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SUBJECT: AIR TEMPERATURE DISTRIBUTION INSIDE THE ENCLOSURES OF AIR MONITORING NETWORK LOCATED IN RIPON, SALINAS AND SHAFTER.

The goal of this memo is to provide information and analysis regarding temporal temperature distribution data collected from inside the old enclosures located in Ripon, Salinas, and Shafter for the Air Monitoring Network study. The collected data represents the period between July 14 and November 30, 2016. This memorandum is to assist in evaluation of temperature effect on instruments installed inside the enclosures.

Data Collection

The temperature data was collected with three 12-bit Temperature/Relative Humidity smart sensors (Part #: S-THB-M008) connected to a HOBO Micro Station datalogger (Part #: H21-002). The datalogger was set to 5 minutes time interval for continous data collection.

Results

The daily measured temperature values were calculated averaging the values monitored by three separate sensors installed inside each enclosure. Figure 1 denotes daily measured (blue solid line), maximum (red solid line), minimum (green solid line) and mean (black dash line) temperature distribution inside the enclosure located in Ripon during the period from July 14, 2016 to November 30, 2016. By examining the data thoughout the measurement period, daily maximum values usually occurred between 2:50 pm and 5:15 pm. The maximum temperature (45.43 ^{o}C) inside the enclosure was recorded on July 27, 2016 at 3:55 pm (Figure 1). The daily minimum temperature values (green solid lines in Figure 1) were consistently recorded at times between 5:15 am and 8:05 am. The minimum temperature (1.24 ^{o}C) inside the enclosure was recorded on November 24, 2016 at 7:55 am (Figure 1) during data collection period.

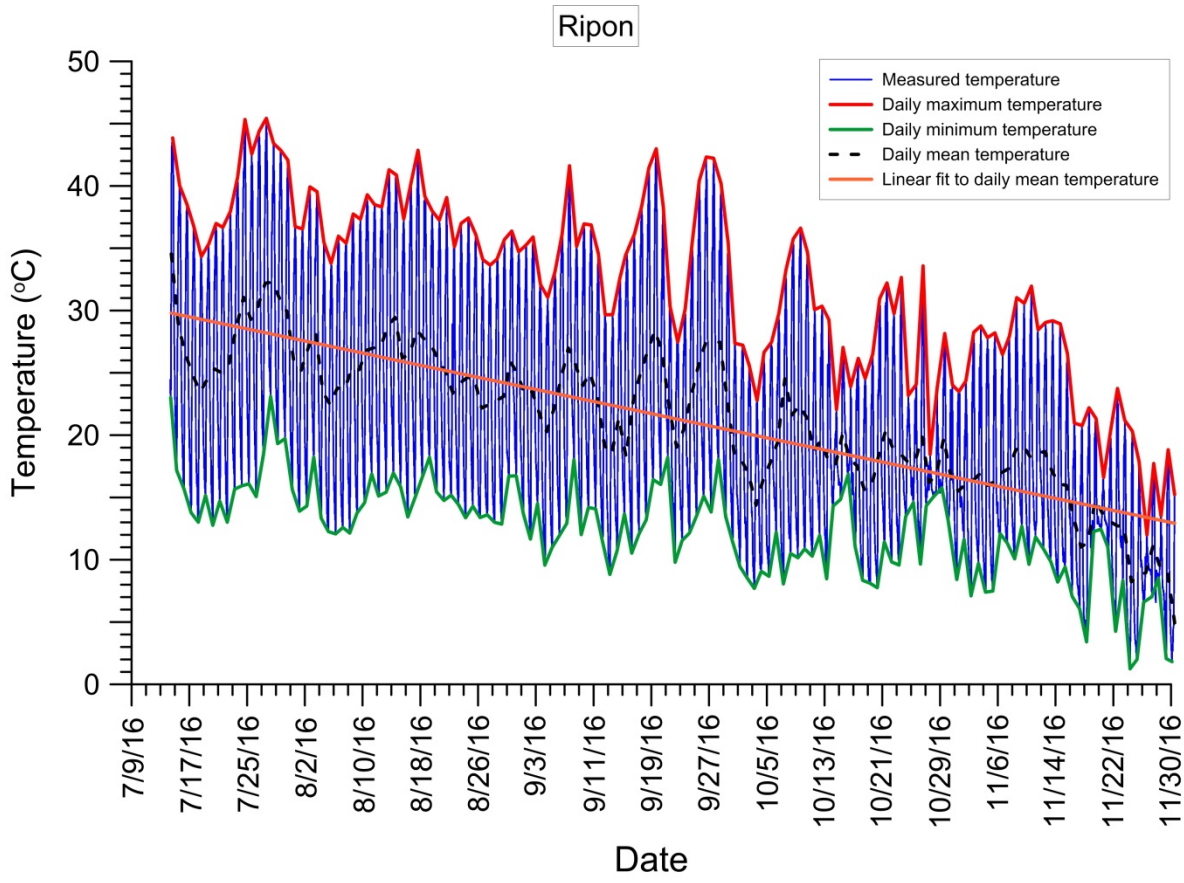

Figure 1. Temporal temperature distribution inside the enclosure in Ripon.

