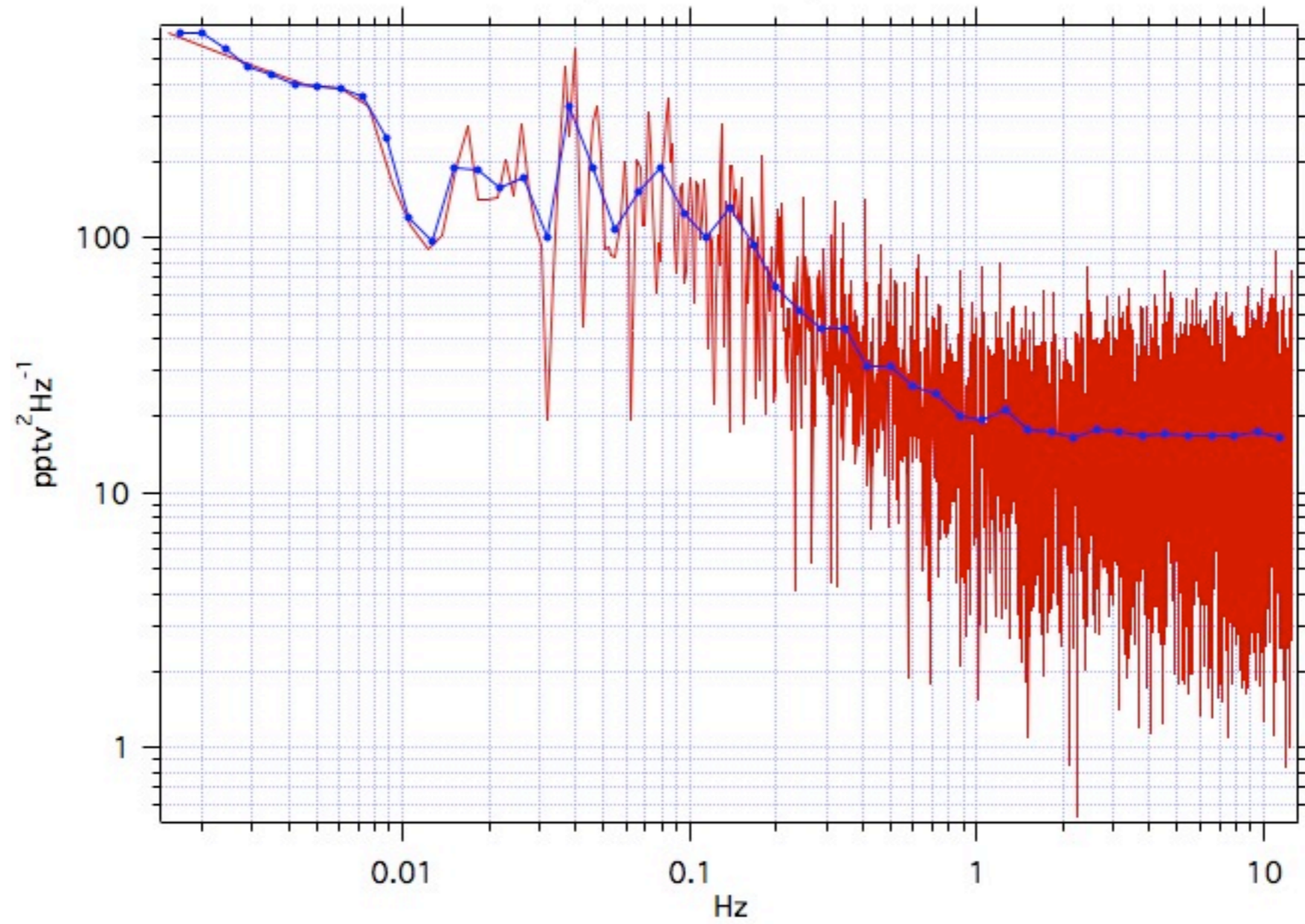
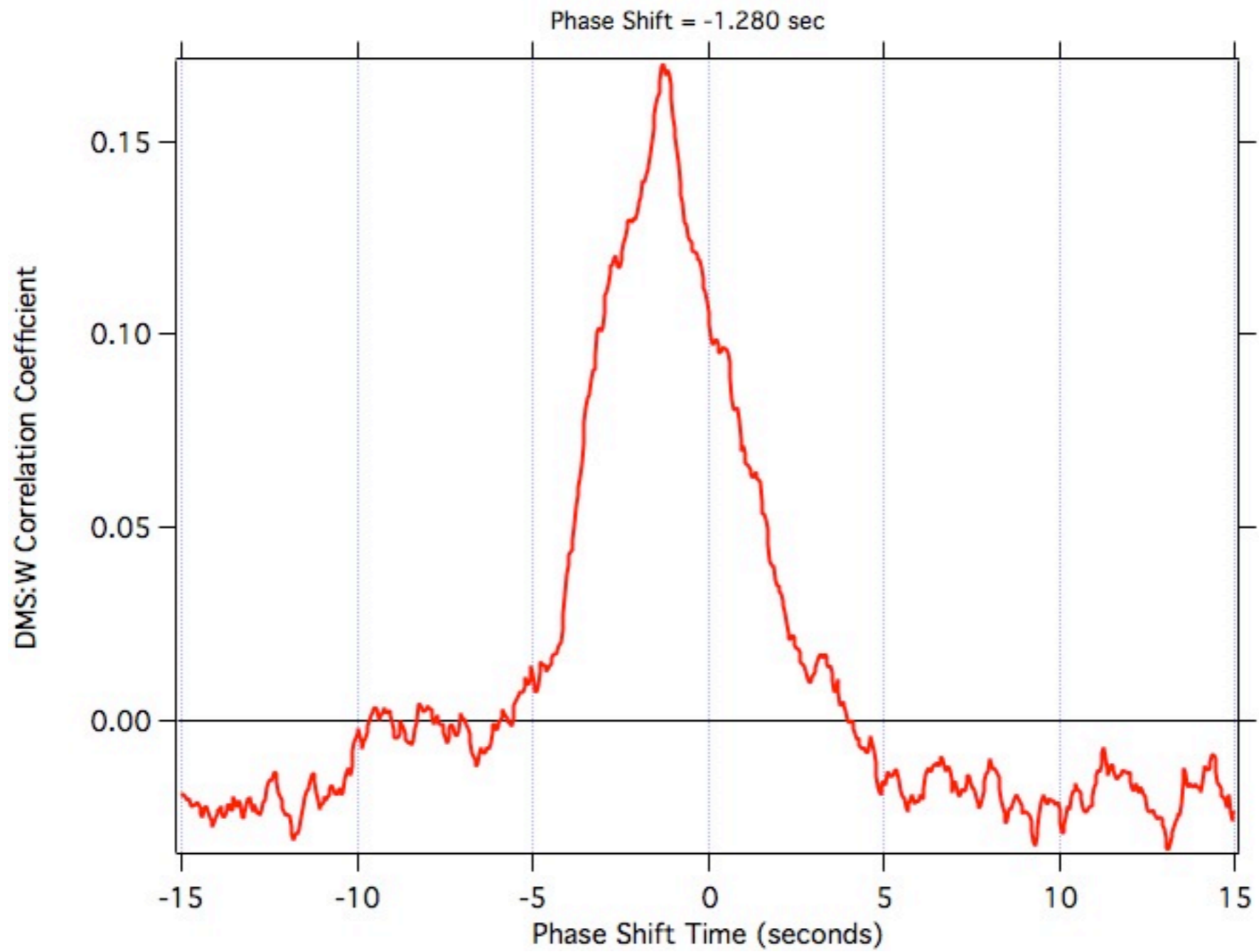


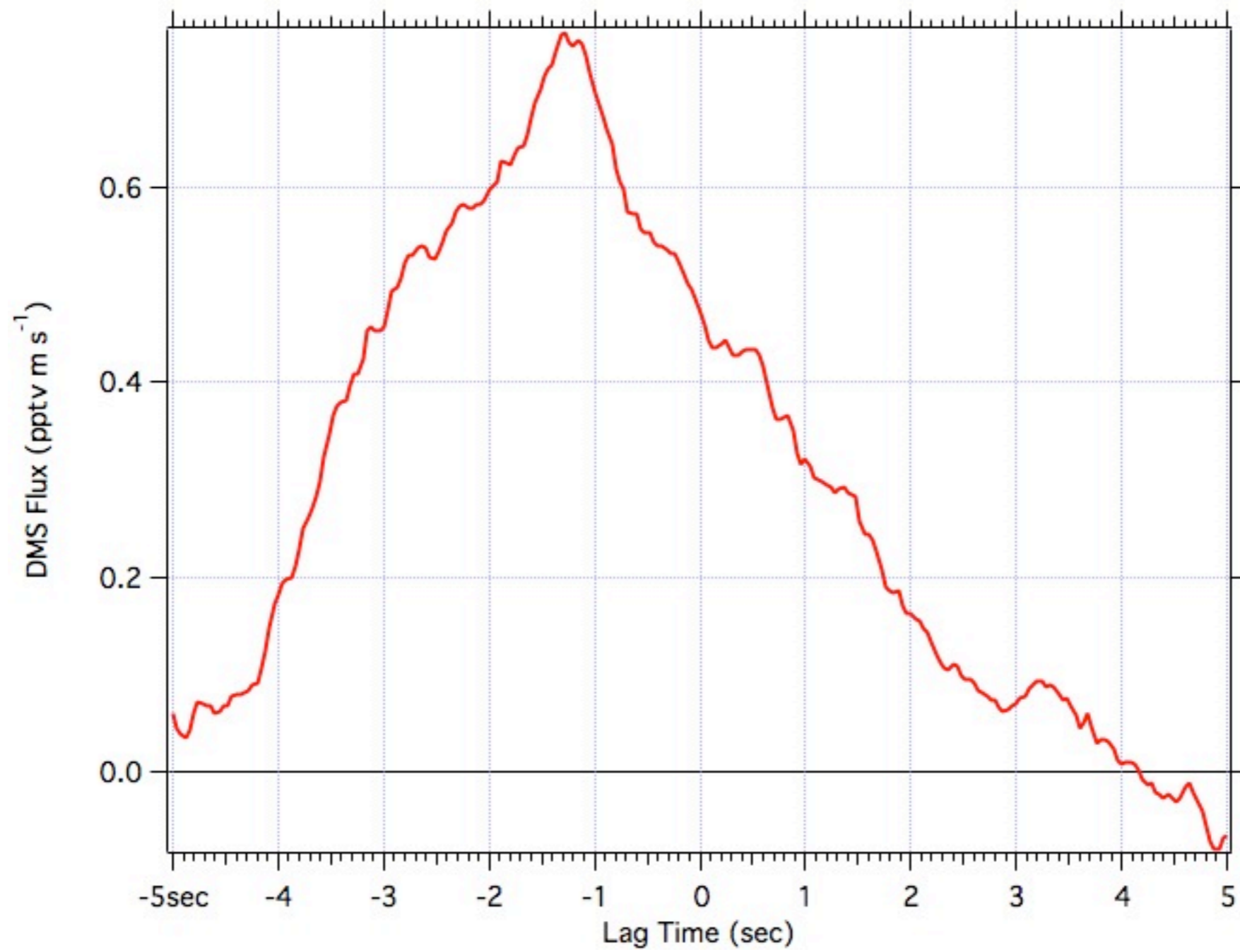
# Fast SO<sub>2</sub> / DMS

- 25 Hz SO<sub>2</sub> and DMS measurements by APIMS-ILS
- Largely identical instruments with slight differences in source temperature, mass spectrometer mode and flow rate.

Variance Spectrum for DMS, RF10 LSL1

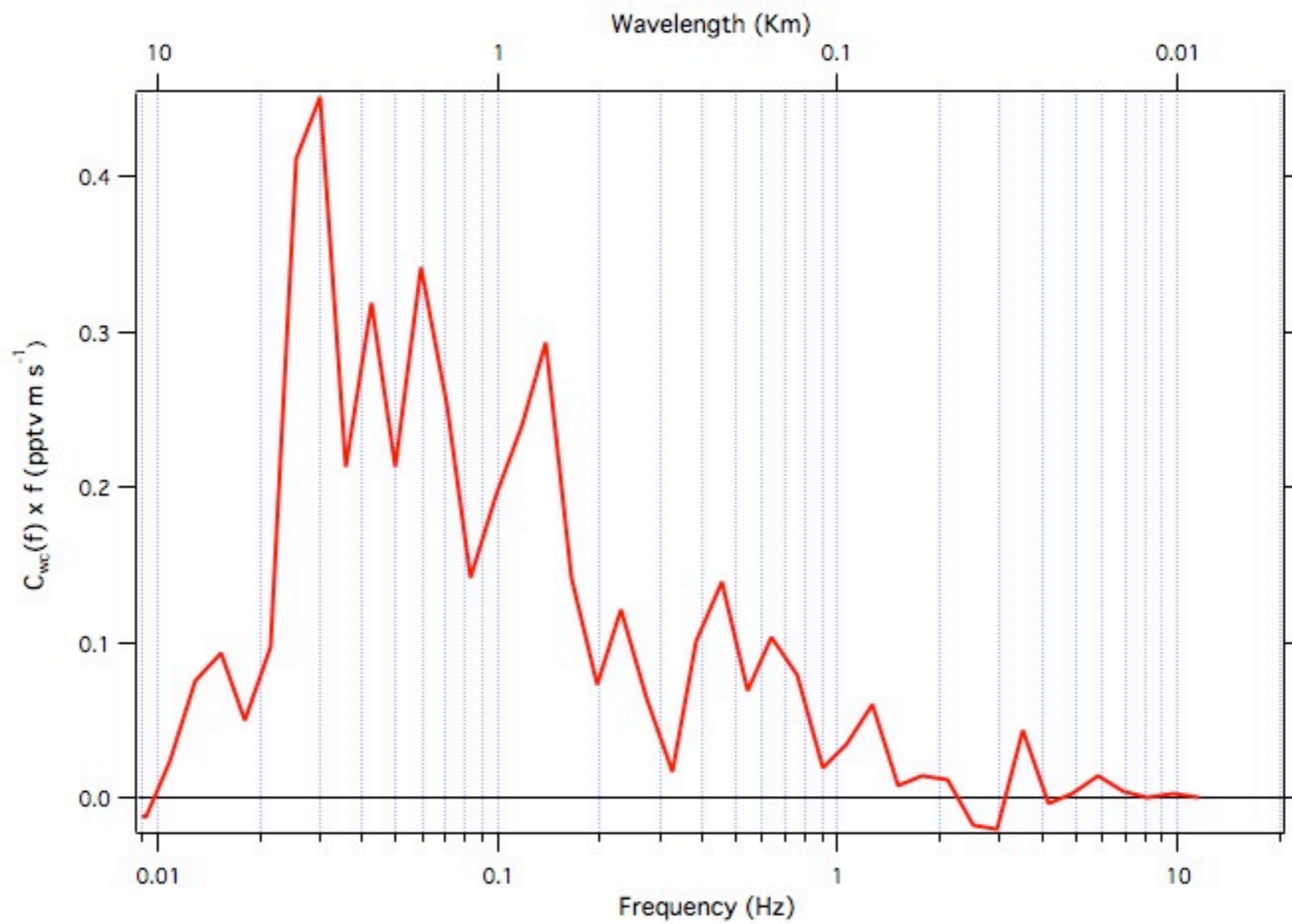








