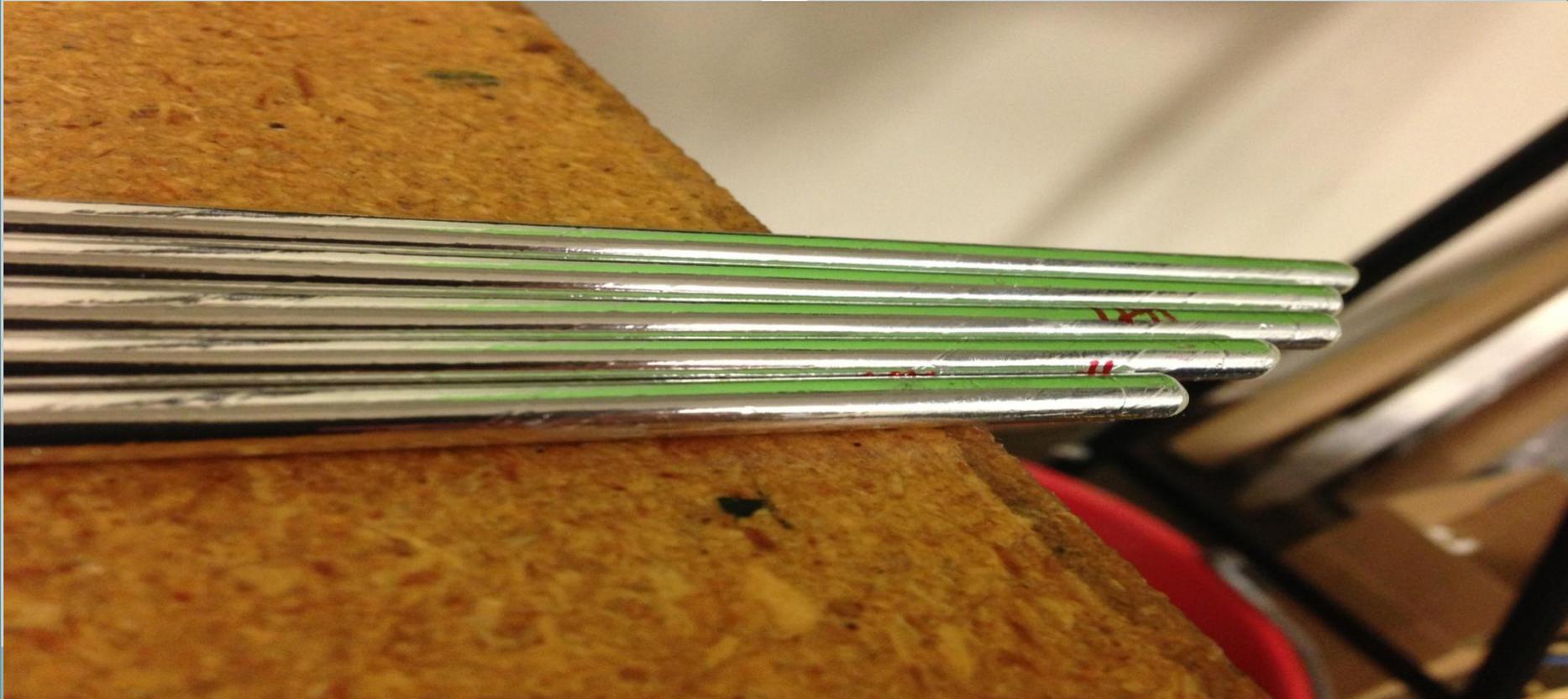


PPG Straw Leak Tests

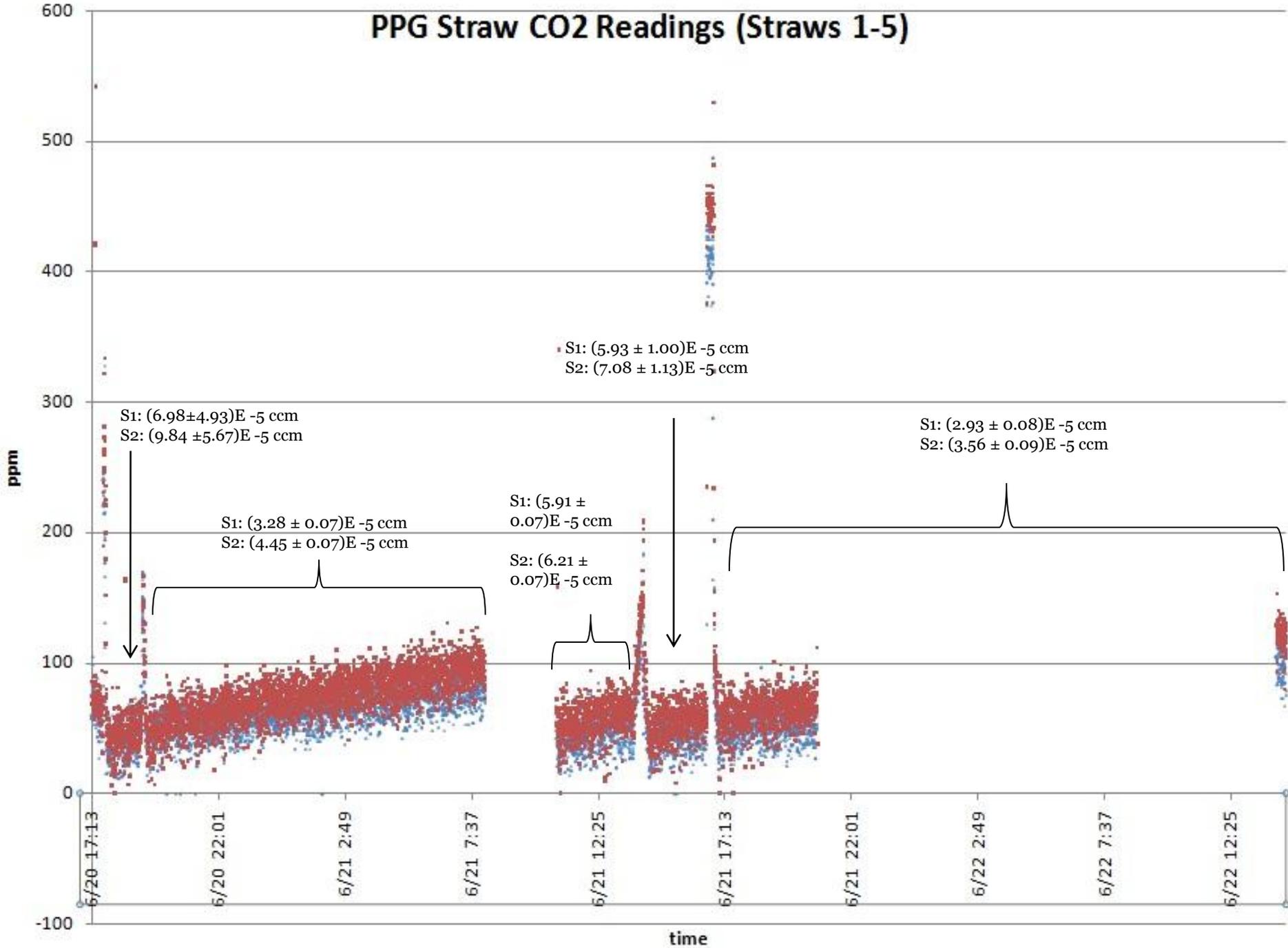


PPG Straw Tests

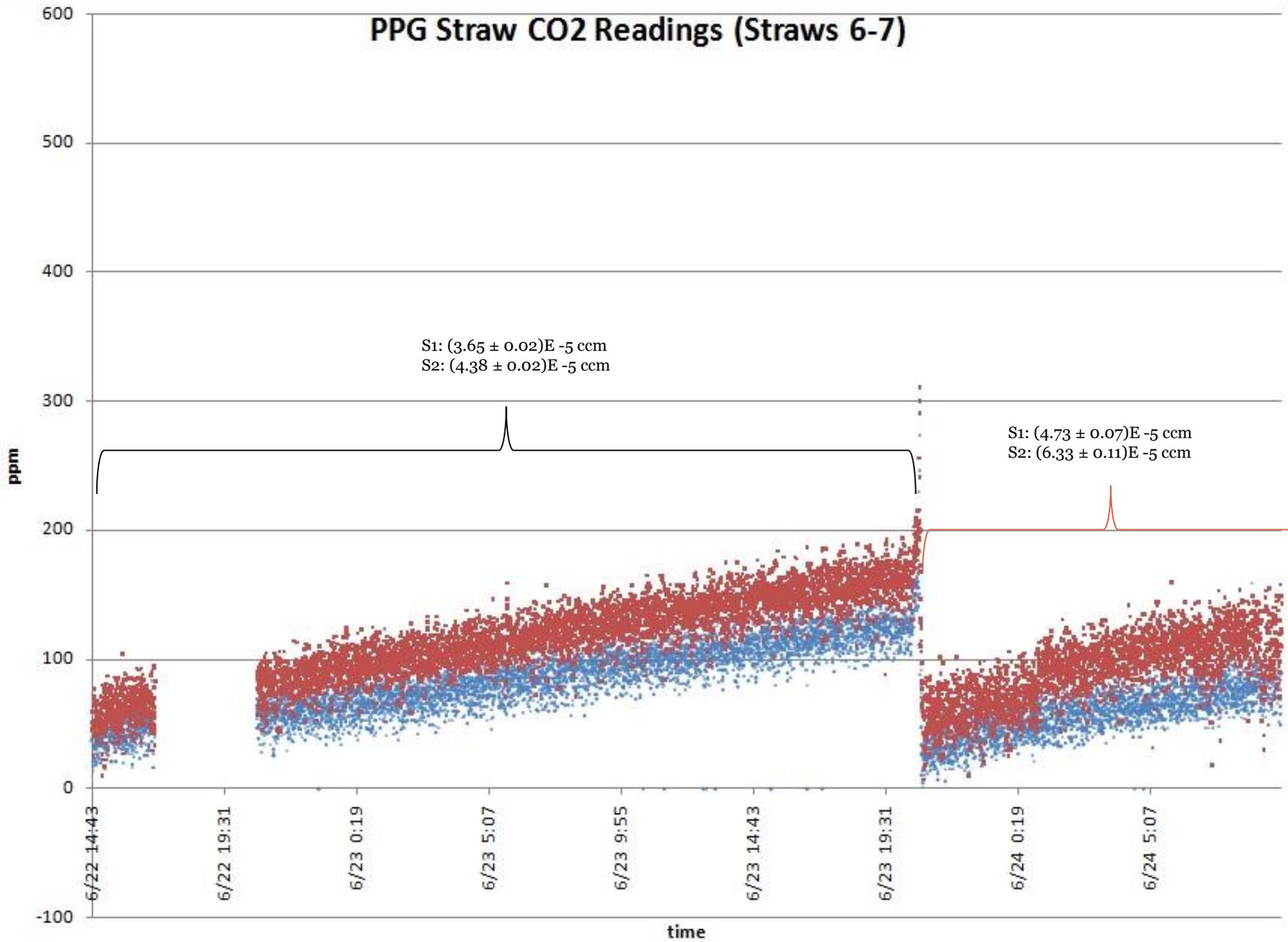


- Flushed with ArCO₂ for 5 minutes
- Sealed ends with 5 Minute Epoxy
- Allowed Epoxy to cure at room temperature for 10 minutes
- Opened valve to air and inserted straw into tube
- Purged with N₂ for 5 minutes

PPG Straw CO2 Readings (Straws 1-5)



PPG Straw CO2 Readings (Straws 6-7)

