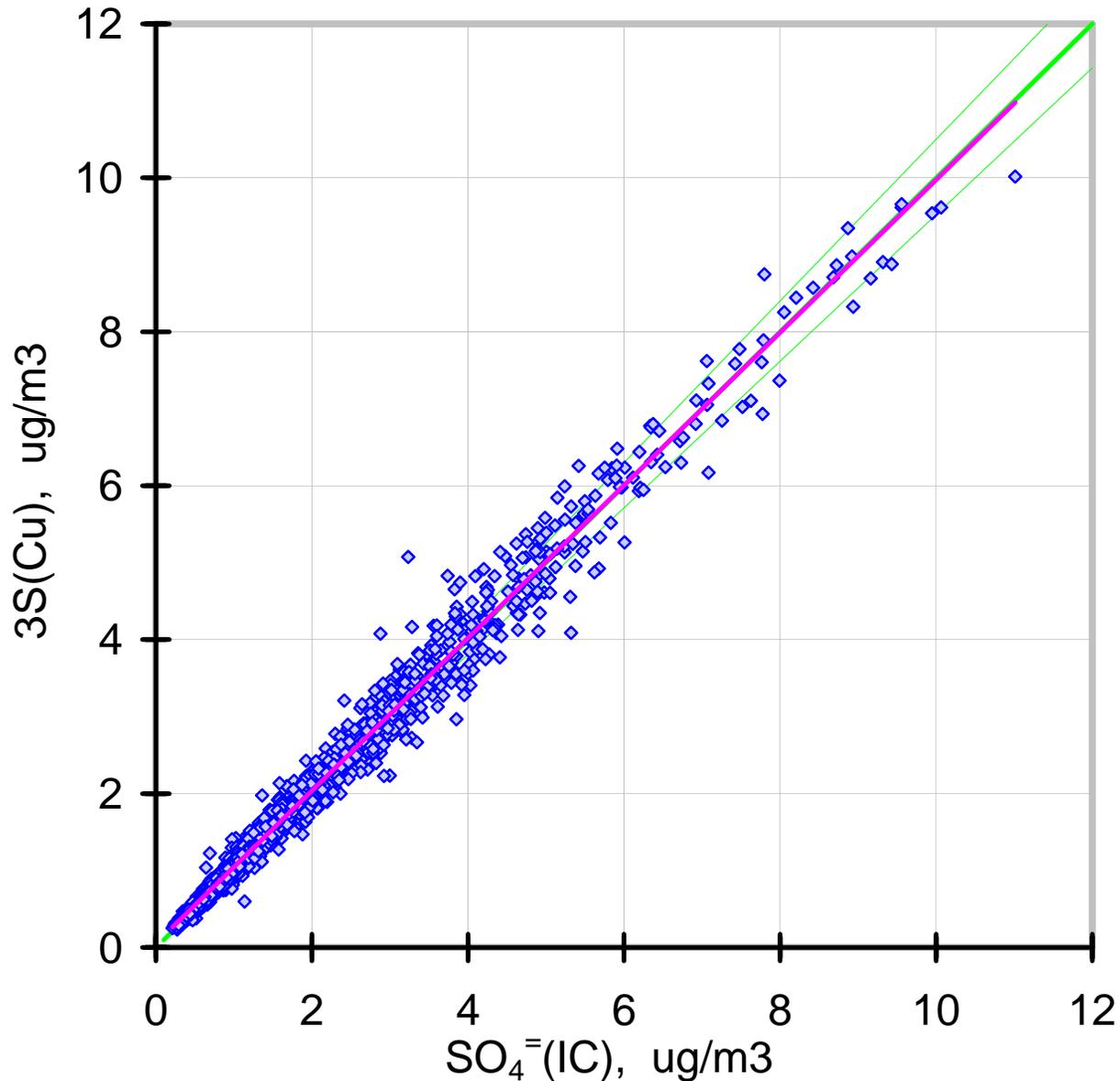


Quality assurance



$$y = 0.992x + 0.054$$
$$r^2 = 0.985$$

agreement $\pm 5\%$

Entire network,
10/2002 – 12/2004.

Each point ($n = 1877$)
is the geometric mean
of at least 8
observations at one
site in one month, all
with value $> 10 \times \text{mdl}$.



Arizona Daily Star



Measuring pollution improvement at canyon to take years

THE ASSOCIATED PRESS, 1/6/2006

PHOENIX - Scientists at the Grand Canyon say they'll spend the next several years measuring air quality to see if the closure of an aging coal-fired power plant improves the views.

The Mohave Generating Station near Laughlin, Nev., closed Dec. 31 rather than violate a court-ordered deadline to install an estimated \$1.1 billion in pollution-control measures.

...

The last study on the plant's impact on the canyon was done in 1998. It showed that during the worst summertime pollution days, the plant contributed anywhere from **2.5 to 16 percent** of the pollution near Meadview and the Canyon's west side.

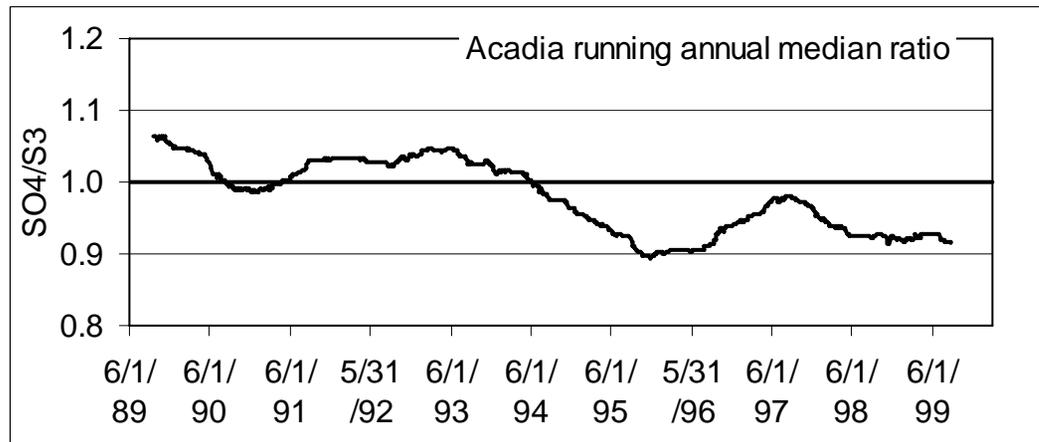
Sulfur-Sulfate Trends for IMPROVE

Author: Robert Eldred, CNL, University of California, Davis (raeldred@ucdavis.edu)

Date: May 17, 2001

Summary: Warren White noted a trend in the ratio of nylon sulfate / Teflon sulfur over the course of the IMPROVE network. This is extremely critical in determining sulfate trends. This report concludes that there is no trend in the ratio of analytical calibrations, but there is a trend in the relationship at low concentrations. This is seen in the intercept and in distributions. The low end concentrations are primarily affected by the artifact that is subtracted from the samples. This change in low end concentrations can account for the trend in the ratios. No mechanism for producing such a change has been identified.

Figure 2. Running annual median ratio of SO₄/S₃ at Acadia National Park. Data collected before 3/18/89 are excluded.

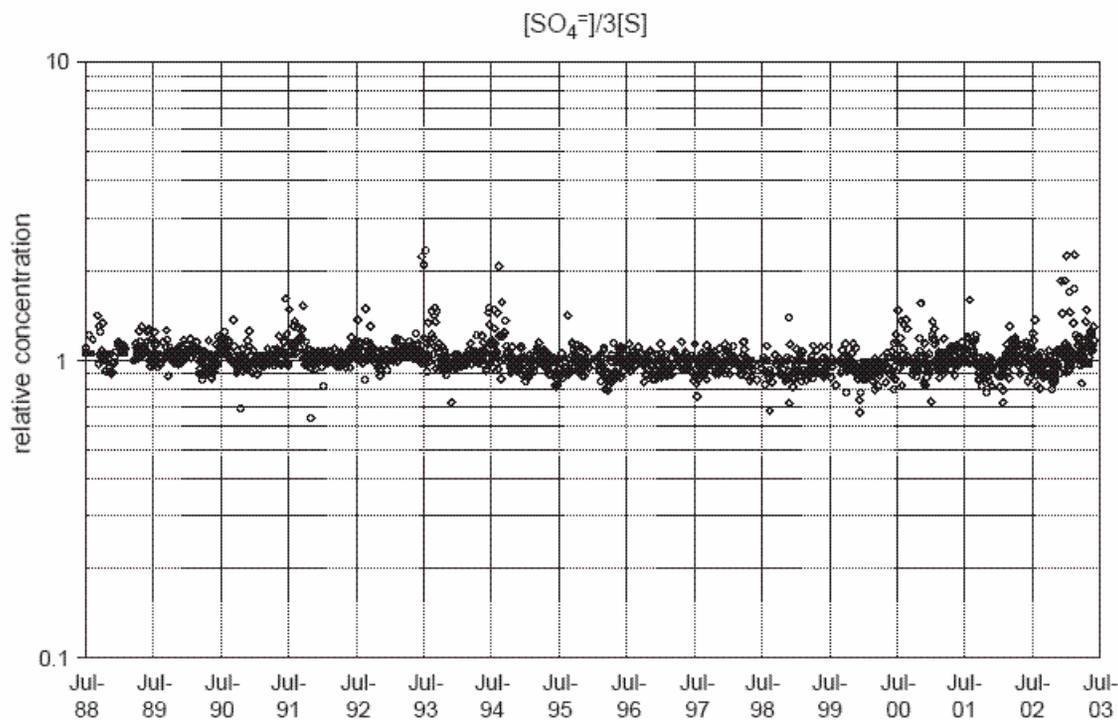


Estimating measurement uncertainty in an ambient sulfate trend

W.H. White*, L.L. Ashbaugh, N.P. Hyslop, C.E. McDade

Crocker Nuclear Laboratory, University of California, One Shields Avenue, Davis, CA 95616, USA