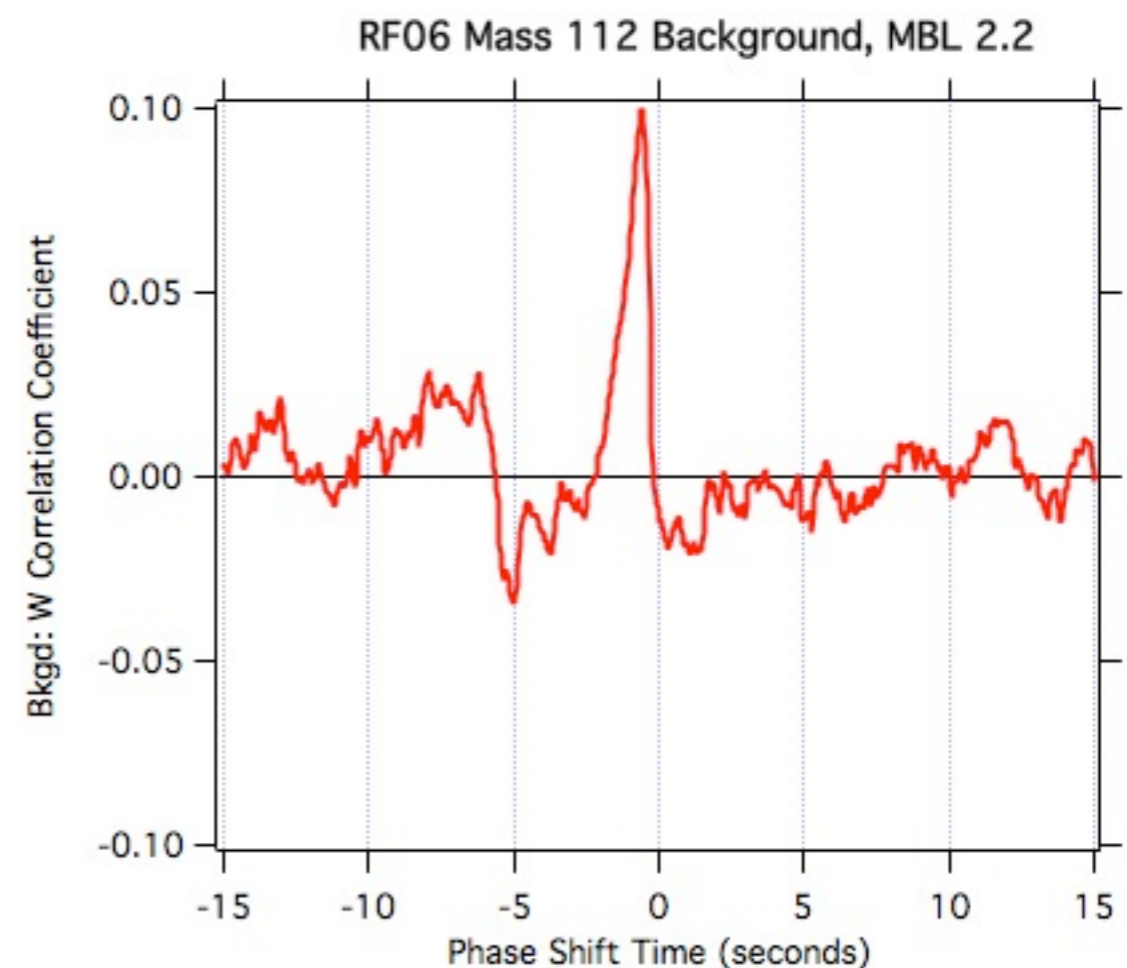
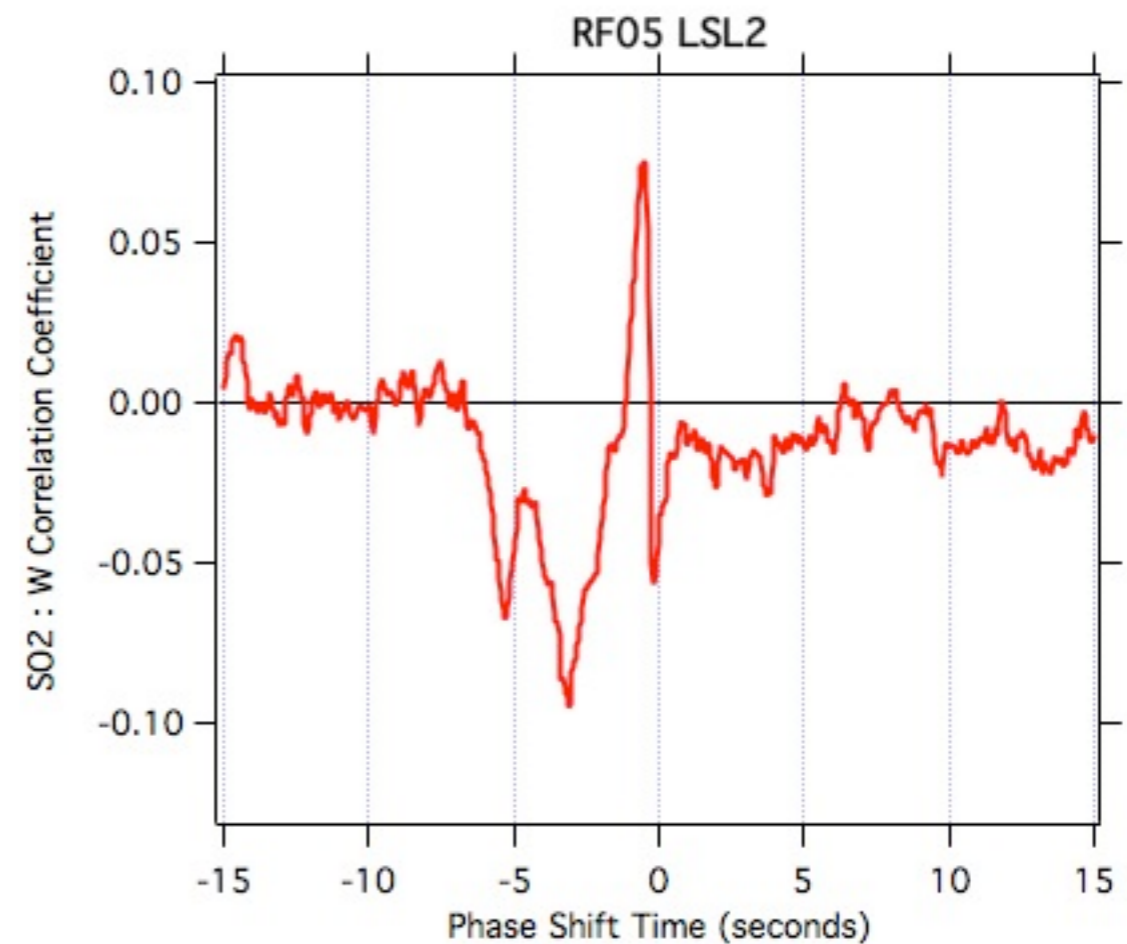
Cospectrum: Wseg & DMSseg (23:03:57 to 23:19:28), Lag = 1.28 sec



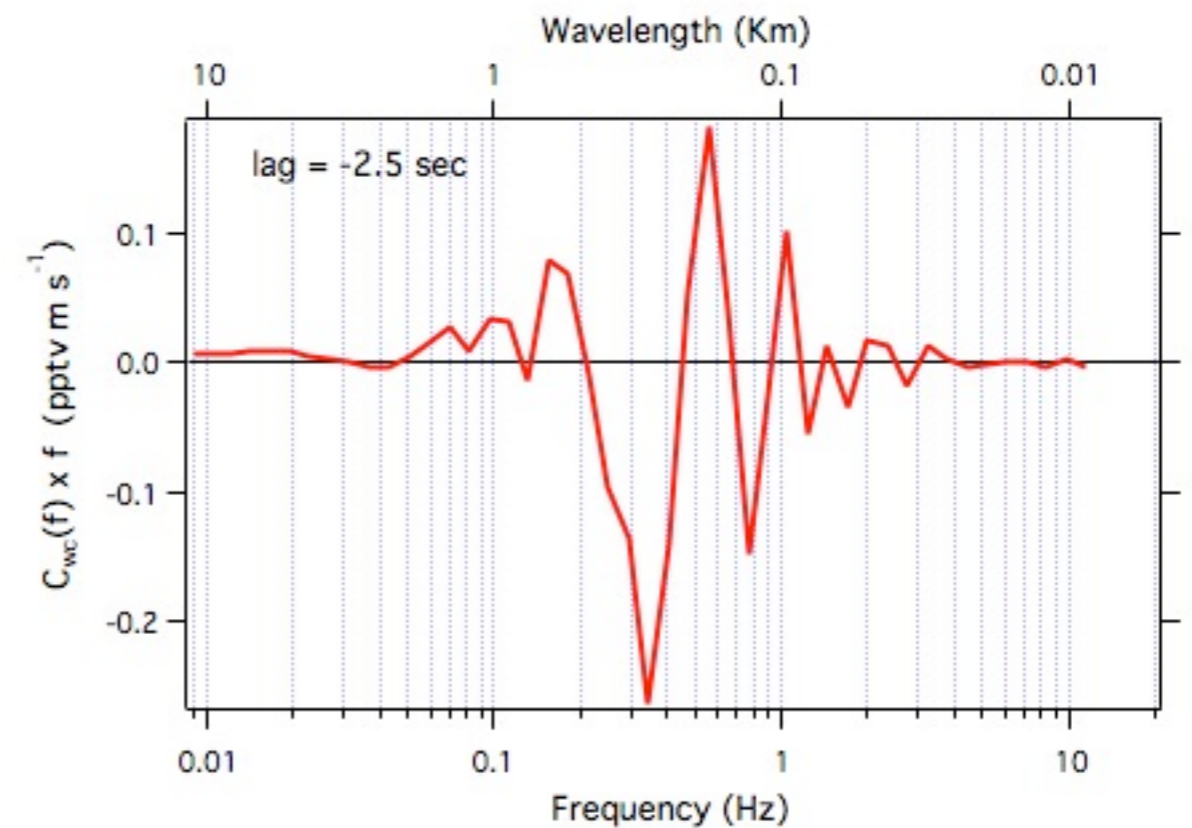
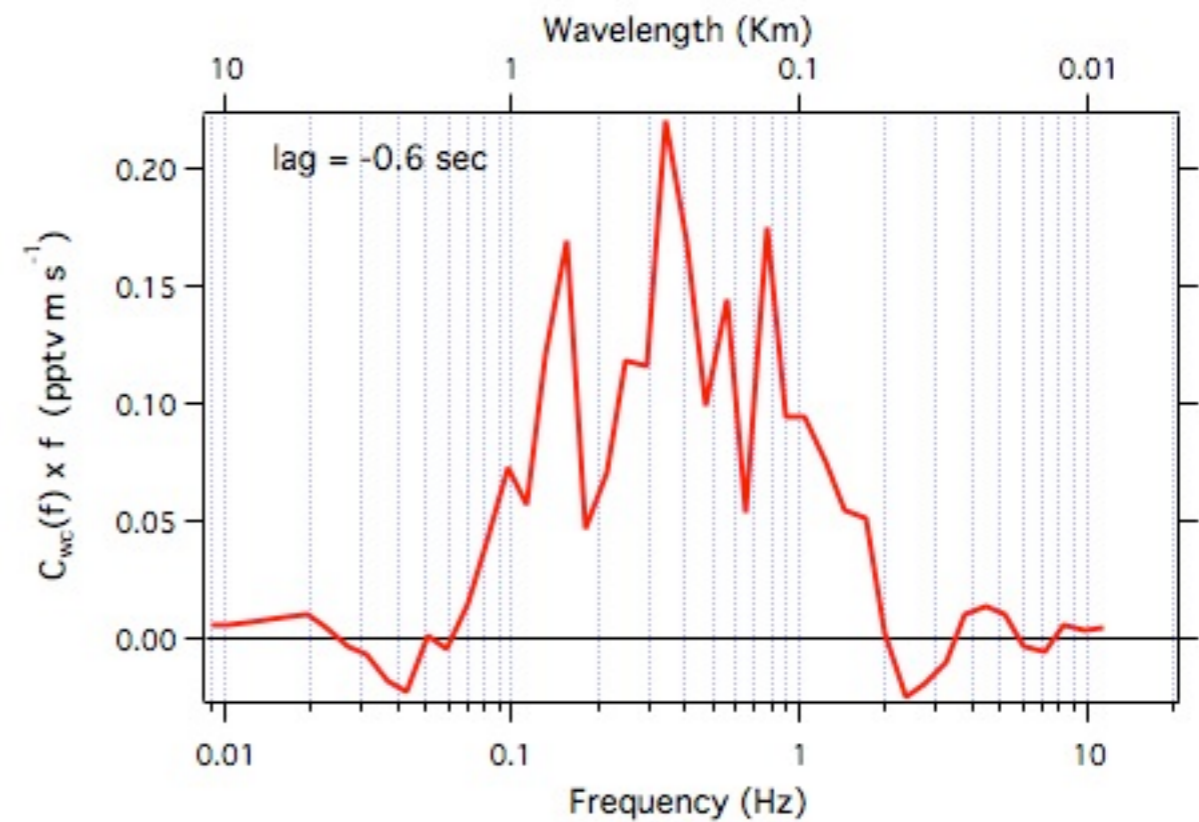
