ABSTRACT:

A MKIII Brewer Ozone Spectrometer was used in Beijing from Oct. 1990 to June 1991 to take the measurement of \( \text{O}_3, \text{SO}_2, \) and UVB radiation. And since Nov. 1991 a new MKIV Brewer Spectrometer, which can take the measurements of \( \text{O}_3, \text{SO}_2, \text{NO}_x, \) and UVB radiation, has been set up in Beijing. The MKIII Brewer Spectrometer was moved to Qinghai baseline station which is on the Qinghai-Tibetan plateau in the northwestern part of China. Both the data in Beijing and Qinghai baseline station have been analysed and some results will be shown here. And also the ozone profiles have been got through the Umkehr program given by AES of Canada for the Brewer Ozone Spectrometer.

INTRODUCTION:

Nowadays, the decrease of ozone and increase of greenhouse gases are two important respects of Atmospheric Chemistry Research Work. Therefore, monitoring the atmospheric constituents, finding its influence, investing the causes for their change are the task for the scientific society and government all over the world. With the help of WHO, our government has decided to build up a baseline station on Qinghai-Tibetan Plateau, which is in the northwestern part of China. It is said to be WHO’s first inland baseline station of high altitude in mid-latitude region. Its altitude is 3816 m. Our Brewer Spectrometer has been calibrated twice with the WHO travelling standard Brewer #017 in the past year.

MEASUREMENT RESULTS IN QINGHAI BASELINE STATION:

At the present time, the construction work of our baseline station has not been finished yet, so our Brewer Spectrometer is located in Gonghe county just close to our baseline station. The latitude and longitude of the place where our Brewer Spectrometer located is 38.287 and -100.817 respectively and the altitude is about 3 km. For one year period (Sep. 1991-Aug. 1992), most of days we can get good results of total column amount of \( \text{O}_3 \), \( \text{SO}_2 \) and UVB radiation value and more than 150 days of the year. Through the Umkehr program, we can get good ozone profile results (RMSRES: 0.7 liter/3) and a lot of days we can get two ozone profiles both for AM and PM. So we can say the weather condition there is quiet good for atmospheric background monitoring. Through the measurement results in Qinghai baseline station we can see:

1. The seasonal variation of total column amount of ozone is similar to other station’s results, higher in Winter and Spring and lower in Summer and Autumn. The noon time UVB radiation value is somewhat inverse to the ozone amount (see fig. 1 and fig. 2).

![Fig. 1](https://ntrs.nasa.gov/search.jsp?R=19950004668)

**Fig. 1** The column amount of ozone in Qinghai baseline station.

![Fig. 2](https://ntrs.nasa.gov/search.jsp?R=19950004668)

**Fig. 2** The UVB(300-325 nm) value at noon in Qinghai baseline station.

2. Most of days \( \text{SO}_2 \) column amount is near zero except the few high value days of using stove for heating. (see fig. 3)
Through the ozone profiles measured by Brewer Spectrometer and processed by Umkehr program developed by AES of Canada, we can see the seasonal variation of stratosphere layer ozone. For the 19.13-23.59 km and 14.71-18.13 km layer, the ozone value has a seasonal variation somewhat like the total column amount of ozone and for the 23.59-28.14 km, 28.14-32.79 km layer the variation is smaller and the rest two layers has even smaller variation. (see fig. 4)

MEASUREMENT RESULTS IN BEIJING:

We have compared the total column amount of ozone measured by Brewer in city Beijing (lat. = 39.95° long. = -118.317°) with that measured by Dobson Spectrometer in Xianghe Station (lat. = 39.46° long. = -117.00°) which is in the suburb of Beijing. Through the eight months comparison (see fig. 5), we can see that most of days the daily means is quiet close. Among the total 135 days, 84 days is less than 1%, another 35 days is less than 2%, the other 24 days is less than 3% while the rest 14 days is more than 3%

3. The column amount of $SO_2$ in Beijing

For 23.59-28.14 km, 28.14-32.79 km layer, the variation is smaller and the rest two layers has even smaller variation. (see fig. 4)

Fig. 5 The column amount of ozone by Brewer and Dobson in Beijing

- Ozone has a more complicated relationship to UVB radiation value probably because of more aerosol in Beijing.
- $SO_2$ amount is quiet high in city Beijing in the heating season.
- It is interesting to note that as the strong wind happened in Beijing the $O_3$ amount increased sharply while the $SO_2$ amount decreased heavily. The increased amount of ozone is because of the transfer of high latitude ozone and decreased amount of $SO_2$ is because the wind made the air clear.
COMPARISON OF MEASUREMENT RESULTS IN QINGHAI BASELINE STATION AND CITY BEIJING:

1. The two station's latitude is quiet close (Beijing 39.95, Gonghe 36.267), but the ozone value has great difference. Generally speaking, the daily means of total column amount of ozone in Qinghai is about 30-60 D.U. lower than that of Beijing in the same day. Compared with world's other ozone station which latitude is close to Qinghai baseline station, we find that the daily means of ozone in Qinghai is also about 30-60 D.U. lower. The reason is probably because of the special meteorological condition in Qinghai-Tibetan plateau. For detail reason it is under research now.

2. SO₂ amount in Beijing is greatly higher than that in Qinghai baseline station.

3. By auto-spectrum analysis, the SO₂ amount shows a 14 days period trend in Beijing while it shows a 16 days period trend in Qinghai.

REFERENCE:


