

Stratospheric Ozone Changes from Five Decades of Ground-Based Observations

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Consistent ground-based observations of column ozone began in the US with the predecessors of NOAA during the IGY and have been a key component of the global Dobson spectrophotometer network ever since. Over time other instruments such as the Brewer spectrometer have been integrated into the global total ozone network. In addition reliable ozone vertical profile measurements from balloon-borne ozonesondes, although not nearly as numerous as column measurements, have contributed to the documentation and understanding of the long-term changes in stratospheric ozone that were not foreseen when these ground-based measurements were inaugurated. The scientific curiosity and dogged perseverance of earlier scientists have produced observational records that document the dramatic alteration human activity can bring even to what was thought to be a somewhat remote portion of the atmosphere.

Based on selected stations from the total ozone, ozonesonde, and umkehr measurement networks, long-term changes in stratospheric ozone have been determined. The total column measurements show the significant declines and the more recent flattening of the ozone trend (figure below). The ozonesonde record emphasizes the changes in the lower stratosphere that may include important long-term transport variations as well as changes associated with anthropogenic influences from human-produced halogen compounds. The umkehr observations derived from the Dobson spectrophotometer measurements are most sensitive in the region near 40 km where the depletion and beginnings of recovery linked with human-produced halogens is dominant.

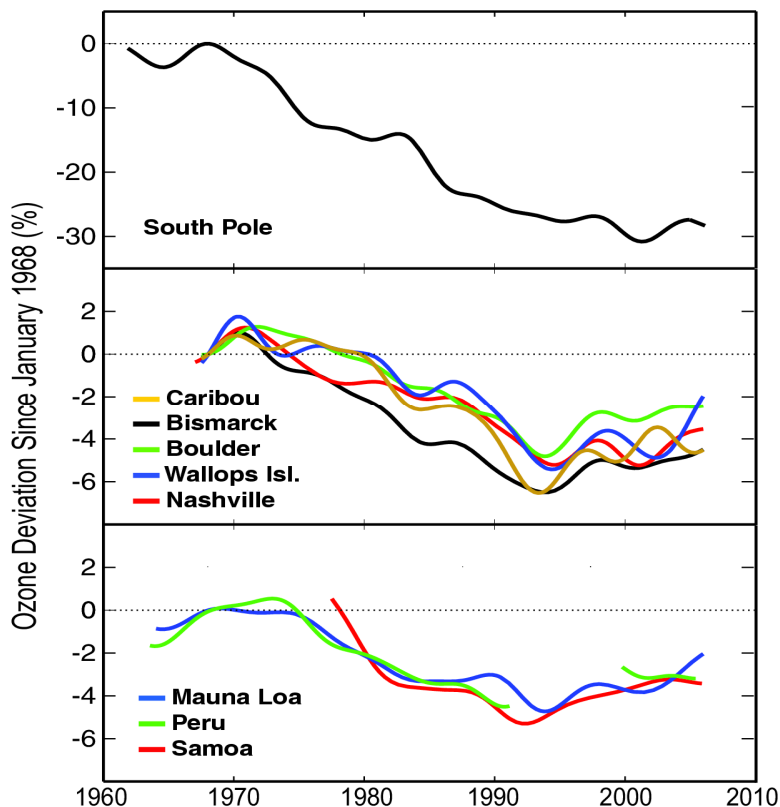


Figure 1. Changes in total ozone from Dobson measurements at South Pole, over the continental US and in the tropics.