

(6-240324-C) Recent Features Affecting the Mauna Loa Apparent Transmission Record

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The Mauna Loa (MLO) apparent atmospheric transmission is one of the longest geophysical records dating back to the International Geophysical Year (1957-58). The daily transmission is calculated from the ratios of morning direct-normal pyrliometer measurements of 2 to 3, 3 to 4, and 4 to 5 solar pathlengths. Daily transmissions are averaged over monthly periods. It is referred to as an “apparent” transmission because of increased measurement uncertainty at the longer pathlengths. Because of the high elevation of the observatory, the MLO transmission is a good proxy of stratospheric aerosols, although the passage of Asian dust is the one tropospheric event that affects the transmission perennially. The record through Feb. 2024 in Figure 1 shows the key explosive volcanic events that have most affected the transmission, Agung in 1964, El Chichon in 1982, and Pinatubo in 1991. Recovery from those events took approximately five to eight years. The cleanest period prior to Agung, with a transmission of 0.934, has only been achieved briefly since then. Surprisingly, the Hunga-Tonga eruption in Jan. 2022, which was more violent than Pinatubo, did not have a large effect on the transmission. In the new millennium, two episodes of several successive, but small-scale eruptions have had decadal-scale effects on the transmission. These and other features of the transmission record will be discussed.

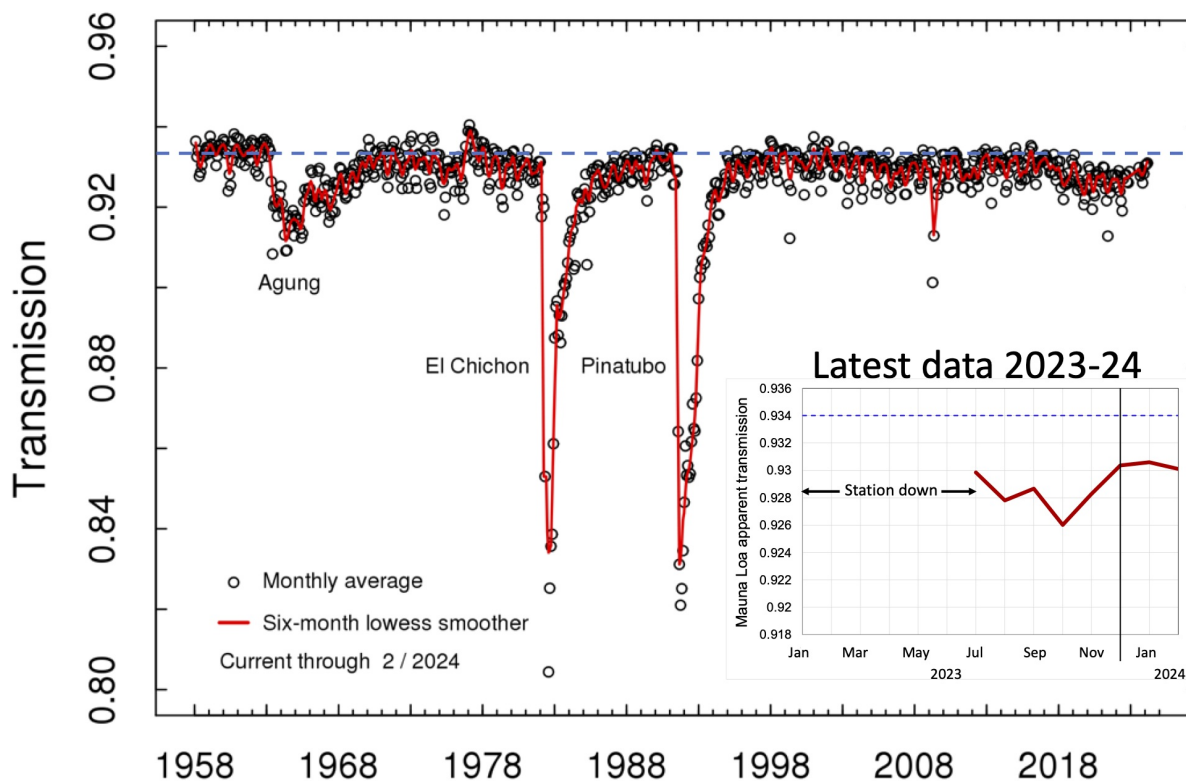


Figure 1. The Mauna Loa apparent transmission from 1958 through Feb. 2024. The dashed blue line represents the cleanest period prior to Agung. The red curve is a LOWESS fit with a six-month smoother applied.