

## Stratospheric Air Sampled at the Surface at Mauna Loa Observatory

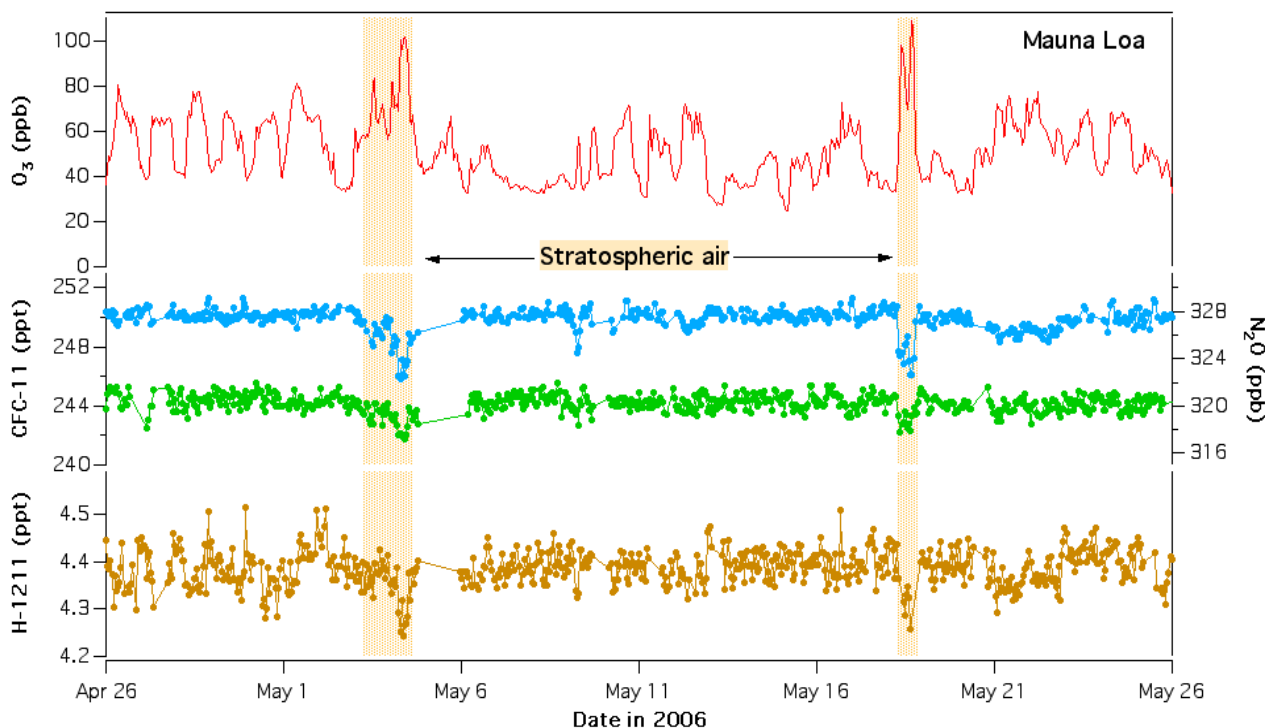
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*In situ* trace gas measurements located at the Mauna Loa, Hawaii NOAA baseline observatory (MLO) have detected periodic intrusions of stratospheric air. The Chromatograph for Atmospheric Trace Species (CATS) was installed in 1998 and continues to make hourly air measurements of 14 non-CO<sub>2</sub> greenhouse gases. Continuous surface ozone (O<sub>3</sub>) measurements have been made since 1973. Many of the gases sampled, chlorofluorocarbons (CFCs), CCl<sub>4</sub>, SF<sub>6</sub> and halon-1211, have little or no tropospheric loss and are only destroyed in the upper atmosphere. Low concentrations of these gases measured at the MLO surface and high concentrations of ozone indicate potential stratospheric intrusions. Comparisons and correlations with lower stratospheric aircraft measurements also indicate the stratospheric nature of these events.

Further investigation using the National Centers for Environmental Prediction (NCEP) potential vorticity calculations also show the stratospheric nature of the air sampled at the surface. Many of these deep stratospheric intrusions are caused by midlatitude cyclones that extend into the North Pacific subtropics; however, some appear to have different origins. This presentation will explore the frequency and mechanisms of these events.



**Figure 1.** Two stratospheric intrusions measured in May 2006 at the surface of the Mauna Loa observatory. Trace gases that have stratospheric sinks such as CFC-11 (blue), N<sub>2</sub>O (green) and halon-1211 (brown) show relatively low concentrations for this latitude. Surface ozone measurements (red) also show high levels typical of stratospheric air.