Received 22 March 2005; accepted 1 August 2005



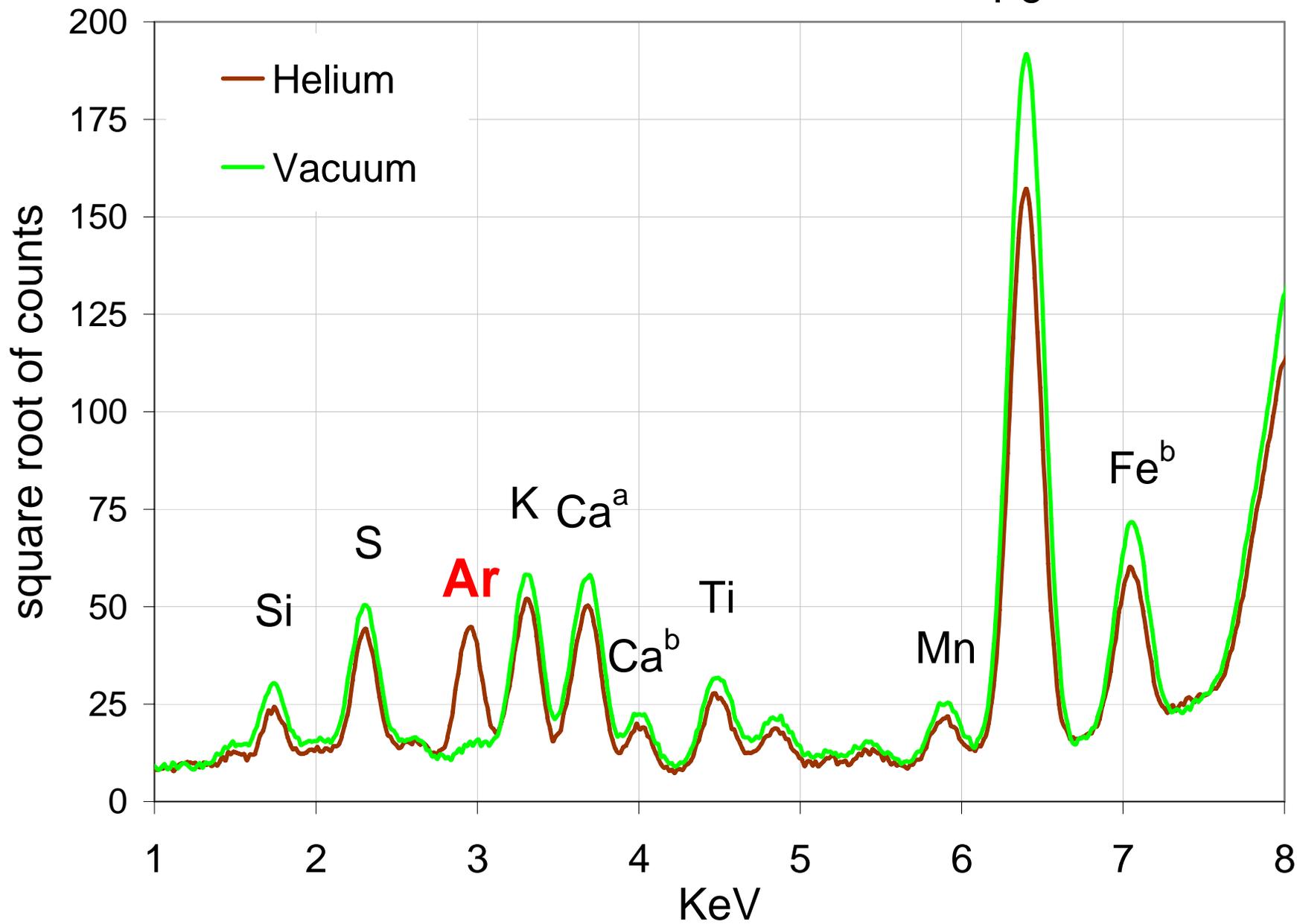
Period	Shenandoah, VA	
	$\text{SO}_4/3\text{S}$	
	Decrease yr^{-1} (%)	\pm (%)
6/88–5/93	0.3	0.6
6/89–5/94	–0.5	0.7
6/90–5/95	0.1	0.7
6/91–5/96	2.3	0.8
6/92–5/97	2.8	0.7
6/93–5/98	2.6	0.7
6/94–5/99	2.0	0.6
6/95–5/00	0.8	0.5
6/96–5/01	–0.6	0.6
6/97–5/02	–1.5	0.7
6/98–5/03	–3.5	0.8
rms/ $\sqrt{2}$	1.3	0.5

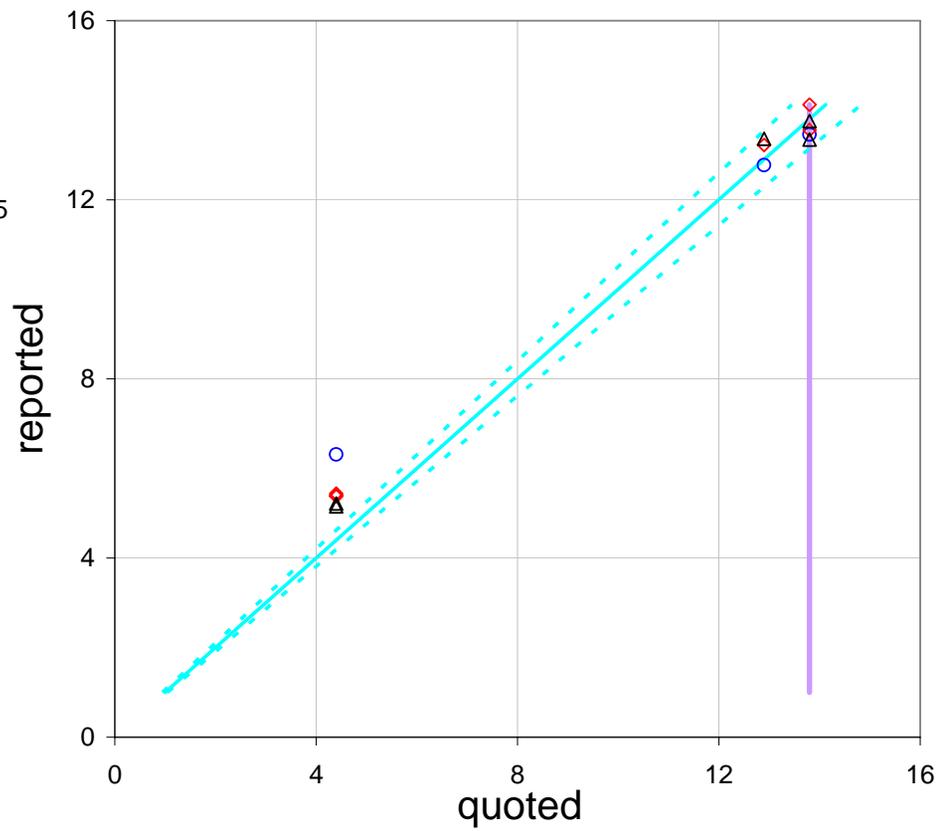
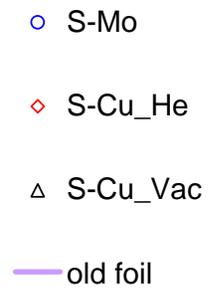
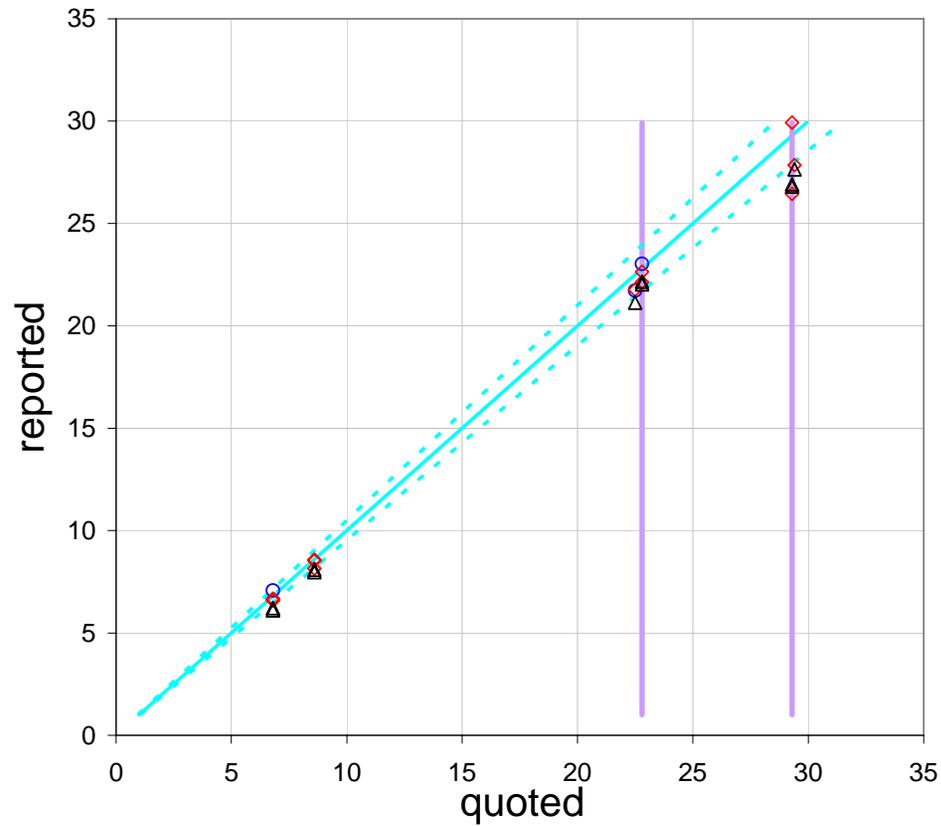
Fig. 8. IMPROVE sulfate concentration ratios at Shenandoah National Park. Each point indicates a ratio $[\text{SO}_4^=]/3[\text{S}]$ of independent 24 h measurements by two different methods.

