

SO_2 indicates that the accuracy and precision are better than 10%. The accuracy of the HV data can be determined by comparison with the denuder data.

Figure 3E.1 compares the HV and AD data for SO_2 for 20 samples. The correlation is excellent, with $r^2 = 0.9$. The slope is close to unity and the intercept is small.

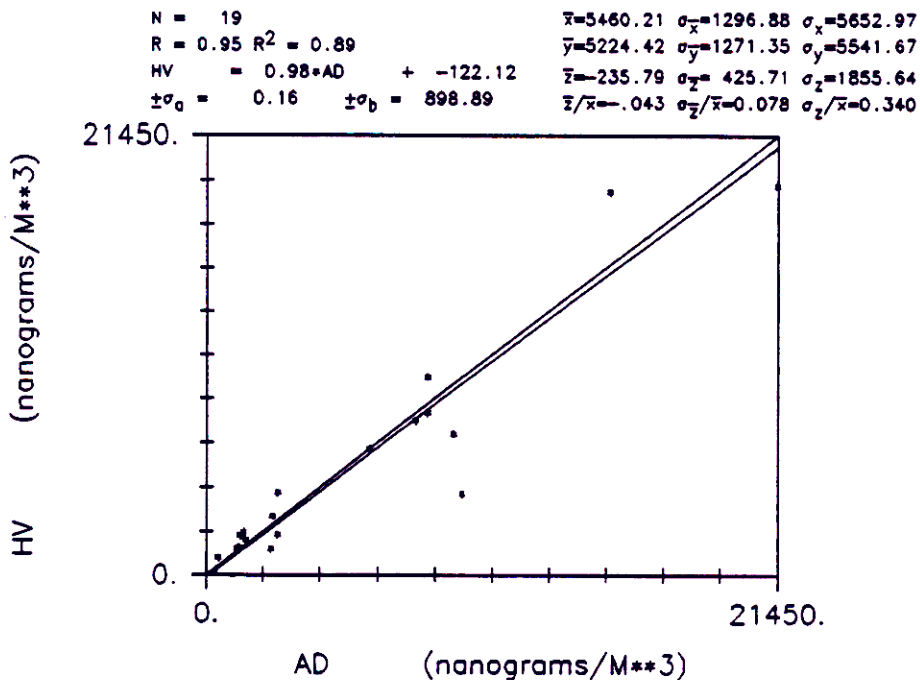


Figure 3E.1: Comparison of SO_2 by HiVol and by annular denuder at Page, February 5-15.

3E.2 Intersampler Comparisons

IMPROVE vs Drexel (Canyonlands)

The IMPROVE sampler with impregnated filter and Drexel gas chromatograph were run in parallel at the Canyonlands site for the duration of the study. The IMPROVE sampler collected integrated 6-hour samples, while the Drexel gas chromatograph made a series of approximately 3 measurements over a period of 1-hour at the start of the 6-hour period.

The Drexel data indicate that the 3-minute concentrations varied widely over each 1-hour sampling period. The average standard deviation for each 1-hour period averaged 1/3 of the mean concentration for that period. If the SO_2 concentrations varied this widely over the 1-hour period, the variation over 6-hours should be even larger. Thus a close correlation between the two methods cannot be expected.

The plot of the SO_2 values of impregnated filter (designated "S") vs Drexel (designated "L") is shown in Figure 3E.2. The correlation of 0.72 is good considering the differences in air volume sampled. The surprising relationship is that the Drexel average values are approximately one-half those of the IMPROVE sampler. If the ambient concentrations are log normal, one would expect an arithmetic mean of instantaneous values to be higher than an integrated sample, which is completely arithmetic. Time plots of the two variables are shown in Figure 3E.3.

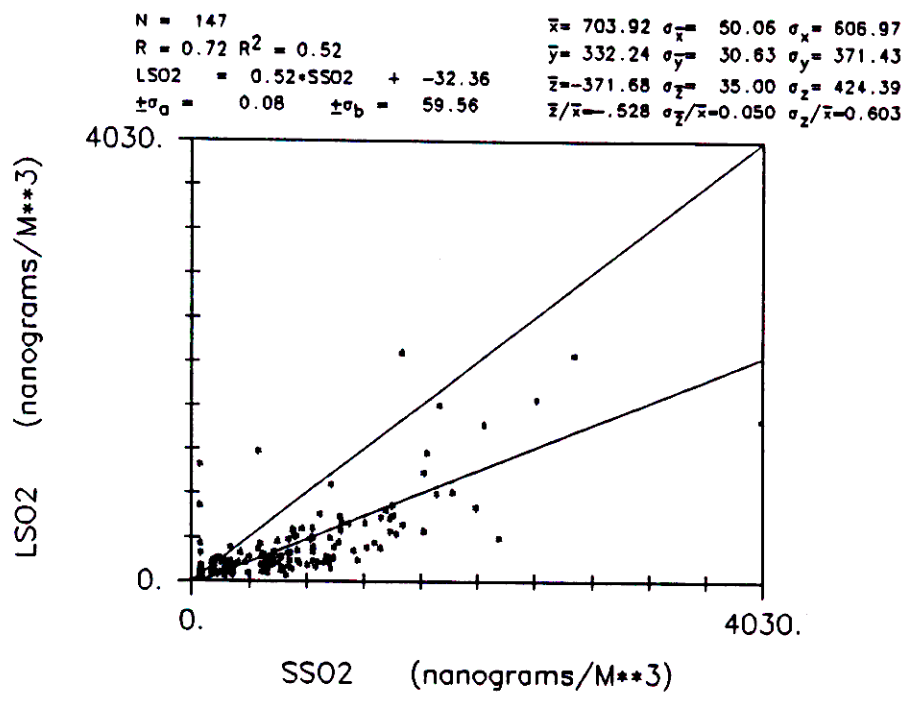


Figure 3E.2: Comparison of SO_2 by Drexel (LSO2) and by IMPROVE (SSO2) at Canyonlands.