The daily mean temperature values were plotted around noon time each day and shown with dashed black line (Figure 1). A linear curve was fitted through the daily mean temperature curve to show declining trend of temperature due to the seasonal weather change (Figure 1).

Figure 2 shows the measured temperature data inside the enclosure in Salinas during the dates between July 19, 2016 and September 26, 2016. The maximum daily temperature generally occurs between 10:26 am and 3:36 pm. The maximum recorded temperature was 39.62 ^{o}C on September 25, 2016 at 2:01 pm. The temperature data was only recorded through September 26, 2016. During data downloading on that day, the data logger was mistakenly stopped by operator and never restarted.

The minimum daily temperatures were measured between 01:36 am and 7:56 am in the enclosure. The time of minimum temperature changes with daily weather fluctuations especially

in the early morning times. When we examine the data further, the temperature inside the enclosure generally drops to its daily minimum values at times between 4:00 am and 7:56 am. The lowest measured temperature was recorded as 7.96 ^{o}C on September 15, 2016 at 6:51 am during the whole data collection period. The linear fit to the daily mean temperature curve indicates that the temperature doesn't show a seasonal weather pattern and its fluctuation stays considerably stable during the measured time period.

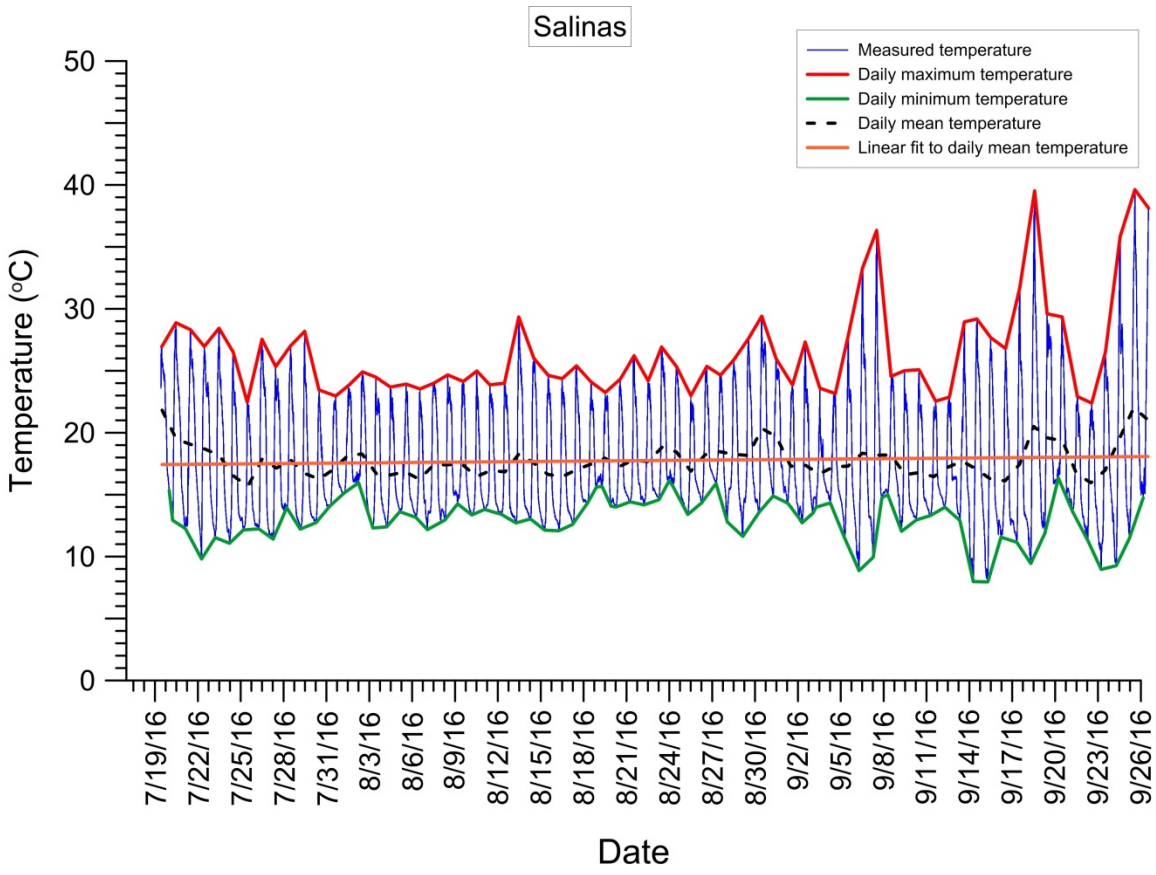

Figure 2. Temporal temperature distribution inside the enclosure in Salinas.