Table 1. Five-year trends in measurement differences

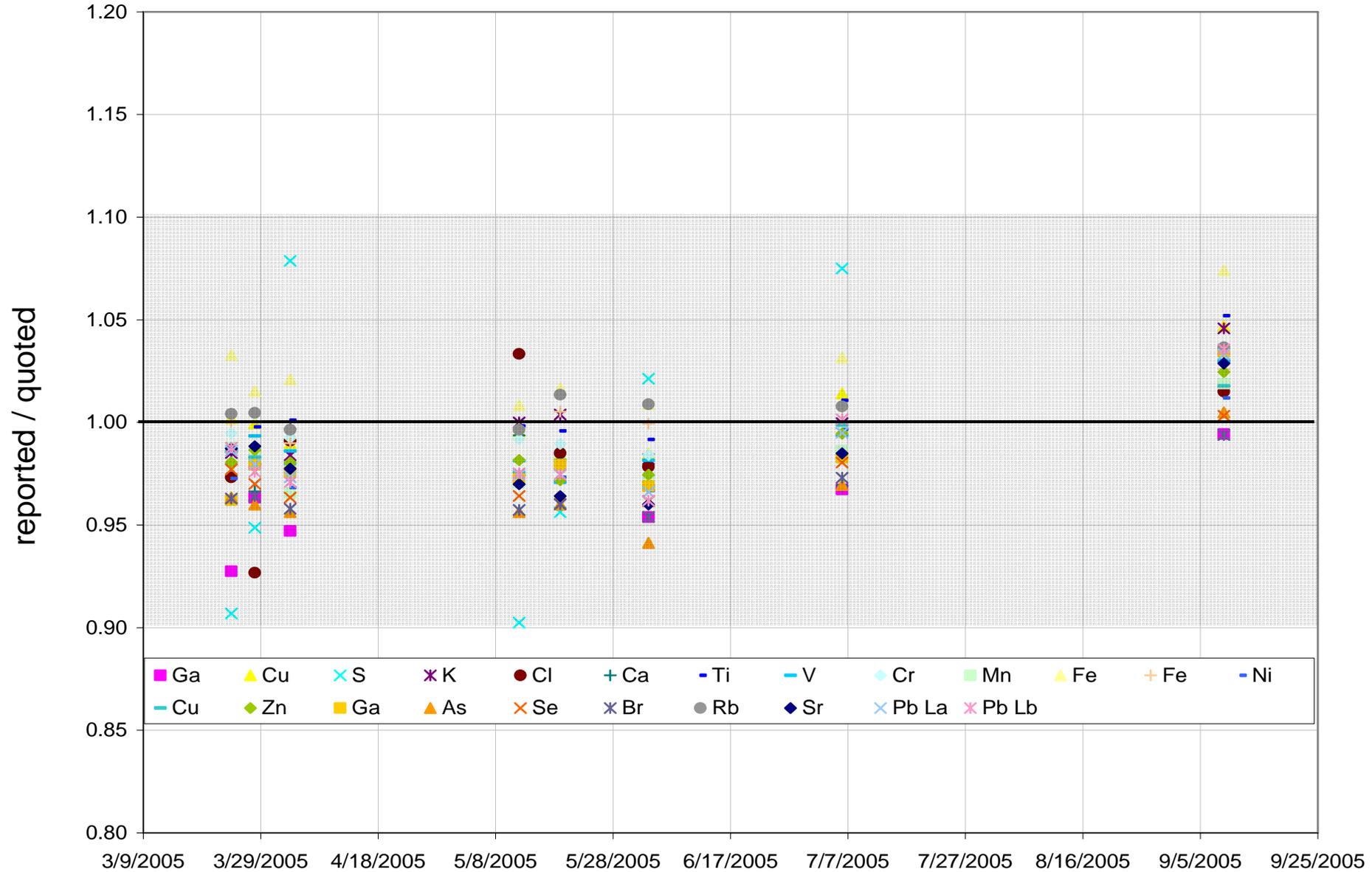
PHOE5, 1/07/05

Fe^a

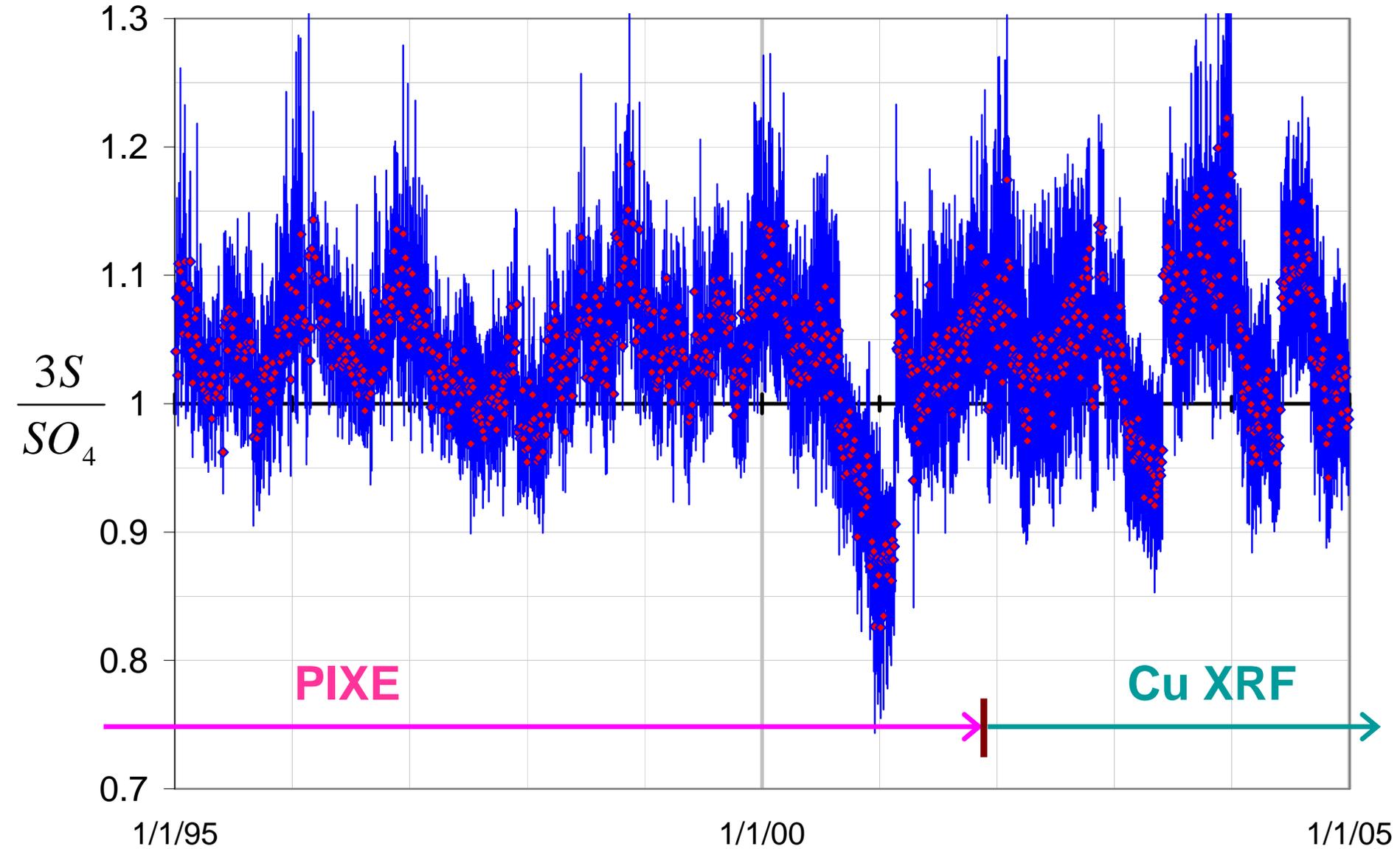




standards on Mo system



