**50 Years of Routine Ozone Soundings at Hohenpeissenberg**


**Summary**
- regular Brewer-Mast ozone sondes since November 1966
- 1 per week until 1977, 2 to 3 per week since 1978
- Vaisala RS41 starting 2017
- radio-sonde type has effect on ozone data
- no long-term change in Brewer-Mast performance since 1975?
- regular Dobson total ozone since January 1968
- regular lidar ozone profiles since September 1987
- stratospheric ozone decline until mid-1990s, beginning recovery since
- tropospheric ozone increase until 1990, flattening since
- stratospheric cooling
- tropospheric warming
- sondes = all-weather workhorse for ozone monitoring, incl. troposphere
- all profiles available through www.woudc.org

**References:**
doi:10.1175/2007JTECHA999.1

**Ozone annual means @ Hohenpeissenberg (48°N, 11°E)**

**Temperature annual means @ Hohenpeissenberg (48°N, 11°E)**

**Quality control, comparisons, long-term stability**

**Ozone equation (Brewer-Mast)**

\[ P_{O_3} = 4.3085 \times 10^{-3} \times T \times \exp{-T/300} \times \exp{-35/\Delta P} \]

where \( P_{O_3} \) = ozone, \( T \) = temperature, \( \Delta P \) = pressure difference

**Difference profiles**
- Sonde – Lidar/SAGE (all data!)
- below 20 km: Meteorological/sampling bias!
- above 30 km: Insufficient pump correction (still Dützsch 1966)!
- little change over time
- Constant bias → trends, variations OK

**Tropospheric ozone increase until 1990, flattening since**

**Stratospheric ozone decline until mid-1990s, beginning recovery since**

**Tropospheric warming**

**Stratospheric cooling**

**No long-term change in Brewer-Mast performance since 1975**

**Radio-sonde type has effect on ozone data**

**Regular Brewer-Mast ozone sondes since November 1966**

**Regular Dobson total ozone since January 1968**

**Regular lidar ozone profiles since September 1987**

**Regular Dobson total ozone since January 1968**

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**Meteorological Observatory Hohenpeissenberg**

http://www.dwd.de/ozon