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NESL's Atmospheric Chemistry Division Seminar

Characterizing background atmospheric concentrations of short-lived halocarbons

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3:00 p.m. – Refreshments & Socializing

Foothills Lab 2, Room 1022

Abstract

Some short lived halocarbons (CH_3I, CH_2Br_2, $CHBr_3$) are emitted to the atmosphere in large quantities from natural processes. They supply reactive halogen to the troposphere and influence the tropospheric chemistry of ozone and mercury. They also contribute bromine to the stratosphere and influencing stratospheric ozone chemistry. The magnitudes of these contributions and their sensitivity to changes in climate are poorly quantified at present. Some of these uncertainties stem from the difficulties associated with interpreting observations of a short-lived trace gas at a point in space and time to broader scales. We have measured these chemicals at a global network of surface stations and aircraft profiling sites for multiple years (up to 18). The results show the apparent influence of seasonal variations in loss processes on broad scales, and they suggest significant summertime emissions from terrestrial ecosystems, particularly for methyl iodide. They also provide a unique picture of global distributions, inter-annual and seasonal variability, and vertical mixing ratio gradients at continental, marine, and coastal locations. When these data are contrasted with results from the recent HIPPO campaign over the mid-Pacific Ocean basin, consistent patterns emerge over land and sea for CH_2Br and $CHBr_3$ (less so for CH_3I) that suggest we can quantify mean mixing ratios and their variability over large spatial scales, particularly in the free troposphere. These results provide constraints on the influence these chemicals have on atmospheric chemistry in both the troposphere and stratosphere, and they provide an important baseline for more reliably quantifying long-term concentration changes, should they occur.