

## **Stratospheric Aerosol Measurements over Mauna Loa Observatory, Hawaii**

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The stratospheric aerosol layer has been monitored above Mauna Loa Observatory (MLO) by lidar since late 1974. The original lidar used a ruby laser (694 nm) and since 1994 a Nd:YAG laser (532 nm) has been in operation. MLO is one of four baseline stations operated by the NOAA/Climate Monitoring and Diagnostics Laboratory. At 19.6 degrees north, MLO is generally on the edge of the tropical atmosphere but experiences mid-latitude air masses as well. The observatory lay in the path of the two largest eruptions (in terms of stratospheric aerosol) in the past 35 years, El Chichon in 1982 and Mount Pinatubo in 1991. Several other smaller eruptions have also been observed.

The exponential decay rates of stratospheric aerosol from the El Chichon and Mount Pinatubo eruptions are both about one year when calculated over an interval of several years. On smaller time scales there are other distinct decay rates attributable to the phase of the quasibiennial oscillation (QBO) in the tropical stratospheric winds. The aerosol is sequestered during the easterly phase of the QBO and transport is restricted. The aerosol layer is also lofted during this phase and the top of the layer can reach 35 km. During the transition to the westerly phase, distinct decreases in the aerosol loading are observed and the top of the layer decreases to 27 km at times. For the past six years the stratospheric aerosol above MLO has remained at a uniform background level with distinct annual variations. There is a clear seasonal cycle in the background integrated (15.8-33 km) backscatter level, which peaks in the winter at  $1.51\text{E-}4$  per sr and has a minimum of  $0.92\text{E-}4$  per sr in the summer.

There is also a natural variation of about 25% in the aerosol backscatter on a weekly time scale which may be related to different source regions because the particle size appears to be different indicating larger sizes in the low backscatter regime. Assumption of a tropical particle source at background suggests that the two regimes are tropical and mid-latitude.