brasseur

Max Planck Institute for Meteorology, Hamburg, Germany

and

National Center for Atmospheric Research, Boulder, CO.

https://youtu.be/p9T-Tqiv6Jg

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Title: "A Historical Journey to Discover the Mysteries of Air"

Speaker: Prof. Guy Brasseur

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Abstract

The ancient Greeks, who based their view of the world on four elements (earth, water, fire, and air), considered air to be a neutral, inseparable, and weightless element. With the revival of the scientific method at the Renaissance, after a long period of obscurantism, substantial progress was made. The atmospheric pressure was measured, the first laws of hydrodynamics were established following Newton's approach; the fundamentals for science-based weather forecasts were gradually developed. At the same time, the first steps were made to identify the chemical nature of air. The theory of "phlogiston" dominated the discussions between "pneumatic chemists." Brilliant minds including Black, Becher, Stahl, Scheele, Cavendish, Priestley, and finally Lavoisier made the first experimental investigations that explained combustion and respiration. The 18th century with the chemical revolution initiated by Lavoisier, and the 19th century, with the discovery of ozone by Schönbein, highlighted the chemical complexity attached to air. The concept of "greenhouse gases" was introduced to explain climate change during the 20th century. Research since the 1950s emphasized the presence of a multitude of minor constituents and the role of the atmosphere in sustaining life. Since 1970, the atmosphere has been viewed as a photochemical reactor. Today, air pollution has become a crucial problem with severe detrimental impacts on people's health. Space observations, surface measurements, and modeling are tools that should help us to provide pure air to all citizens of the world.

The Speaker

Prof. Guy P. Brasseur was educated at the Free University of Brussels, Belgium, where he earned two engineering degrees: one in physics (1971) and one in telecommunications and electronics (1974). He obtained his Ph.D. degree in 1976 at the same University but completed the work at the Belgian Institute for Space Aeronomy. Between 1977 and 1981, he served as an elected member of the Belgian House of Representatives (Belgian National Parliament) and was a delegate to the Parliamentary Assemblies of the Council of Europe (Strasbourg, France) and of the Western European Union (Paris, France). In 1990, Prof. Brasseur became Director of the Atmospheric Chemistry Division of NCAR. He served as Editor in Chief of the Journal of Geophysical Research (Atmospheres) between 1992 and 1996, and during the period 1994-to 2001, he became Chair of the International Atmospheric Chemistry Project (IGAC) of the International Geosphere-Biosphere Program (IGBP). On 1 January 2000, Prof. Brasseur became Director at the Max Planck Institute for Meteorology in Hamburg, Germany, and Honorary Professor at the Universities of Hamburg and Brussels. He also became the Scientific Director of the German Climate Computer Center. Between January 2002 and December 2005, Prof. Brasseur was the Chair of the Scientific Committee of the International Geosphere-Biosphere Programme (IGBP). He was also President of the Atmospheric Sciences Section of the American Geophysical Union (2002-2004) and a member of the Council of AGU. He was a Coordinating Lead Author for the fourth Assessment Report (WG-1) of the International Panel for Climate Change (IPCC). Jointly with Al Gore, the IPCC was awarded the 2007 Nobel Peace Prize. Between January 2006 and July 2009, Brasseur was an Associate Director of the National Center for Atmospheric Research (NCAR) and Head of the Earth and Sun Systems Laboratory, and in July 2009, became the founding Director of the Climate Service Center (CSC) in Hamburg, Germany. Since June 2014, he has been affiliated with the Max Planck Institute for Meteorology. He is also a Distinguished Scholar at NCAR. Prof. Brasseur is a Member of the Academia Europaea, a Foreign Member of the Norwegian Academy of Sciences and Letters, an Ordinary Member of the Academy of Sciences of Hamburg, Germany, and an Associate Member of the Royal Academy of Belgium. He is Doctor Honoris Causa of the Universities of Paris 6, Oslo, and Athens and a Fellow of the American Geophysical Union. He is the author or co-author of about 200 peer-reviewed scientific papers. He also published or edited several books. He is the recipient of numerous awards and honors such as the Wetrems Prize (1974) of the Royal Academy of Sciences and Letters Belgium, Prize Jacques Cox (1975) of the Free University of Brussels, NCAR Outstanding publication Award (1995), NASA Group Achievement Awards (2005 and 2009), Award on Environmental Physics (2002) from the European Physical Society and Abate Ignacio Molina Prize (2015) of the Government of Chile.

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About PRL

The Physical Research Laboratory (PRL), known as the “cradle of space science” in India, is one of the premier research institutes founded in 1947 by Prof. Vikram Sarabhai, a renowned Cosmic Ray Scientist, a great visionary and institution builder. PRL played a seminal role in producing a highly motivated cadre of space scientists and the technologists of highest international repute. The first scientific rocket launched from Thumba on 21st November-1963 and many other rockets launched thereafter contained payloads developed at PRL. Dr. Sarabhai initiated many of these scientific and technical activities at PRL which eventually led to the formation of the Indian Space Research Organization (ISRO). Therefore, PRL is known as the “cradle of space science” in India. Further, the research in the area of Plasma Physics expanded to the formation of the Institute of Plasma Research (IPR).

As an institution PRL is unique in that it conducts fundamental research in a wide range of research areas from the Earth to the cosmos, and comprising Astronomy and Astrophysics; Solar Physics; Space and Atmospheric Sciences; Theoretical Physics; Geosciences; Atomic, Molecular and Optical Physics, Astrochemistry; and Planetary Sciences and Space Exploration. PRL is one of the rare research institutes of international repute wherein research in such diverse fields of sciences is carried out using several state-of-the-art experimental facilities that exist under one umbrella.

Along with the ongoing research, several new initiatives have been taken up during the last few years. The Multi-Application Solar Telescope (MAST) at Udaipur Solar Observatory has been operationalized. PRL initiated scientific programmes in frontier areas of research, which include a search for exo-planets, laboratory studies of interstellar grains, laboratory synthesis of cold astromolecules and experimental studies in the field of quantum optics. PRL is also developing several scientific payloads as a part of ISRO’s larger vision and contributing to roadmap for competitive scientific exploration of the solar system and beyond. In particular, PRL has been contributing significantly not only in building instruments for space missions, such as Chandrayaan-1, Chandrayaan-2, AstroSat and upcoming Aditya-L1, Chandrayaan-3 and planetary and space missions, but also by bringing out new and insightful science results.

PRL contributes to several national and international research programmes and to human resource development through its Doctoral and Post-Doctoral Programmes, capacity building programmes, such as UN Course on Space Science, and science and engineering internship programmes. PRL contributes significantly to society through its Outreach Programmes by periodically organizing science exhibitions and Open Houses, planned visits of students of various school and college to PRL, and popular talks at various institutions to not only share the excitements of the advancements of contemporary scientific findings but also to encourage students to take up sciences as their research career.

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