

AN ANALYSIS OF TROPOPAUSE PRESSURE AND TOTAL OZONE CORRELATIONS

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A study of the relationship between total ozone and tropopause pressure has been carried out using 4 years of NIMBUS-7 total ozone data and NMC global analyses on a 5° by 5° grid. Maps are presented of the global distribution of variability in total ozone and tropopause pressure and their correlation for different spatial scales. The decomposition in space is done via a spherical harmonic representation where the fields are divided into large-scales (total wave number <6) and the medium scales (total wave number ≥ 6).

The medium scales generally show correlations greater than 0.6 throughout the middle latitudes of both hemispheres with some regions exceeding 0.8. These results have been confirmed in part using station data between $\pm 30^\circ$ longitude. The areas of highest correlations seem to be associated with the storm track regions of both the northern and southern hemispheres.

A detailed spectral analysis is performed for the medium scales on five pairs of time series (differing by latitude) of area averaged tropopause pressure and total ozone. In middle latitudes total ozone and tropopause pressure exhibit generally similar distributions in the power spectrum. In the subtropics and tropics the power in ozone drops off more rapidly with increasing frequency than the power in tropopause pressure. Only in the northern hemisphere middle latitudes does one find a clear association between increased power in ozone and tropopause pressure and maxima in the coherency spectrum.

Results for the large scales (1979 only) are more complicated showing generally positive correlations in the middle latitudes of the southern hemisphere and the middle and high latitudes of the northern hemisphere with extreme values exceeding 0.8. Some tendency for negative correlations is found in the northern subtropics particularly during the northern hemisphere fall.