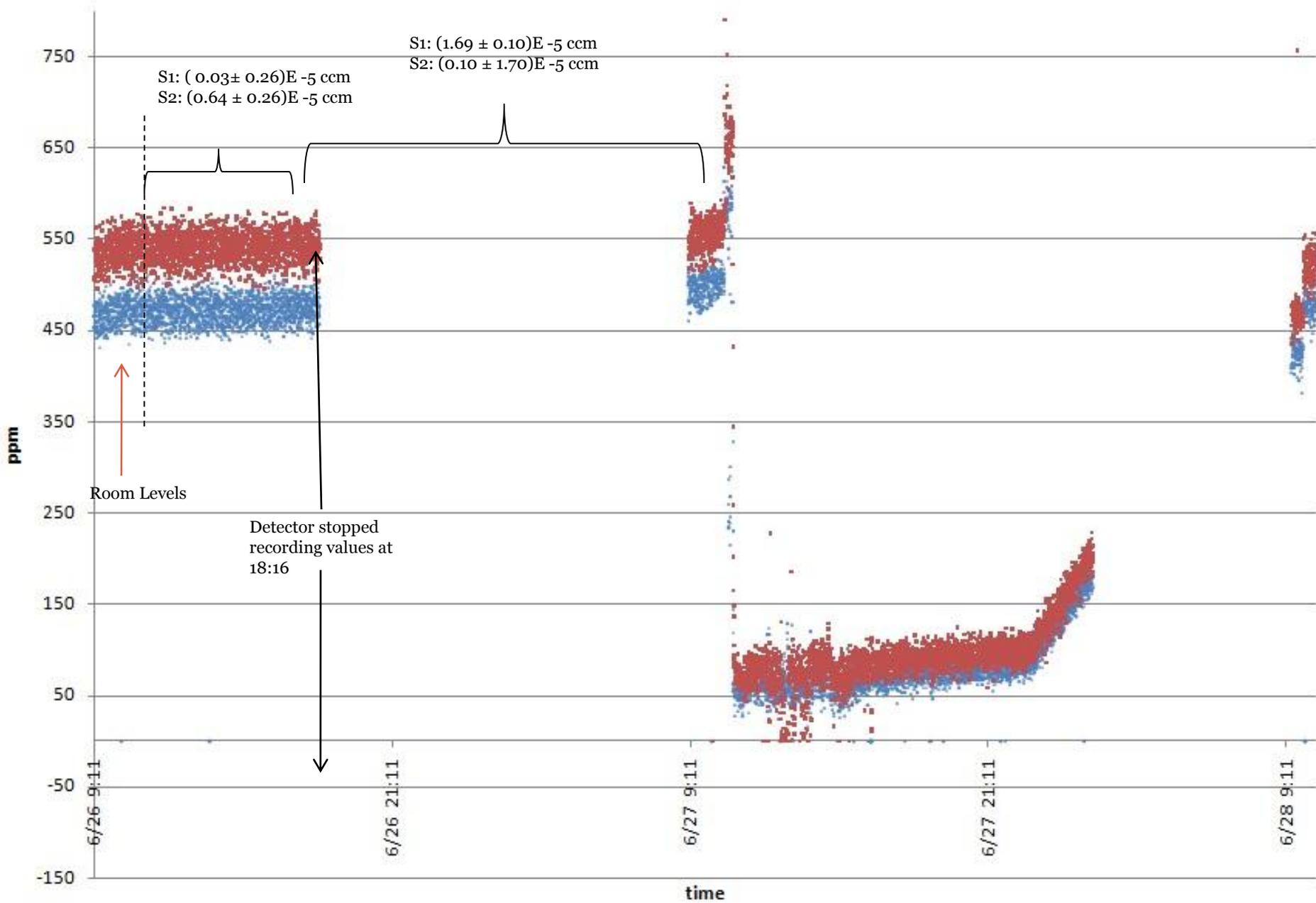


Room Air/No N₂ Purge

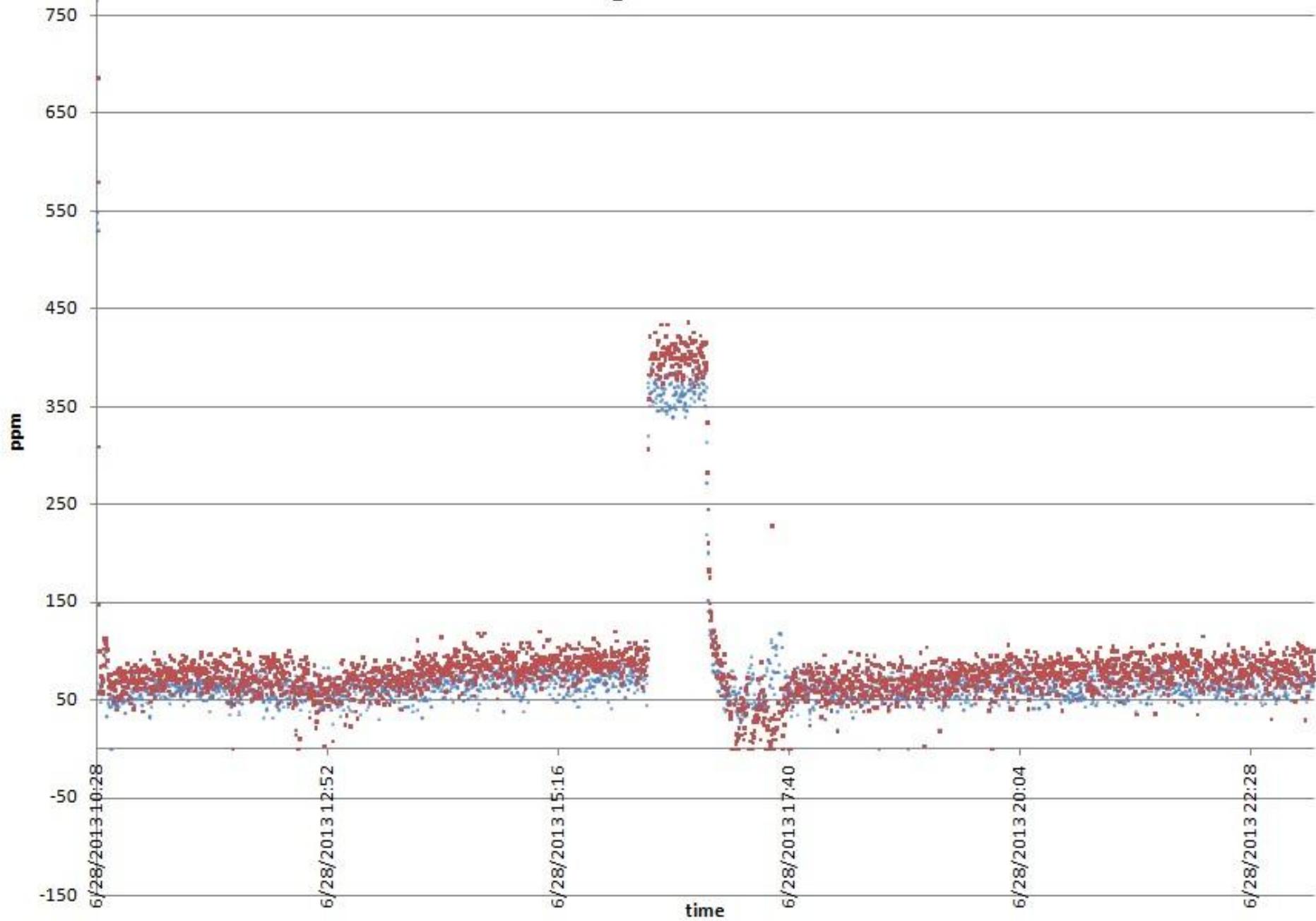


- Left straw valve open to air over night
- Cut 5, 1-foot PPG straw segments (labeled a – e)
- CO₂ readings averaged out to 463 ppm for sensor 1, and 530 for sensor 2
- Did not purge with Nitrogen
- Attached hooks to the ends with 5 Minute Epoxy
- Results for straw a:
 - S1: $(0.03 \pm 0.10) \times 10^{-5}$ ccm $R^2 = 7E-7$
 - S2: $(0.10 \pm 1.7) \times 10^{-5}$ ccm $R^2 = 4E-3$

PPG Segments a-c



PPG Segments d & e



Approximations Utilizing the First Hour of Readings



- For the EE891 sensor it was noted that ignoring the first 7-10 minutes yielded a good approximation of the slope (to the right order of magnitude) for the leak rate
- There was no such pattern with the older model of the E+E CO₂ sensor (EE892)

Conclusion



- Use the newer sensor (E+E Elektronik EE891)
- Purge with Nitrogen (more controlled)
- Exclude the first few minutes (7-10) from the first hour of reading to get an OK approximation of the overall leak rate (sensor 1)
- Should be able to easily tell if a straw is leaking above 40×10^{-5} ccm within the first hour (using 20% CO₂)
- Consider a new tapered design to get the straw through the manifold with less difficulty