

Speaker: Dr. Chinmay Mallik
Max Planck Institute for Chemistry, Mainz, Germany

Title : "Atmospheric pollutants and cleansers"

(Lecture on 26 March 2019 at IITM)

Abstract:

The universal dependence of humanity on fossil fuels, that has changed the way human beings live and breathe on this planet, has been a catastrophe to human health and the Earth's environment. Worsening air quality due to emissions of primary pollutants and formation of secondary pollutants e.g. SO₂, NO_x, particulate matter, O₃ is a cause of concern for common people and governments alike. Recent studies point to India as overtaking China in terms of anthropogenic SO₂ emissions, showing the importance of implementation of regulations in curbing air pollution. During this presentation, I will discuss about the processes controlling atmospheric SO₂ over different regions of India and the use of chemical fingerprints in determining sources of various air pollutants. I will also discuss about the processes controlling tropospheric O₃ over India. O₃ is not only a greenhouse gas and toxic to human health and crops; it is also the primary source of atmospheric hydroxyl radical (OH), the central gas phase oxidant and the 'detergent' of the atmosphere.

Like India, the Mediterranean is a region of climatic extremes and air pollution excesses. The Mediterranean is also at the crossroads of different air masses, which have resided over different parts of Europe, Africa and Asia. The resulting concomitant influences of industrial emissions, biomass burning, oceanic emissions and desert dust lead to a diversified atmospheric chemistry over the region. An intensive field measurement campaign (Cyprus Photochemistry Experiment, CYPHEX-2014) <tel:+442014> was conducted in the north-west of Cyprus in the summer of 2014 <tel:+442014> to obtain a comprehensive understanding of this complex atmospheric chemistry. I will discuss about how our measurements of OH and the hydroperoxy radical (HO₂) during CYPHEX led to improved understanding regarding the role of anthropogenic and biogenic emissions in the atmospheric cleansing and air mass processing over the Mediterranean. I will also discuss about how the atmosphere maintains its oxidation capacity and how our understanding of atmospheric oxidation has implications to regional and global predictions of air quality and its possible implications to the Indian region.