MEDIAN AND INTERQUARTILE RANGE ENTIRE NETWORK, ALL DETECTED CONCENTRATIONS



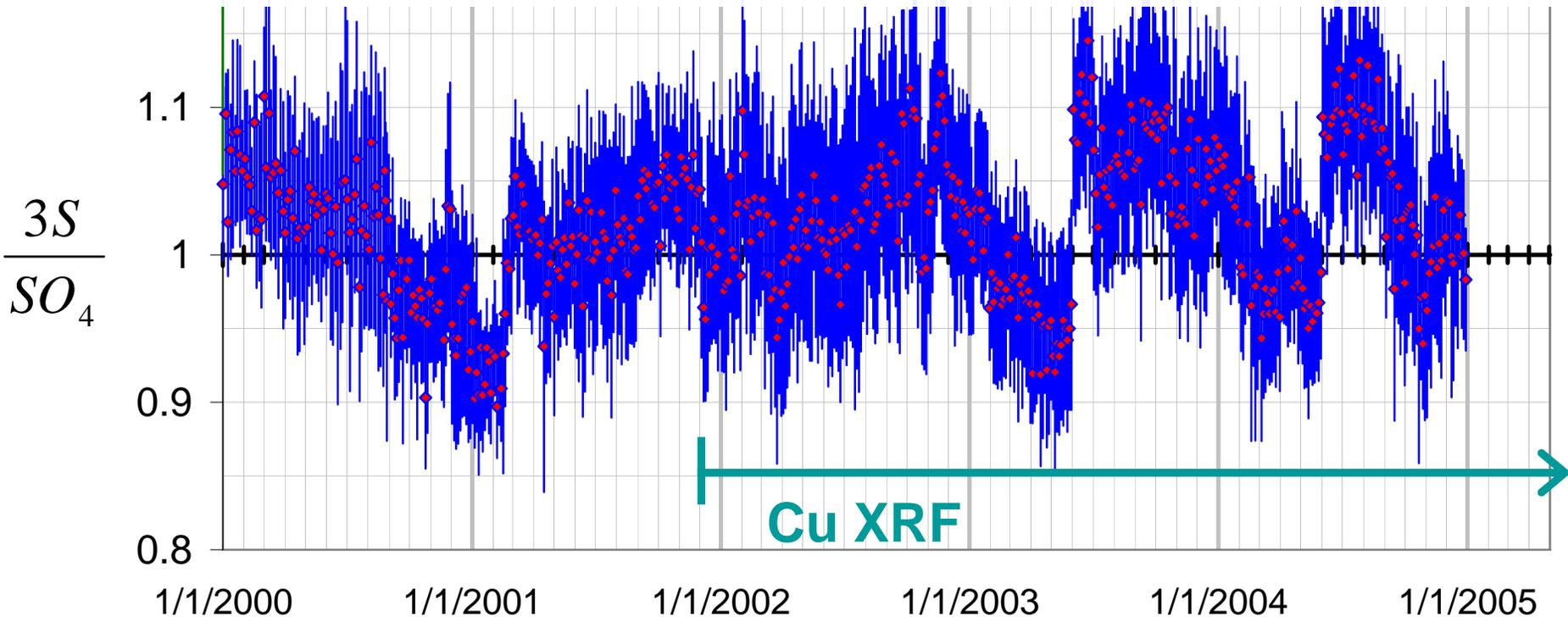
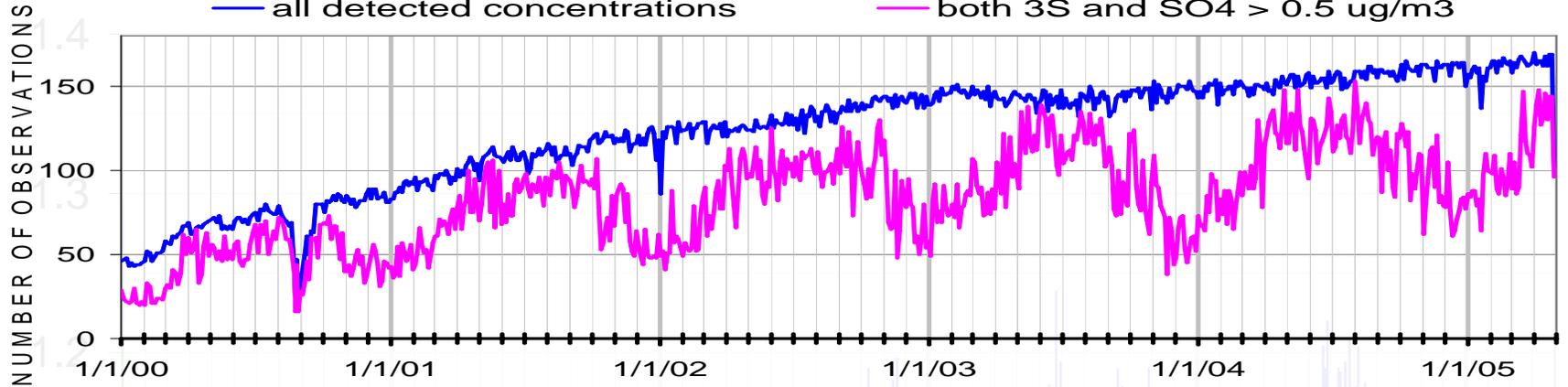
MEDIAN AND INTERQUARTILE RANGE

