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DOBSON-STATIONS PERFORMANCE ASSESSMENT USING TOMS DATA

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Apart from the large natural variability of total ozone in the middle and high latitudes, the variance of available data is directly related to their quality, which is depending on the measurement techniques, the application of calibration procedures, the historical continuity of operating conditions at a given station, etc. During the past seven years, the TOMS satellite data provided a unique possibility for assessing the level of performance of ground-based ozone stations. Complete comparative assessment will stimulate common action for improving the performance of the GO_3OS to meet the requirement of providing accurate and precise data for trend analysis and other studies.

Presented will be examples of comparisons of monthly summaries (based on daily measurements) at some of the regularly operating Dobson stations, with the values deduced from TOMS overpasses. Shortcomings in certain Dobson stations are identified, such as: use of an incorrect value for the extra-terrestrial constant (Hobart); sudden large value changes (Brisbane); unusually low Dobson readings (Mauna Loa); use of inaccurate cloud-blue-sky charts, causing fictitious differences with direct sun measurements (Toronto).

For the 1979-82 period, the average deviations of TOMS from the average Dobson network are: -6.5 ± 1.8, -6.3 ± 1.9, -5.4 ± 2.0 and -5.3 ± 1.7, respectively. If this average bias is removed, the frequency distribution of the TOMS-Dobson differences reveals that 67 percent of all Dobson stations are within the ±2 percent difference interval and less than 10 percent are outside the ±4 percent difference. These give confidence in the quality of long-term data gathered by carefully operated Dobson stations; the Dobson stations do not provide, however, the necessary widespread geographical coverage which should rely on continuity of TOMS type of satellite operations.

In studies aiming to detect small, long-term ozone variability and trends, uncertainty of quality of measurements could cause great difficulties and lead to erroneous conclusions. Therefore, a complete study of each station should be completed and the results widely publicized. This would serve both as a warning and as guidance to potential users, who, as experience shows, are frequently taking the numbers at face value.

Continuous operation of TOMS would provide the means for assessment and guarantee the availability of global coverage of reliable ozone data.