In Shafter, temperature inside the enclosure was measured from July 19, 2016 to November 29, 2016 (Figure 3). The recorded data showed that the temperature reached its daily maximum value at times between 2:30 pm and 6:30 pm. The highest measured temperature value was 46.91 ^{o}C, which occured on July 25, 2016 at 4:01 pm. Figure 3 denotes a data gap created

between September 20 and September 28 due to physically removing data logger from the enclosure and bringing to the exchange site for data downloading process.

The daily minimum temperatures were consistently measured at times between 5:00 am and 9:00 am during data collection period. The lowest measured temperature inside the enclosure was -0.610 ^{o}C on November 25, 2016 at 6:41 am. Further examination of temperature data revealed that there were two daily minimum temperature incidents that reached below zero values as -0.144 ^{o}C on November 18, 2016 at 7:11 am and -0.610 ^{o}C on November 25, 2016 at 6:41 am. Similar to the case in Ripon, a linear fit through mean daily temperature data suggested a declining trend in temperature distribution.

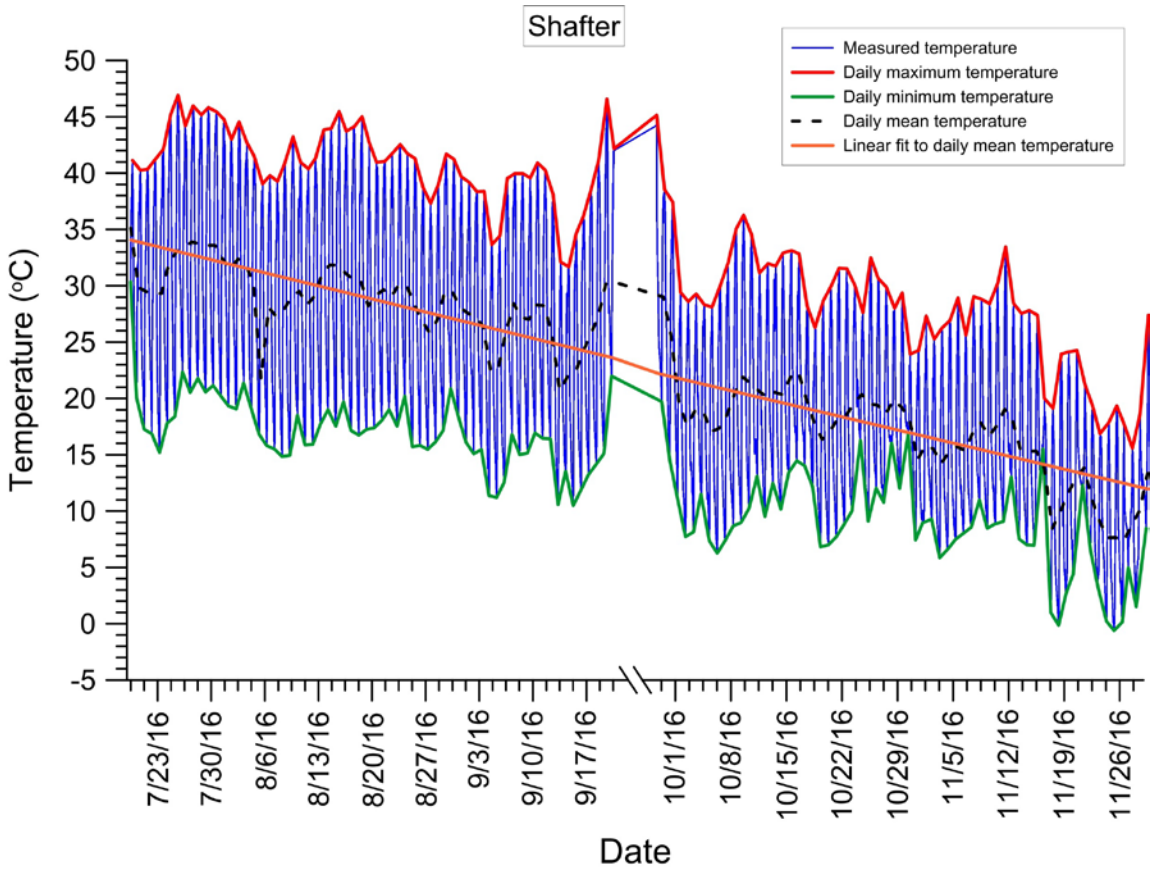

Figure 3. Temporal temperature distribution inside the enclosure in Shafter.

