

#### 4.1.4. SURFACE OZONE

Observations of surface ozone continued at each of the four baseline observatories, as well as Niwot Ridge, Colorado; Westman Islands, Iceland; and Arrival Heights, Antarctica. In November 1999 a TEI Model 49C ozone analyzer was added at the CMDL South Pole Observatory, Antarctica (SPO), and it will operate alongside the Dasibi 1003AH analyzer. In mid-1999 the Dasibi 1003AH analyzer at SMO malfunctioned and could not be repaired. It ran alongside the TEI Model 49 for nearly 2 years. The operation of the Dasibi was discontinued temporarily but will be resumed when the instrument is repaired. Data from the CMDL Barrow, Alaska, Observatory (BRW), MLO, and SPO have been processed through 1999. The monthly mean data for the three sites are given for 1998 and 1999 (Table 4.4). For MLO the average is based on downslope (10-18 Universal Time Coordinated (UTC)) data. The data system at SMO experienced a number of outages after the measurements were restarted in

1997 following about a 1-yr gap. Although the data were recorded on a backup chart recorder, resources have not been available to process these data and bring the record up to date.

At Arrival Heights, Antarctica (near McMurdo Station), a surface ozone analyzer was installed near the end of 1996. This instrument is operated in cooperation with the National Institute for Water and Atmospheric Research, New Zealand (NIWA). The data for 1996-1999 for this site are included in Table 4.4. In Figure 4.1 the seasonal behavior for 1997-1999 is compared to that for SPO. The winter maximum in ozone at each site is almost identical in magnitude, but the summer minimum at Arrival Heights is much deeper. At Arrival Heights the minimum is reached in January, while at SPO it is in February. The depth and timing of the minimum at these antarctic sites likely reflects the photochemical loss mechanism in the southern hemisphere in which ozone is lost in the formation of the hydroxyl radical where nitrogen oxide ( $\text{NO}_x$ ) concentrations are low.

TABLE 4.4. Monthly Mean Surface Ozone Mixing Ratios (ppbv)

Year	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
<i>BRW</i>												
1998	33.3	28.9	22.7	25.3	21.6	19.2	21.6	18.8	21.2	25.1	27.5	24.8
1999	23.4	21.9	9.3	6.3								
<i>MLO (nighttime only)</i>												
1998	49.0	47.5	55.4	57.7	57.0	45.3	46.4	39.7	46.7	37.1	35.9	43.2
1999												
<i>SPO</i>												
1998	23.5	23.7	22.2	25.5	28.7	32.4	33.3	33.6	33.0	31.4	32.6	29.5
1999	26.9	20.1	21.1	25.1	29.3	32.9	36.3	37.0	35.2	31.3	32.3	29.6
<i>Arrival Heights, Antarctica</i>												
1996												15.5
1997	13.7	17.1	21.9	26.4	30.3	33.0	34.4	32.6	30.4	28.0	23.5	14.5
1998	9.2	14.5	17.9	22.2	26.0	29.1	30.5	31.2	29.1	25.6	18.0	17.4
1999	15.9	16.5	19.3	24.7	27.7	32.5	33.6	32.6	30.0	27.6	20.9	15.7

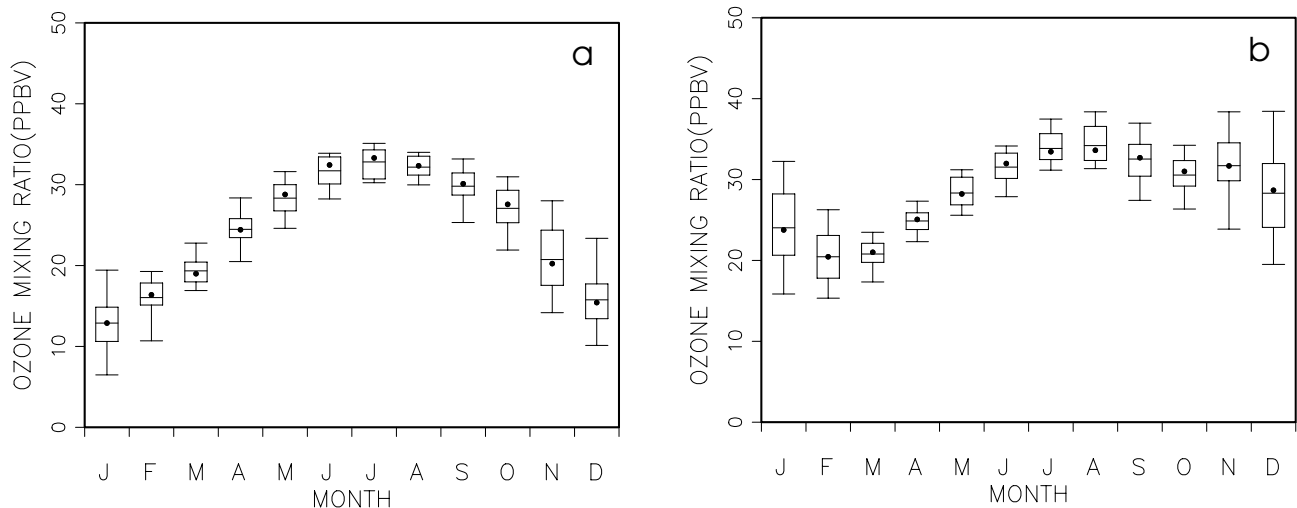


Fig. 4.1. Seasonal variation of surface ozone mixing ratio at (a) Arrival Heights, Antarctica, and (b) SPO. The solid dot is the mean; the horizontal bar is the median; the box is the inner 50<sup>th</sup> percentile; and the "whiskers" are the inner 90<sup>th</sup> percentile of the data. The data are for the period 1997-1999.