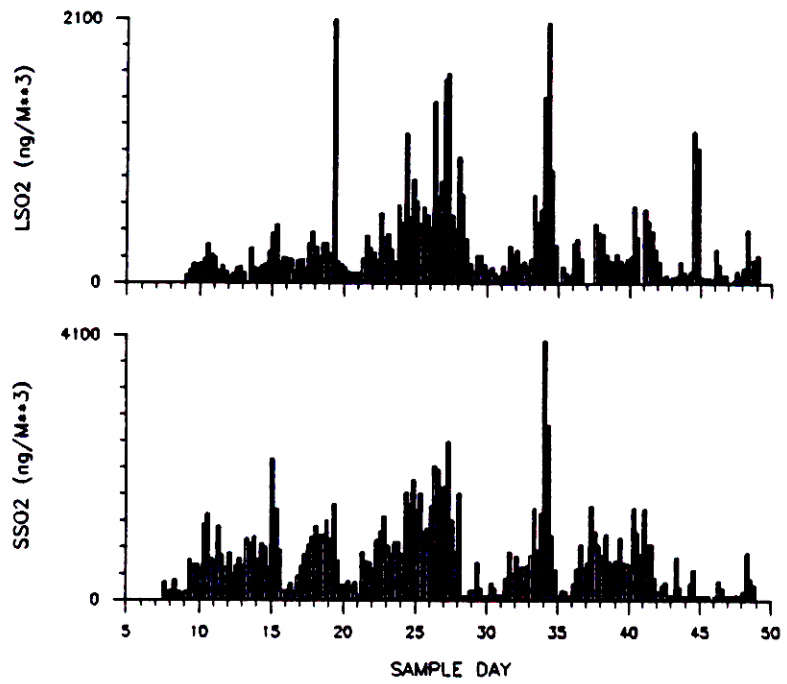


Figure 3E.3: Time plots of SO_2 by Drexel (LSO2) and SO_2 by IMPROVE at Canyonlands.

IMPROVE vs BYU (Page)

The IMPROVE and BYU samplers took samples in parallel for an 11-day period from February 5–15. Figure 3E.4 shows the temporal behavior of the three measurements. Figure 3E.5 compares the three individual measurements with the mean. The correlations between any two methods are approximately $r^2 = 0.9$.

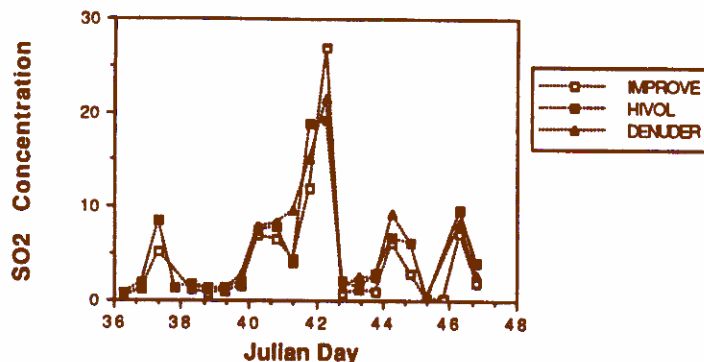


Figure 3E.4: Time plot of IMPROVE, BYU HiVol, and BYU annular denuder samplers for SO₂.

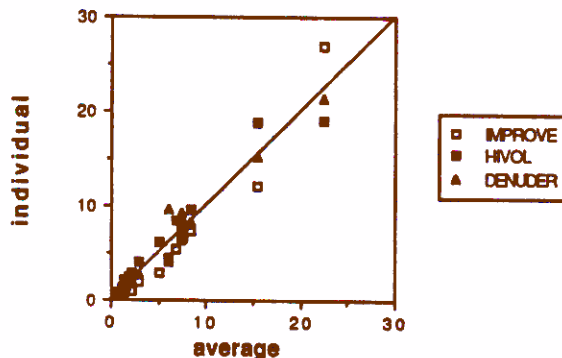


Figure 3E.5: Comparison of SO₂ by IMPROVE, BYU HiVol, and BYU annular denuder samplers at Page for February 5–15.

References

- ¹Thornton, D.C., A.R. Driedger, and A.R. Bandy, 1986: Determination of part-per-trillion levels of sulfur dioxide in humid air, *Anal. Chemistry*, **58**, 2688.
- ²Lewis, E.A., C. Benner, L. Lewis, M. Olsen, L.D. Hansen, D.L. Eatough, N.L. Eatough, and P.S. Bhardwaja, 1990: Sulfur and nitrogen oxo-acids present during the WHITEX study as determined by using filter pack and diffusion denuder sampling systems, *Proceedings of the AWMA/EPA International Specialty Conference: Visibility and Fine Particles*, Estes Park, CO, October 15-19.