When we compared the magnitude of daily temperature difference between daily maximum and minimum values for the sites, it gave us information about the range of temperature change in a given day (Figure 4). Figure 4 shows that temperature change usually fluctuates less in Salinas's enclosure than in Ripon's and Shafter's except in September where an extreme weather event took place for a couple of days.

The time of the maximum temperature at Ripon and Shafter often occurred quite late in the afternoon. Although the daily temperature changes are quite similar in Ripon and Shafter, the Shafter site had consistently higher temperature differences within the daily measurements than Ripon.

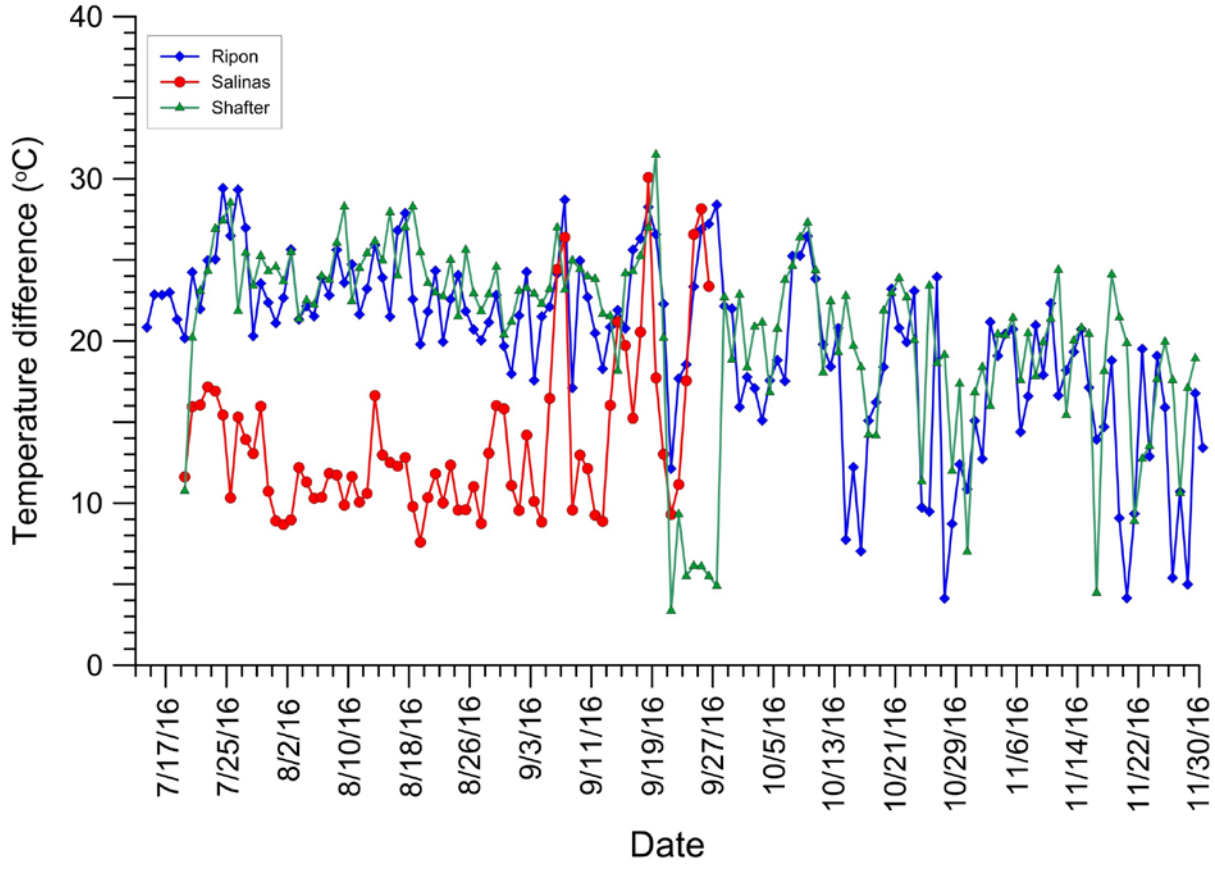

Figure 4. Daily maximum and minimum temperature difference inside the enclosures in Ripon, Salinas, and Shafter.