ENTIRE NETWORK

3S & SO₄ BOTH > 0.5 μg/m³

— all detected concentrations

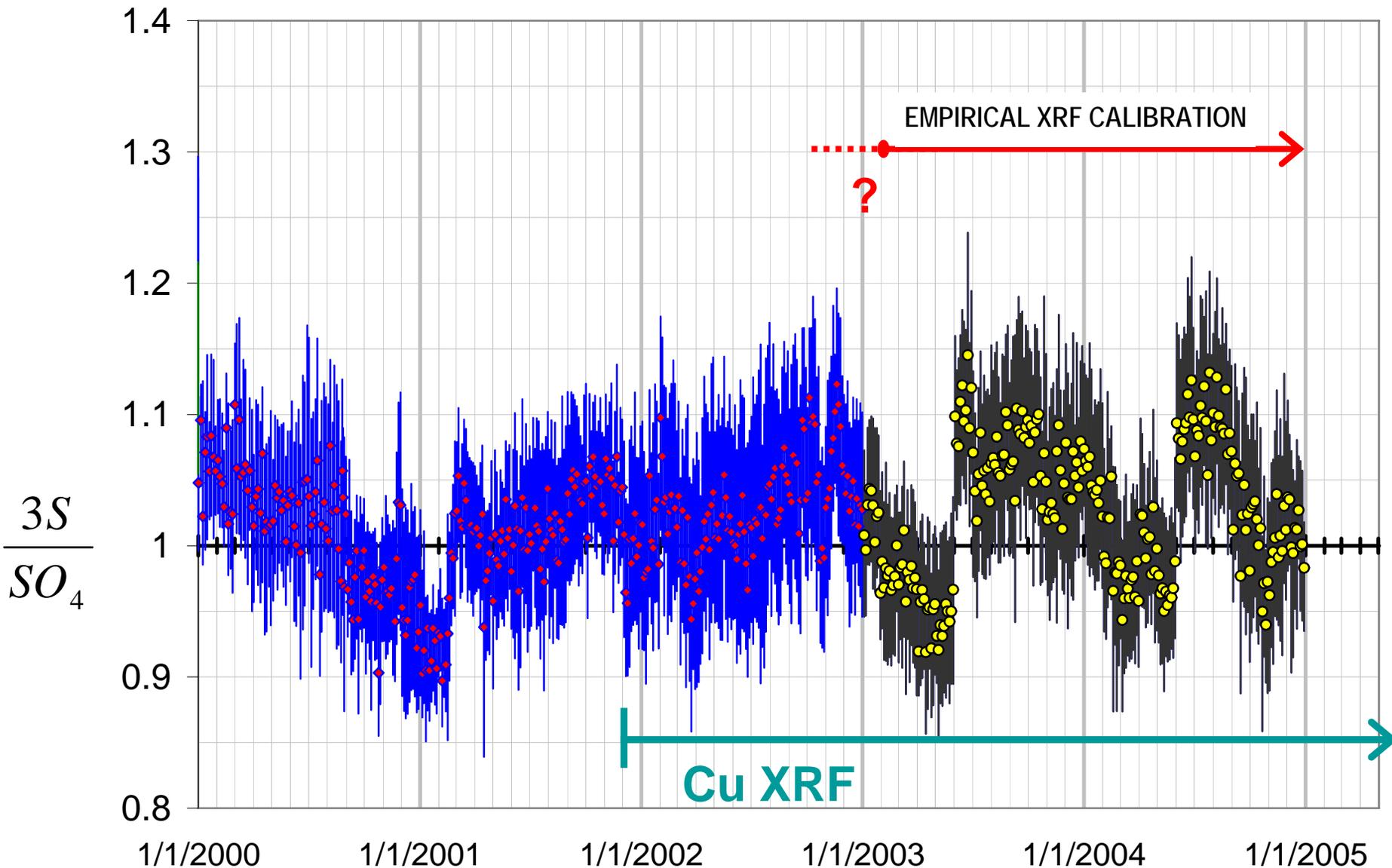
— both 3S and SO₄ > 0.5 ug/m³

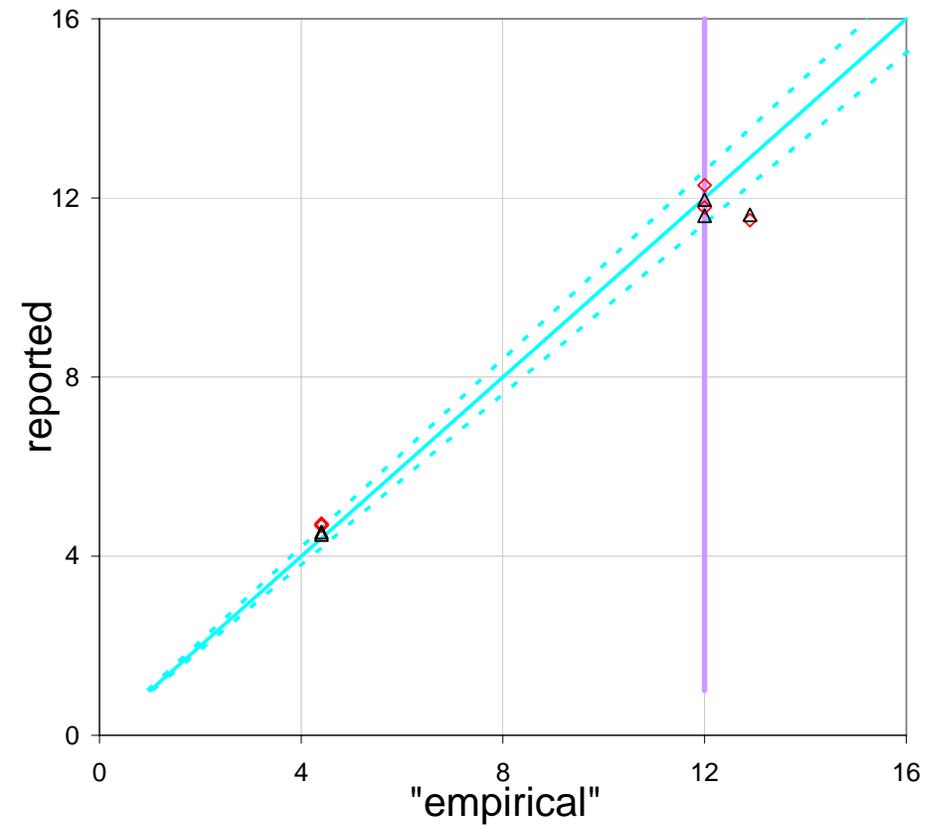


MEDIAN AND INTERQUARTILE RANGE

ENTIRE NETWORK

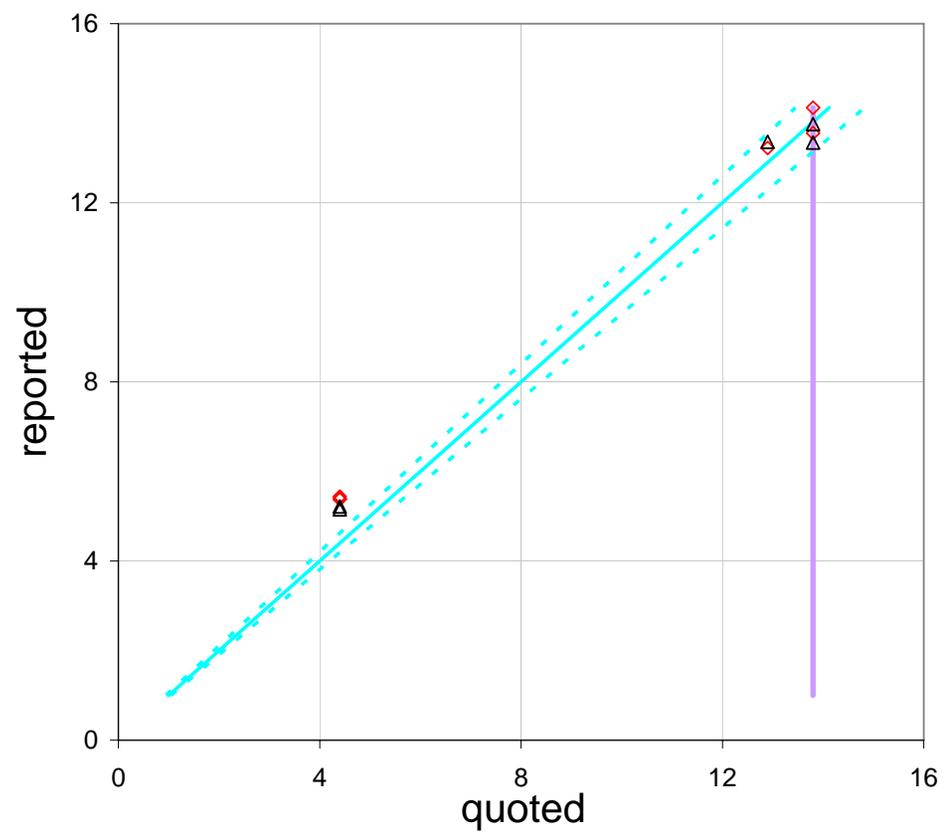
3S & SO₄ BOTH > 0.5 μg/m³





- ◇ S-Cu_He
- △ S-Cu_Vac
- old foil

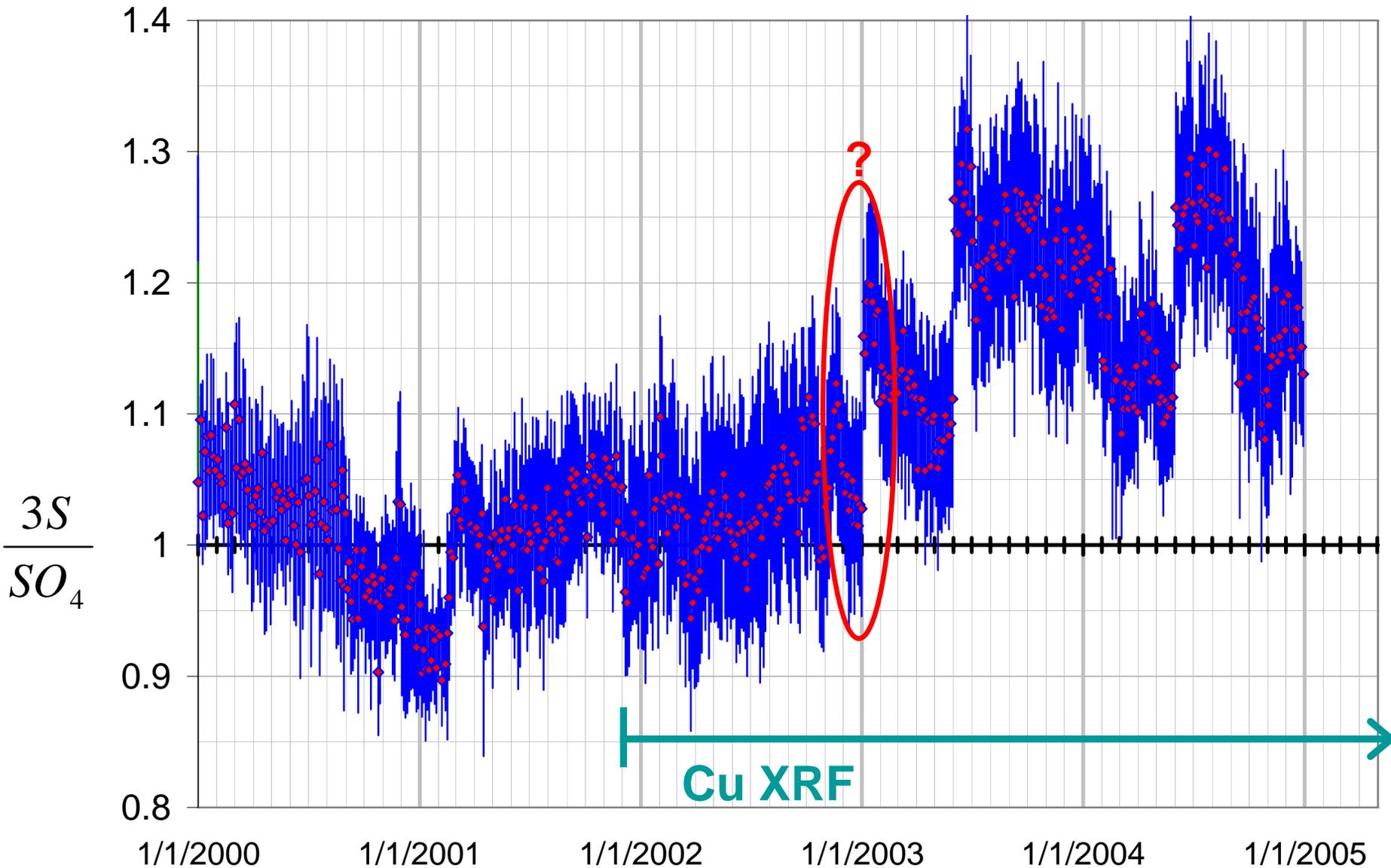
- ◇ S-Cu_He
- △ S-Cu_Vac
- old foil



MEDIAN AND INTERQUARTILE RANGE

ENTIRE NETWORK

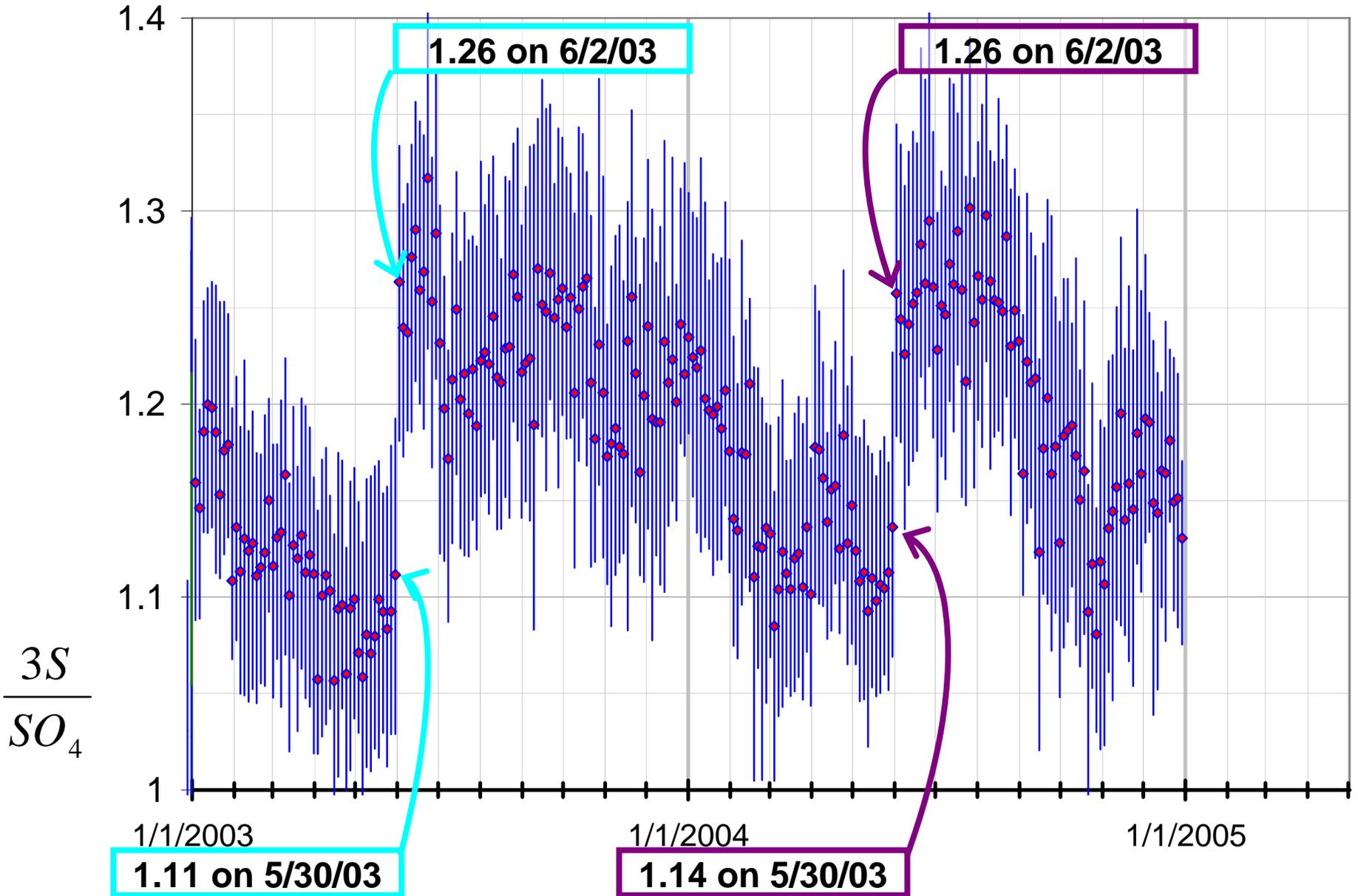
3S & SO₄ BOTH > 0.5 μg/m³



MEDIAN AND INTERQUARTILE RANGE

ENTIRE NETWORK

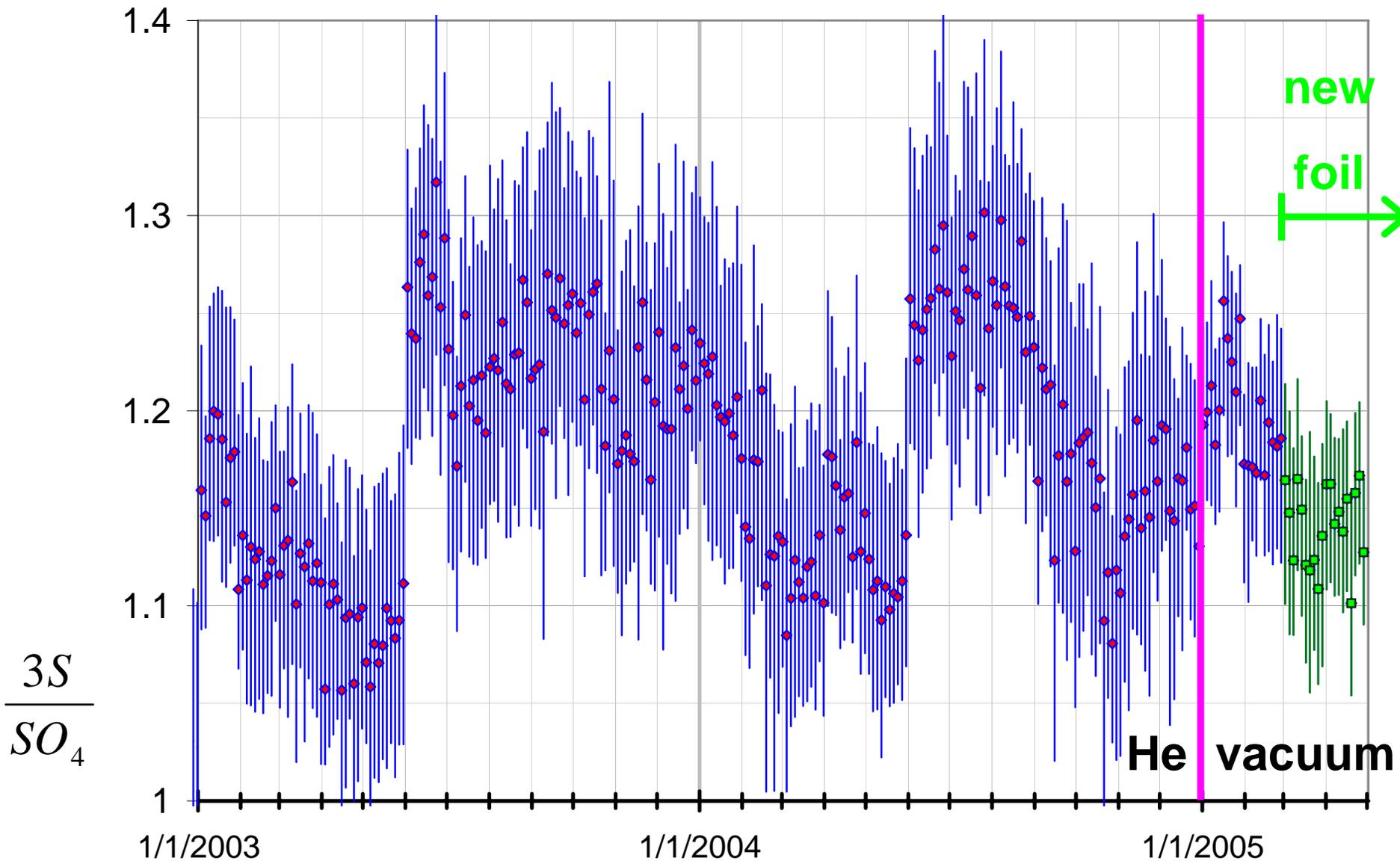
3S & SO₄ BOTH > 0.5 μg/m³



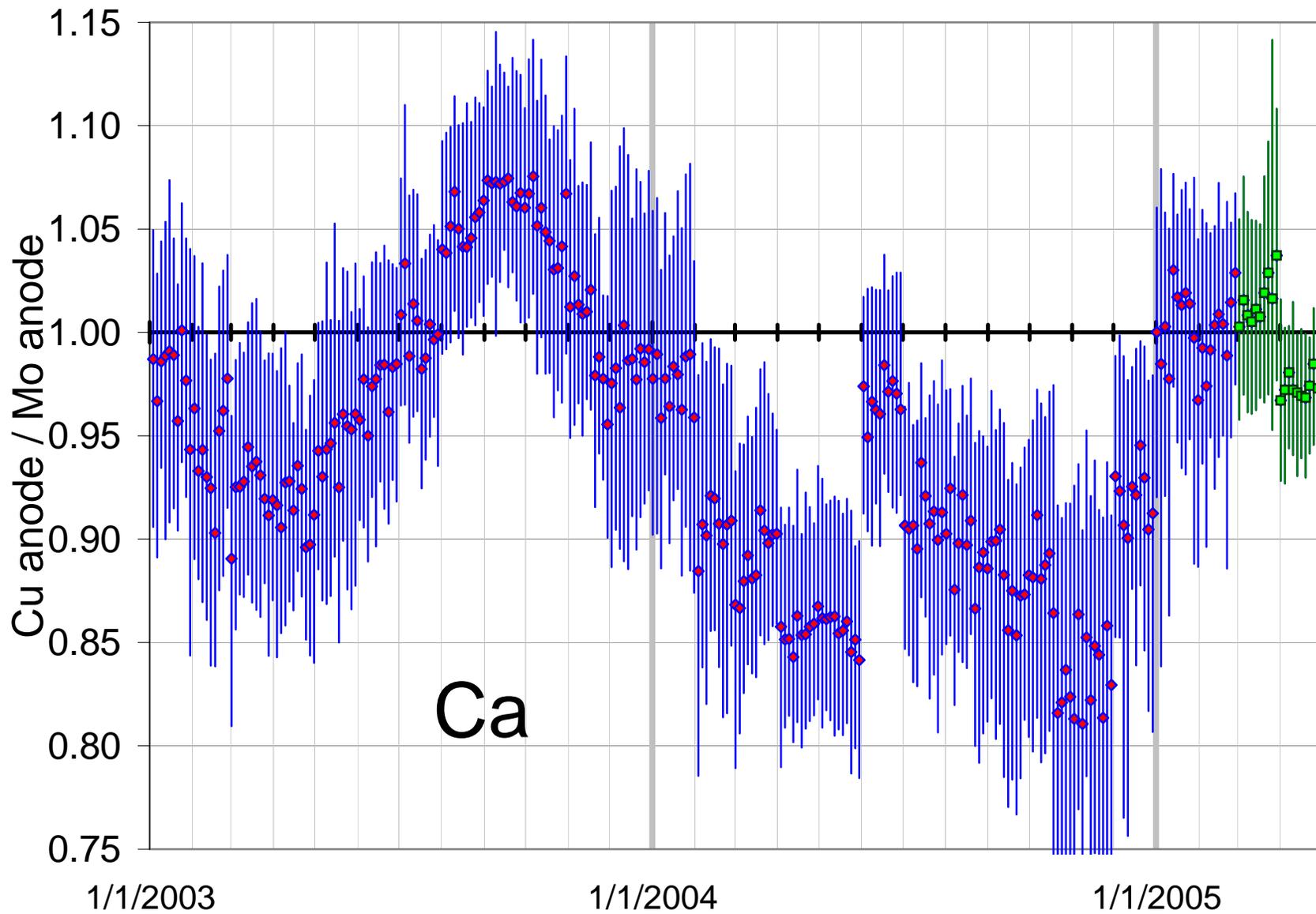
