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Three-Dimensional modelling of the long-term variability of tracer transport in the Asian Summer Monsoon anticyclone

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The Asian Monsoon is an important region for the transport of gases from the troposphere to the stratosphere. Recent work by many groups has focused on quantifying processes which contribute to coupling in the upper troposphere - lower stratosphere (UTLS), including transport during the Asian Summer Monsoon (ASM). Troposphere-to-stratosphere transport in this region has been the focus of a number of recent campaigns, including the EU "StratoClim campaign" in Kalamata, Greece, 2016.
Anthropogenic compounds such as CO Very Short-Lived Substances (VSLS), which destroy stratospheric ozone, and sulphur compounds, which maintain the stratospheric aerosol layer, are among the important species involved in large convective systems transport such as the ASM. An important question for halogenated VSLS is whether ASM-associated transport can take place on timescales which are short relative to their chemical lifetimes of days to months.
This talk will present results of the TOMCAT/SLIMCAT off-line 3-D chemical transport model to investigate these issues using moderate-resolution simulations (2.8°x2.8°, 60 levels from surface to 60 km). The model is forced by ECMWF ERA-Interim reanalyses.
A 1979-2016 simulation was run using artificial and idealized tracers with parametrized loss rates, lifetimes and emissions. These types of tracer have already been successfully used to study the transport of VSLS from surface through the TTL. The interannual variability of the transport inside and through the ASM anticyclone and related confinement will be shown and quantified. Comparisons will be made with in-situ and remote satellite data, where possible.