The NOAA Global Monitoring Division's UV Monitoring Networks: Update on Antarctica and NEUBrew

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The 2015 Antarctic ozone hole was large even by current standards. Depending on the baseline, it was at least the 4th largest on record. This extreme event was not consistent with the prevailing trend of ozone holes over the last ten years. The ramifications of large ozone depletion over a large area are increased ultraviolet (UV) irradiance at the surface. The dynamic aspect of the hole shifting and rotating in addition to changing cloud conditions cause rapidly changing surface UV, which impacts the biological systems. One of the derivative products of the spectral UV irradiance measured at each station is the UV index. The index is a measure of the sun-burning ability of the irradiance. Palmer station, on the Antarctic peninsula incurred large UV index values on multiple days. The World Meteorological Organization has declared UV indexes of 11 or greater as extreme. UV indices at Palmer station exceeded 12 several times this past austral spring. These measurements are important for understanding the effects on the biological systems influenced by the rapidly changing UV irradiance levels.

The NOAA-EPA Brewer Spectrophotometer UV and Ozone (NEUBrew) network operates Brewer Mark IV spectrophotometers at each station. This is a multi-functional instrument that measures UV irradiance, total column ozone and the ozone profile. The Mark IV utilizes a solar blind nickel sulfate ($NiSO_4$) crystal sandwiched between two UG-11 colored glass filter. The filter performs order sorting and greatly reduces out-of-band straylight. Unfortunately, the $NiSO_4$ filter is very hygroscopic and its operating characteristics change as it takes on or sheds water molecules. This results in unstable UV calibrations. A new variant of the $NiSO_4$ is now available and is more thermally stable than its predecessor. Eight of the ten NEUBrew network Brewers were outfitted with the new UVC-7 filter in October 2014. The other two Brewers were left with their original NiSO4 filters. Long-term testing of the new filter's stability vs. the original units was performed. The results of those tests are presented here.

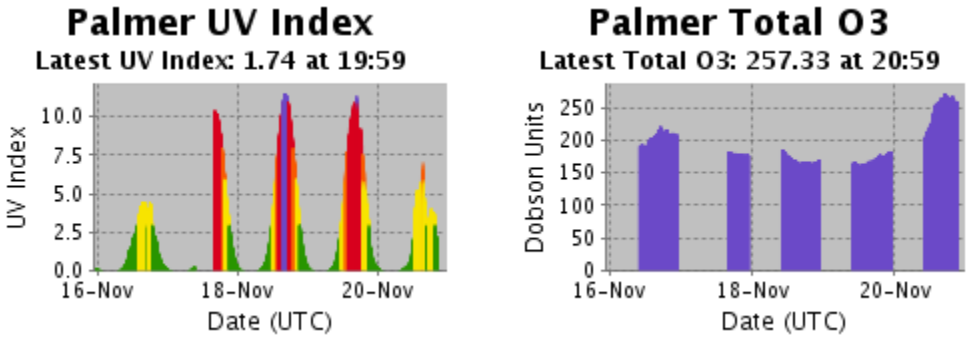

Figure 1. The two plots above are of UV Index (a measure of the sun-burning ability of solar UV radiation) and total column ozone measurements made by Earth System Rearch Laboratory Global Monitoring Division Global Radiation's Antarctic UV Monitoring program. Palmer experienced UV indices greater than 12 this last season.