GMD'S Part in Monitoring the Earth's Ozone Layer

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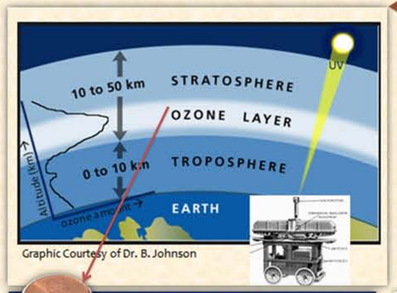
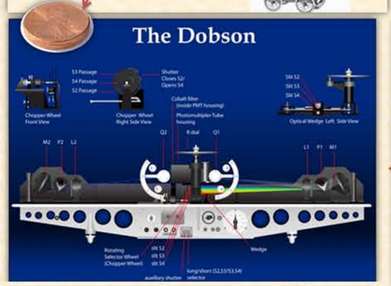
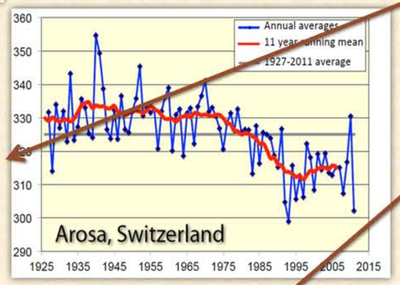


Graphic Courtesy of Dr. B. Johnson

The history of Total Column Ozone (TCO) measurements is almost as long as that of air temperature. Our instrument was developed by Dr. Gordon Dobson in the 1920s at Oxford. TCO is expressed in Dobson Units (DU). The average is 325DU or the thickness of three stacked pennies of pure ozone.



GMD has 15 Sites using this Instrument.



Graphic courtesy of Dr. J. Stähelin, ETH-Z

The **Ozone Layer** is a feature of the earth's atmosphere produced by its composition and the interaction with sunlight. The thickness and profile are important to our understanding of Climate Dynamics.

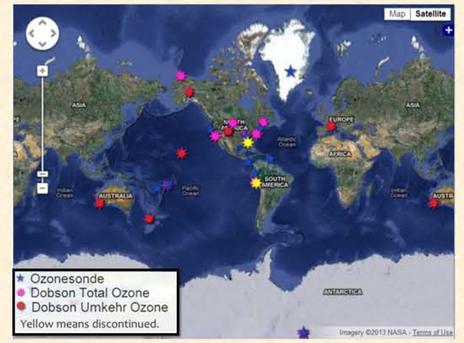
The USA has **monitored** TCO with Dobson Ozone spectrophotometers since before NOAA was founded. The profile is investigated as well, by special measurements with the Dobson and with **ozonesondes**.

As part of a **global effort** to measure TCO, there is a need to understand the differences between instrument types.

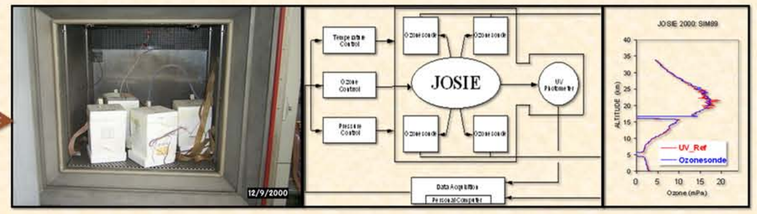
The process to understand the measurements and the instruments to improve the **precision** and **accuracy** is ongoing.

The Balloon-borne **ozonesonde** gives detailed information of the structure of the Ozone Layer. The sensor used was developed by personnel in GMD's predecessors.

GMD's Ozonesonde Sites
Boulder, Colorado
Hilo, Hawaii
South Pole Station
Pago Pago, Samoa
Trinidad Head, California
Suva, Fiji
Huntsville, Alabama
San Cristobal, Galapagos
Costa Rica
Summit Station, Greenland

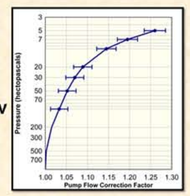


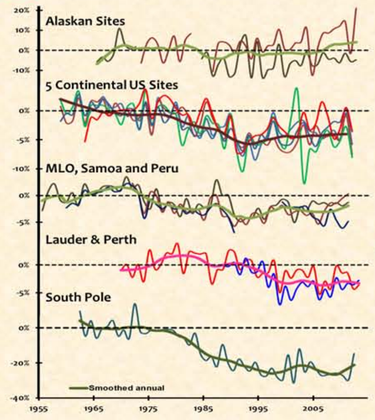
GMD determines precision and accuracy of ozonesondes through participation in international intercomparison campaigns and laboratory testing within GMD:
Jülich Ozonesonde Intercomparison Experiments: 1996 & 2000
Research Center Jülich, Germany.

