# Tropospheric Column Ozone Variability from Space: Results from the First Multi-instrument Intercomparison

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Tropospheric ozone is a pollutant detrimental to human health, and crop and ecosystem productivity. Tropospheric ozone is also the third most important greenhouse gas (after carbon dioxide and methane), responsible for approximately 17% of global radiative forcing since 1750. However, the lack of a comprehensive global ozone monitoring network means that ozone's radiative forcing must be estimated by chemistry-climate models. As a result, the most recent estimate of ozone's radiative forcing has large error bars of plus or minus 50% due to model uncertainties ($0.40 \pm 0.20$ W $m^{-2}$, according to the fifth Intergovernmental Panel on Climate Change [IPCC] assessment report). Improvements to this estimate require an accurate observation-based quantification of the present-day tropospheric ozone burden (TOB), and greater confidence in chemistry-climate model estimates of TOB in pre-industrial times. In its most simple form, TOB is the total mass of ozone in the troposphere (expressed in units of Tg), calculated by summing all of the tropospheric column ozone (TCO) values at every point on Earth. Presently there is only one published observation-based estimate of TOB, which comes from the Ozone Monitoring Instrument/Microwave Limb Sounder (OMI/MLS) satellite instruments on NASA's Aura satellite. Recently, four new satellite products have been developed for measuring TCO and TOB, with two based on the OMI satellite instrument and two based on the Infrared Atmospheric Sounding Interferometer (IASI) satellite instrument. The first intercomparison of these products will soon be published as a component of the Tropospheric Ozone Assessment Report (TOAR). While all five products show the same general tropospheric ozone features across the globe, they differ in absolute TCO quantities and they also differ in terms of decadal trends. The next step is to evaluate all products against the exact same set of *in situ* ozone observations to gauge the performance of each product in different regions of the world. We will present preliminary results from this evaluation which relies on daily In-service Aircraft for a Global Observing System (IAGOS) commercial aircraft profiles above Frankfurt, Germany and weekly ESRL/GMD ozonesonde profiles above Hilo, Hawaii; Trinidad Head, California; and Boulder, Colorado.

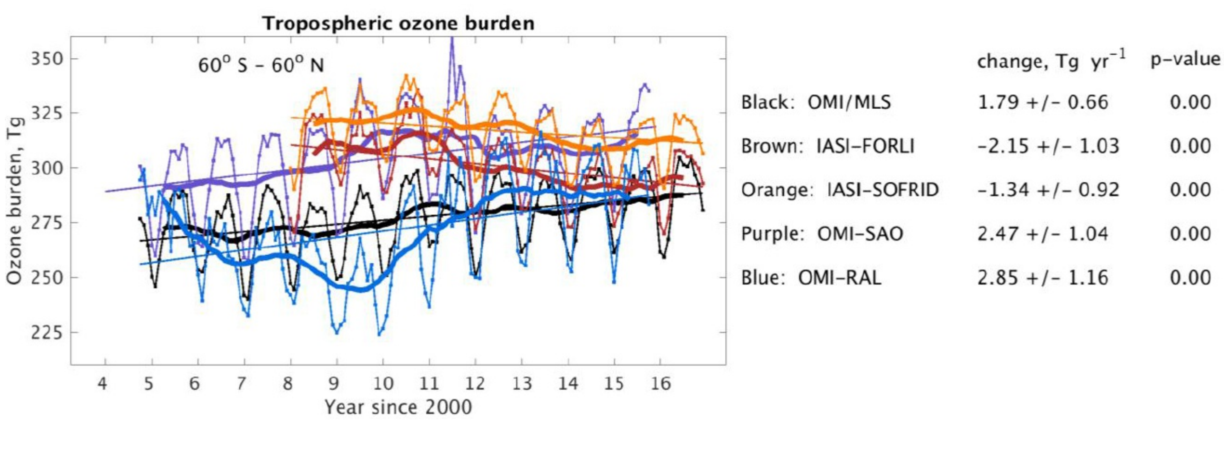


**Figure 1.** Monthly tropospheric ozone burden (thin curves) for 60° S - 60° N for 5 different satellite products. Thick curves are the 12-month running means and the thin straight lines are the least square linear fits.