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iLEAPS Global Colloquium Series 2025

Improving understanding of tropospheric ozone and OH through model calibration

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Oliver Wild is Professor of Atmospheric Science at Lancaster Environment Centre, Lancaster University, UK. He has 30 years' experience in developing and applying numerical models of atmospheric processes to advance understanding of tropospheric composition and air quality over urban, regional and global scales. After a PhD in Cambridge, he spent three years at the University of California, Irvine and six years at JAMSTEC in Yokohama, Japan. Chemistry and photolysis codes he developed are widely used in atmospheric models around the world. He published the first assessment of the indirect climate impacts of NOx and CO and pioneered model studies of the intercontinental transport of ozone and other oxidants, underpinning contributions to the UN/ECE Task Force on Hemispheric Transport of Air Pollution (HTAP). He has contributed to major climate and ozone assessment reports including IPCC, WMO and TOAR and to revisions of the Gothenburg protocol through HTAP. He is currently a member of the international Commission on Atmospheric Chemistry and Global Pollution (iCACGP).

Abstract: The major processes governing the abundance of tropospheric oxidants such as ozone and OH are largely understood, but assessing the importance of different processes and the interactions between them remains challenging. Weaknesses in representing processes in atmospheric chemistry transport models introduces uncertainty, and model intercomparisons show substantial diversity in tropospheric ozone and in methane lifetime. In this study we perform a global uncertainty analysis on a chemistry transport model to identify the processes contributing most to uncertainty in tropospheric composition. We then use atmospheric observations to calibrate the model and identify weaknesses in process representation and understanding. We find that the largest uncertainties are associated with factors affecting chemical reaction rates and with deposition processes, particularly over the ocean. We demonstrate that formal calibration has great potential for constraining key processes and is also valuable to uncover missing processes and structural errors in models.

Registration Link: https://ukceh-ac-uk.zoom.us/j/94200315291

Convenor: Dr. Pallavi Saxena, iLEAPS SSC Member
Moderator: Dr. Semeena V. Shamsudheen, iLEAPS IPO