**Table S1. Total number of O3 observations over the 1994-2012 period. (DOC)**

Results are given per pressure level and per 3-hour time period. The 0-3 UTC time period is ignored due to too sparse data. The largest number of data are found at 3-6, 6-9 and 9-12 UTC, with more than 1.2 millions observations along the tropospheric column. This number is reduced to about 0.8 million at 12-15 UTC, and below 0.5 million during the other time periods. Data are the sparsest at 18-21 UTC with about 0.2 million observations along the tropospheric column.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| Level (hPa) | 3-6  UTC | 6-9  UTC | 9-12 UTC | 12-15 UTC | 15-18 UTC | 18-21 UTC | 21-24 UTC |
| 300 | 72,658 | 92,222 | 204,092 | 151,567 | 65,911 | 24,472 | 43,798 |
| 350 | 73,808 | 97,801 | 184,314 | 116,278 | 49,039 | 25,878 | 39,220 |
| 400 | 93,564 | 105,938 | 129,191 | 85,282 | 46,313 | 21,040 | 27,675 |
| 450 | 79,692 | 89,480 | 103,240 | 64,863 | 34,131 | 15,327 | 21,372 |
| 500 | 63,757 | 75,557 | 81,484 | 49,501 | 26,813 | 12,734 | 16,296 |
| 550 | 66,949 | 78,946 | 74,819 | 43,158 | 24,343 | 11,473 | 14,063 |
| 600 | 62,331 | 71,961 | 68,856 | 38,587 | 22,653 | 10,466 | 12,137 |
| 650 | 92,842 | 101,534 | 78,020 | 41,636 | 25,225 | 10,957 | 13,847 |
| 700 | 118,485 | 127,481 | 89,800 | 42,024 | 26,491 | 11,740 | 12,415 |
| 750 | 93,554 | 104,479 | 65,377 | 30,862 | 19,925 | 9,286 | 8,628 |
| 800 | 93,795 | 99,068 | 66,385 | 29,593 | 19,646 | 9,380 | 8,001 |
| 850 | 90,422 | 93,943 | 68,976 | 31,682 | 20,953 | 9,205 | 7,829 |
| 900 | 95,563 | 101,501 | 81,548 | 37,080 | 22,999 | 12,265 | 11,499 |
| 950 | 63,948 | 78,822 | 72,128 | 34,275 | 21,164 | 12,786 | 11,041 |
| 1000 | 42,567 | 50,891 | 44,399 | 21,943 | 14,220 | 7,582 | 5,288 |
| Average | 80,262 | 91,308 | 94,175 | 54,555 | 29,322 | 13,639 | 16,874 |
| Total | 1,203,935 | 1,369,624 | 1,412,629 | 818,331 | 439,826 | 204,591 | 253,109 |