# SO<sub>2</sub> Lag Time

- Lag Correlation (surface legs)
- Analysis of time lag from cal gas spikes (4 flights) ~ 2.52 sec
- Comparison with DMS lag ~ 2-3 sec sec

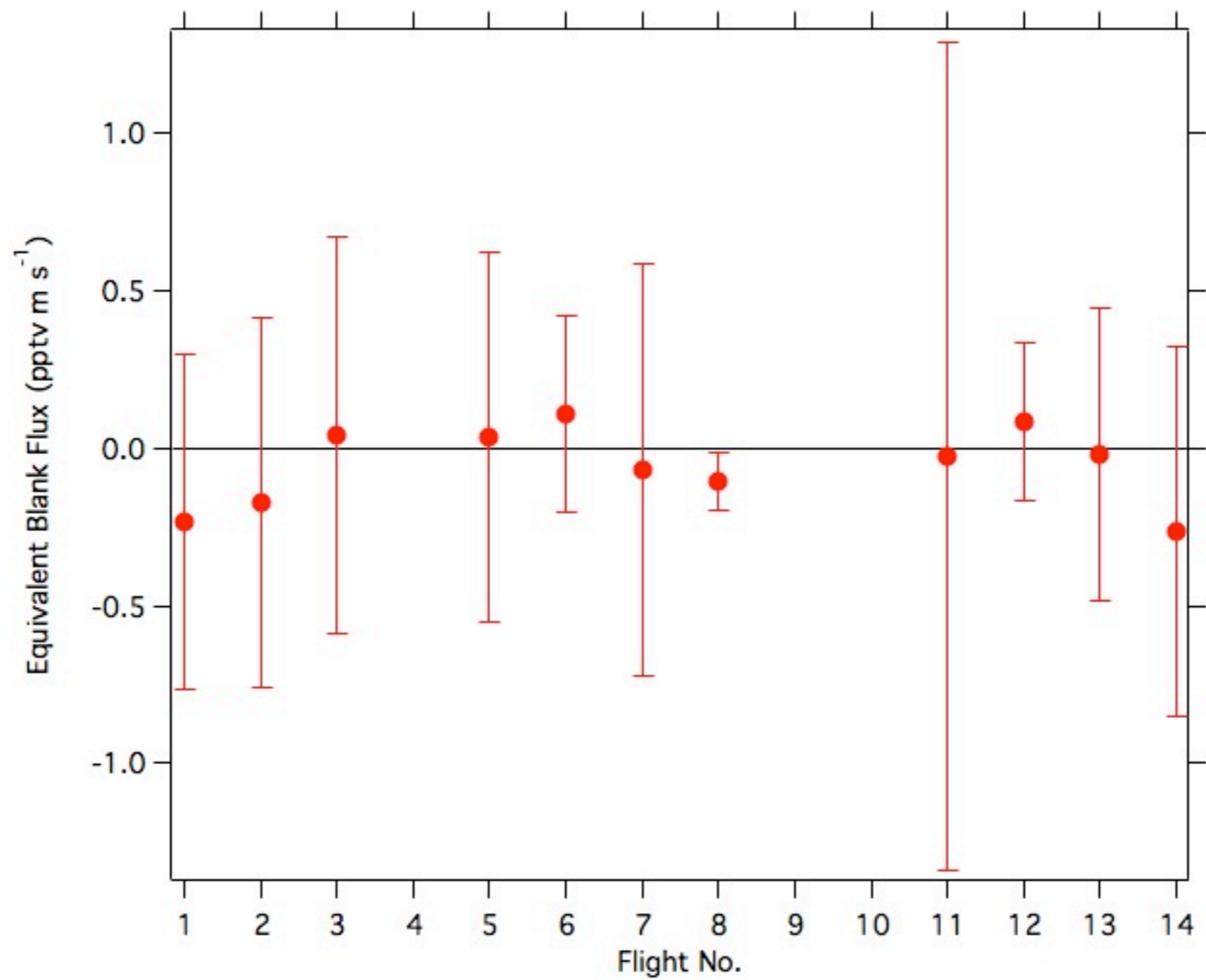
- Correlation between  $\text{SO}_2$  and W is more complex.
- Bkgd signal at mass 112 exhibits strong correlation at lag of -0.5 sec.
- Blank is determined by diverting sample flow through 25 ft. loop of Cu tubing. Lag time for bkgd correlation is independent of sample line length (transit time).



- At -0.6 lag time, the background signal represents a significant positive flux.
- At lag time appropriate for the ambient SO<sub>2</sub> signal, the background variability is out of phase with WV and the net flux contribution is near zero.
- But, the cospectrum is corrupted by oscillations contributed by the background signal.