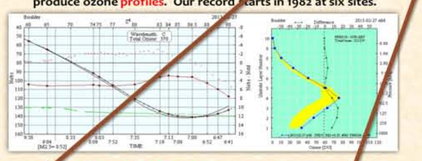


GMD Environmental Chamber

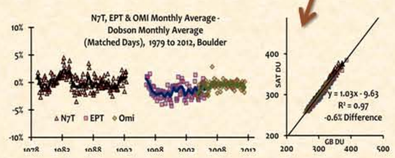
The GMD **Ozone and Water Vapor** chamber is used for ozonesonde performance test and flow rate efficiency measurements at low pressure and temperatures.



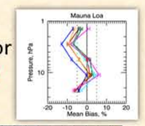


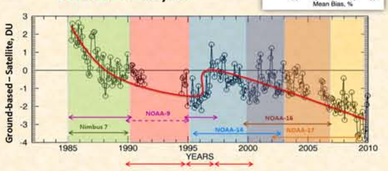


Comparisons with other ozone measuring systems can improve the data **quality** of each.

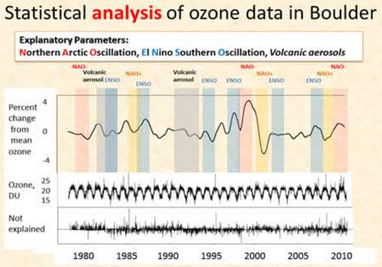


Understanding of differences is important for consistency in **long-term trend** analysis

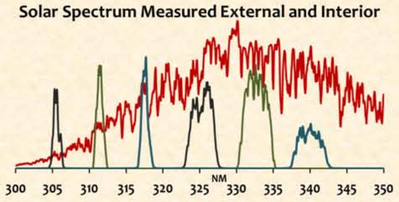




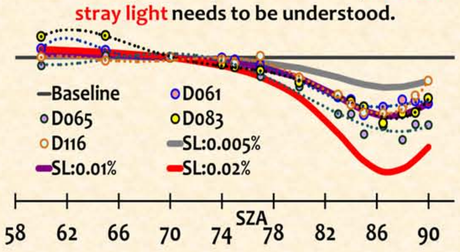
Statistical **analysis** of ozone data in Boulder

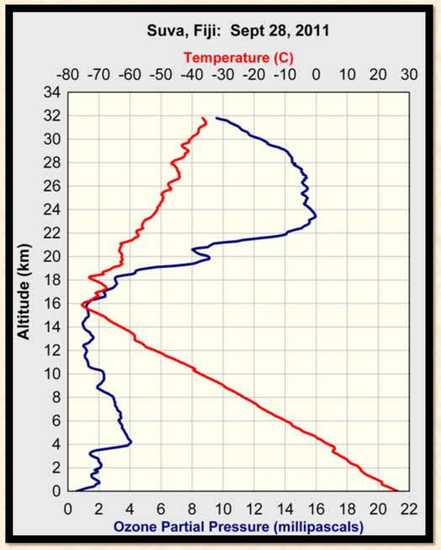


Continuing investigations of the instrument **characterization** of individual instruments, and the results of the observations
Solar Spectrum Measured External and Interior

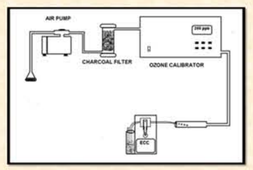


For Profile (Umkehr) measurements, **internal stray light** needs to be understood.

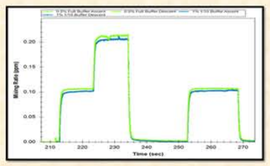




Laboratory Ozonesonde Experiments and Multiple Sonde Flights at Boulder.



Reconditioned ozonesondes are tested in the lab by comparing with a NIST traceable TEI ozone calibrator.



Four of the weekly Boulder balloon flights during November, 2012 carried **four ozonesonde instruments** to compare different ozone sensing solutions.