MEDIAN AND INTERQUARTILE RANGE

ENTIRE NETWORK

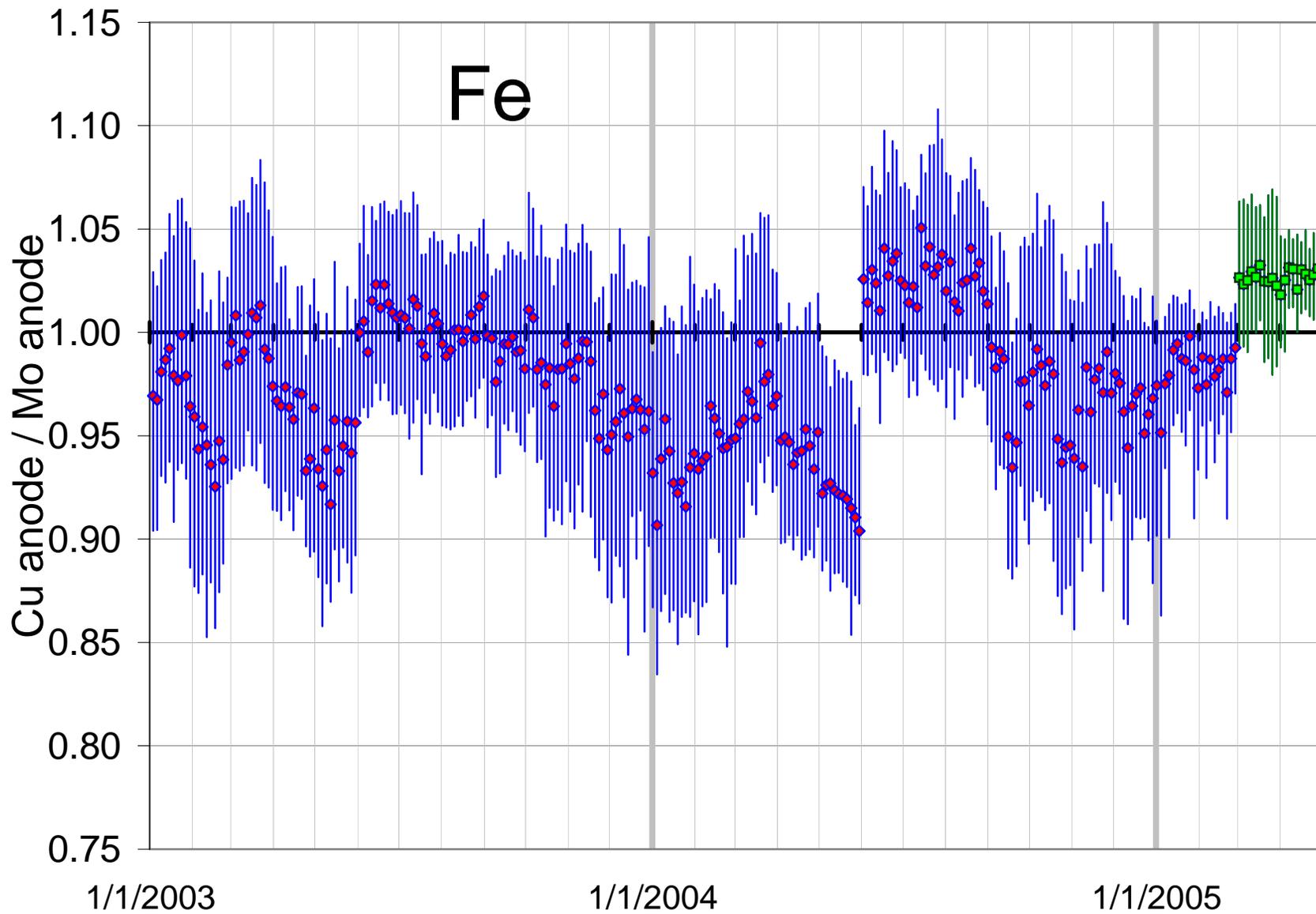
3S & SO₄ BOTH > 0.5 μg/m³



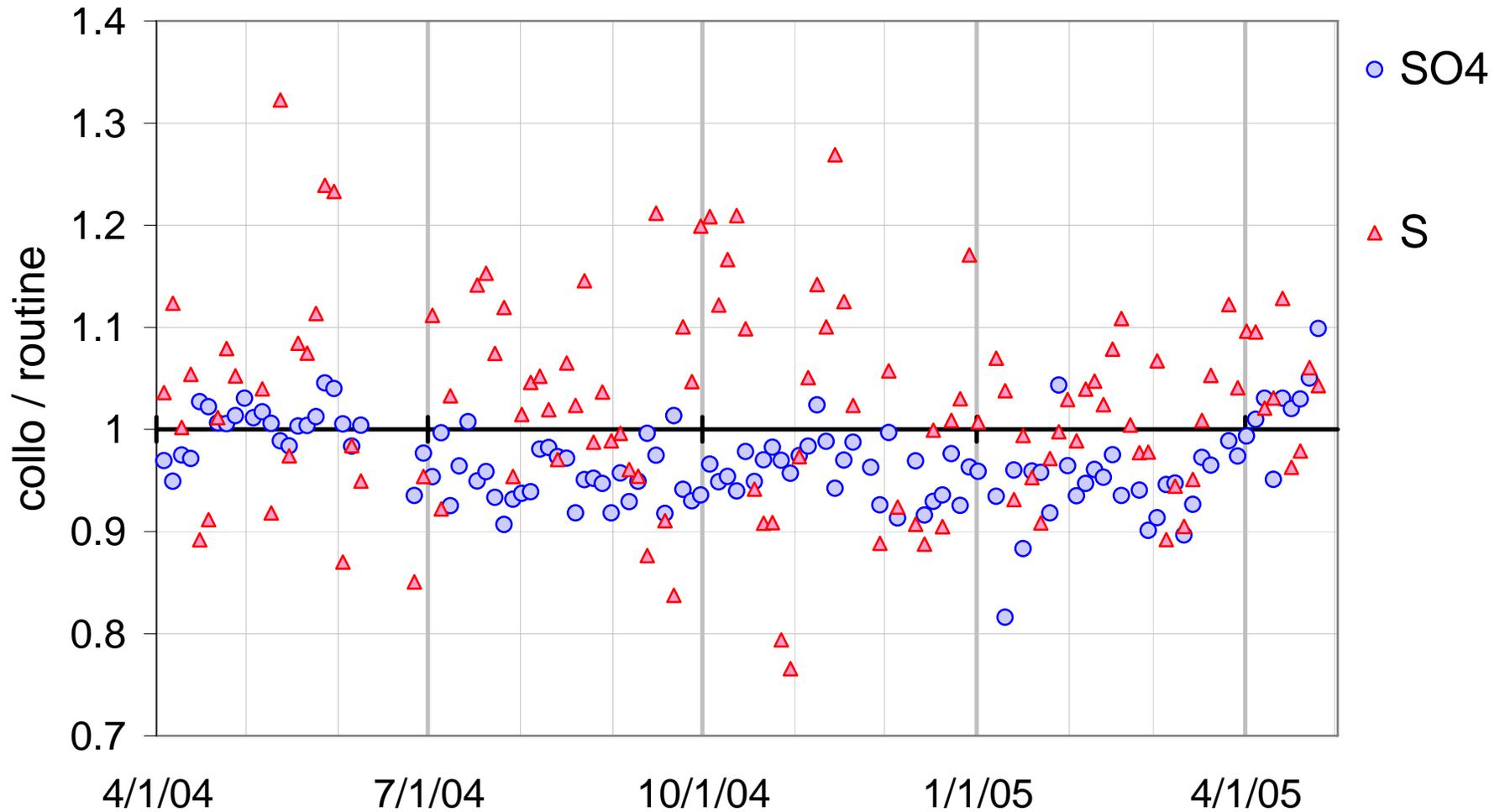
MEDIAN AND INTERQUARTILE RANGE ENTIRE NETWORK, ALL DETECTED CONCENTRATIONS



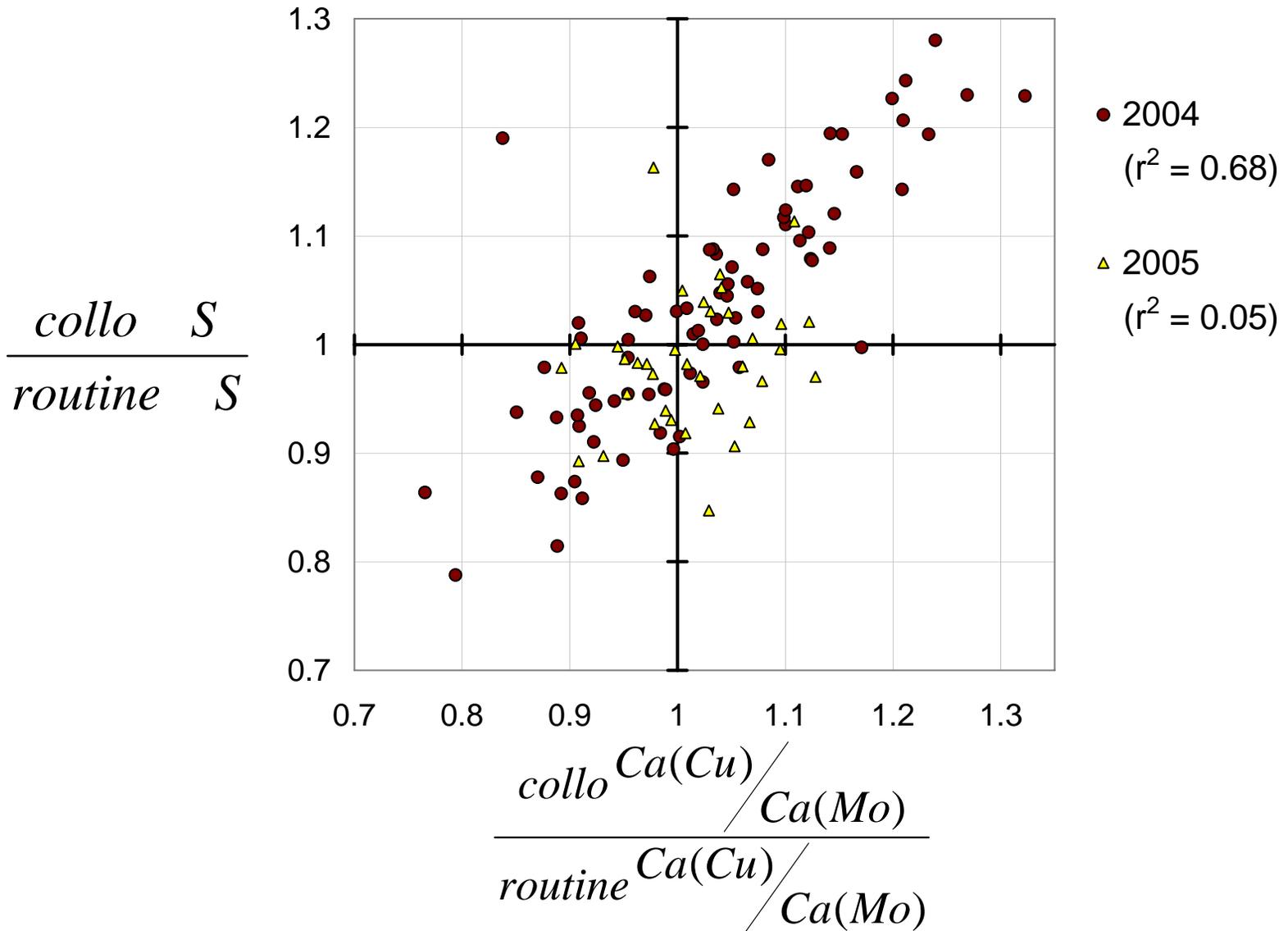
MEDIAN AND INTERQUARTILE RANGE ENTIRE NETWORK, ALL DETECTED CONCENTRATIONS



COLLOCATED SAMPLING, PHOENIX



COLLOCATED SAMPLING, PHOENIX



Recommendations:

to USEPA

Change RHR guidance to identify IC as the preferred sulfate measurement.

to IMPROVE Steering Committee

Temporarily withdraw all XRF sulfur from the public IMPROVE data base. It can remain available on request.

Highlight the change on the website and issue a data advisory. (Considered “grey literature”)

Gist of proposed data advisory

- In its ongoing review of IMPROVE data quality, the Steering Committee has identified concerns with the calibration of the elemental sulfur analyses. These may have implications for the accuracy of XRF data for other elements between sodium and iron in the periodic table.
- At some point after January 2001, the nominal value of the sulfur calibration standard was empirically adjusted to make sulfur concentrations more consistent with sulfate concentrations measured by IC. This adjustment was not clearly documented, and the date at which it was introduced is yet to be determined.
- The issues involved in XRF calibration are under active current investigation directed at understanding the causes of problems, correcting the historical data where records and new understanding make this possible, and minimizing calibration errors in future analyses.
- Until the calibration review has been completed, the Steering Committee recommends that XRF sulfur be considered suspect. For this reason it has been withdrawn from the public data base.
- The investigations underway and planned may also affect the interpretation of other elemental data, but these are not withdrawn because their calibration procedures have been consistent over time.