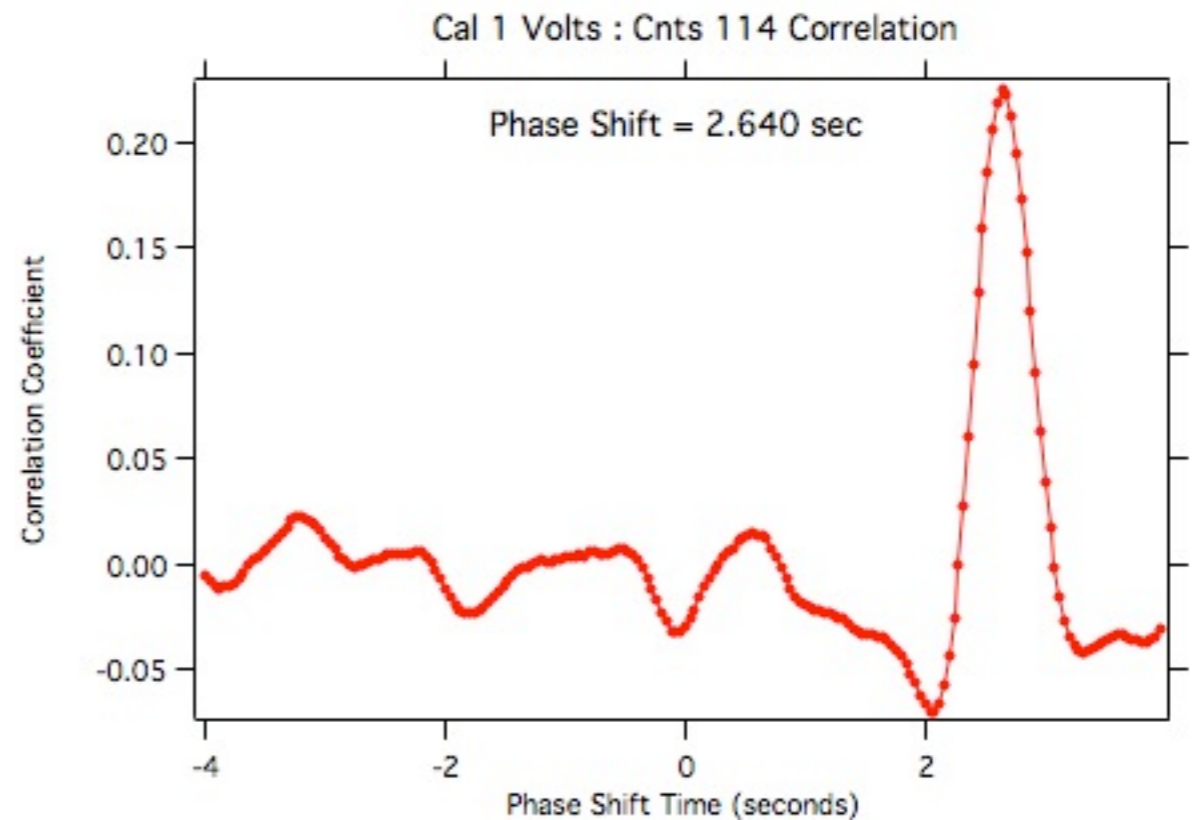
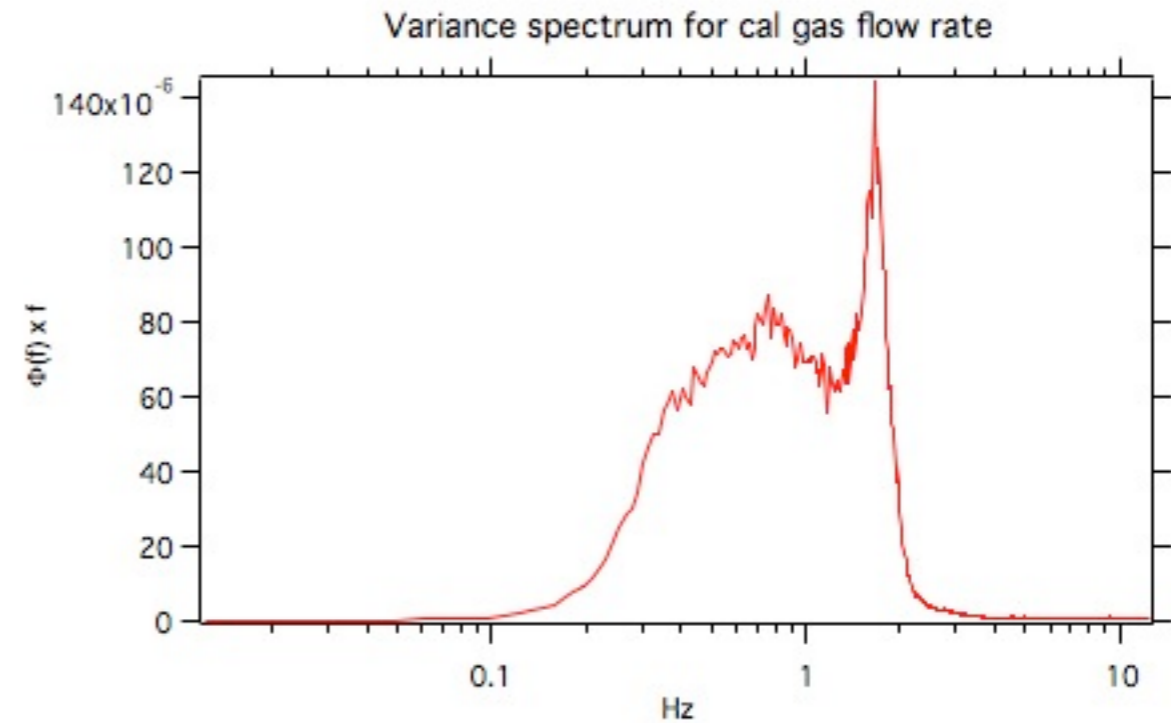






- Motion sensitivity in calibration gas flow controller.

- Flow measurement and mass 114 count rate are out of phase due to time lag.



- Do nothing.
- Low-pass filter flow rate and mass 114 count rate to remove the motion artifact.
- Adjust for the time lag between flow and mass 114 count rate, bringing the two signals into phase.
- No significant effect on computed flux.