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A 32-year time series of reflectivity measured from space

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Daily cloud reflectivity values have been measured since 1979 from the Total Ozone Mapping Spectrometer (TOMS) and Solar Backscatter UltraViolet (SBUV) series of instruments as well as the Ozone Monitoring Instrument (OMI) on AURA. The reflectivities are calculated as Lambert Equivalent Reflectivity (LER) at 340 nm. All datasets have been processed with a common TOMS/SBUV/OMI version 8 retrieval algorithm, resulting in a 32-yr composite dataset of reflectivity with a reliable, geophysically validated, long-term calibration. The UV region of the spectrum is particularly useful to measure cloud amounts due to the fact that the surface reflectivities of snow/ice free land & water are relatively small and the measurements are almost unaffected by vegetation or sea color changes. The NOAA SBUV series of instruments had slowly precessing orbits that provided useful LER data from ~6:30AM to ~5:30PM local time, while the TOMS and OMI instruments were primarily in stable, noon-time orbits. By analyzing the calculated LER as a function of time of day, it is possible to observe significant cloud changes as the day progresses. Results show that the changes in cloud cover over land surfaces are significantly different than those over water. We will present time of day LER results in 5 degree zonal means from 60 North to 60 South for both land and water. Once the diurnal signal has been removed from the data record, long-term trends can be calculated over the entire 32-year period using a standard least squares fit method. A significant increase in LER is found for the Southern Hemisphere, increasing linearly from 5∫S to 60∫S. It is further found that the increase in LER is inversely proportional to the GISS Temperature Anomaly trend over the same 32-yr period (over 10∫S-60∫S). The statistically significant inverse correlation between LER and surface temperatures has implications for global warming and global dimming studies.