Salton Sea Management Program

Air Quality Monitoring Report for Surface Roughening at the SCH Site

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Executive Summary

Surface roughening as a dust suppression measure was implemented on 755 acres of the Species Conservation Habitat (SCH) site in late 2020. Particulate matter concentration and meteorological data were monitored at six stations across the site during the first half of 2021 to understand the performance of surface roughening. Surface roughening at this site was implemented as a temporary measure, and the site is currently under construction, being converted to habitat ponds that are part of the SCH project. The implementation of this dust suppression project and the associated monitoring and data analysis, provide a useful framework for future projects around the Salton Sea: future projects can use similar monitoring equipment and analysis methods to evaluate dust suppression efficacy.

Surface roughening across a focused control area reduces the emission of particulate matter (PM) from that area, in part by reducing wind speeds and trapping of particles and thus saltation flux that can generate dust emissions. However, elevated PM concentrations may still be present across the site that originate from outside of the area. The performance effectiveness of the dust suppression method was identified by comparing wind speeds and particulate matter concentrations upwind and downwind of the control area. A decrease in wind speed indicates the control measure is working as intended. Similarly, if there is no increase in particulate matter concentration downwind, the performance of the control area is deemed to be effective. The results of the SCH monitoring, performed from February through June 2021, are:

- Wind speed measured at 2.5 m above the ground level is consistently greater on the upwind (western) monitoring stations than the downwind stations, indicating the benefit of surface roughening.
- Short intervals of saltation were observed at all the stations when wind speeds exceeded 8 m s^{-1}, but winds exceeding this speed did not always cause saltation.
- The percentage of time that saltation driven by elevated wind speeds was observed at the SCH indicated it was relatively infrequent and not even across the site. The greatest frequency of occurrence and magnitude of saltation flux was observed in the interior of the SCH site, where there were deposits of loose sand.
- A relation between mean hourly saltation flux and mean hourly wind speed binned into 1 m s^{-1} classes was observed for some of the stations.
- The amount of saltation flux at the downwind side of the site indicates that relative to the saltation flux observed in the middle of the site, very little sand was reaching the downwind monitoring stations.
- During the monitoring period, particulate matter data ≤10 microns (i.e., PM_{10}) indicate that there was no measurable increase between upwind and downwind PM_{10} monitors for all wind speeds from the west, the prevailing wind direction from the Salton Sea to the site. Thus, surface roughening appears to be effective in controlling dust emissions from the project area.
- High PM_{10} concentrations were still observed at the site, although these appear to originate outside the dust suppression project area as indicated by the upwind PM_{10} monitor.

- The PM monitors were removed from the field in July 2021 for servicing and recalibration.
- The monitoring system performed reliably, exceeding the system-wide target value of 95% data capture by 2% (97%). The greatest impact on data capture was due to the physical damage to one of the stations that caused the datalogger to malfunction, which affected the complete data stream for that station. The loss of a datalogger or modem causes the data capture to decrease significantly as compared with the loss of an environmental sensing instrument.
- The monitoring stations were connected via cellular modems to a database system (REMAS) at the Desert Research Institute (DRI). This provided real-time access to the monitoring data through a web interface over the monitoring period.
- The stations were removed from the SCH site at the end of August 2021.

Lessons Learned

- The monitoring stations and the REMAS data presentation/data archiving system performed exceptionally well, and this system should be maintained as additional stations are brought on line whether they are for performance monitoring or for gathering meteorological, air quality, and other relevant environmental data to inform management decisions.
- Spare dataloggers are critical for assuring high data recovery as the failure of a datalogger has a multiplier effect compared to the failure of individual instruments
- It would be ideal to install multi-height sand traps (Big Spring Number 8 type) alongside the SANTRI saltation instruments at the time of deployment to collect physical samples of the particles in saltation and the vertical distribution of mass flux as a function of height. This provides data to convert the highly temporally resolved particle count data of the SANTRI instrument to saltation flux (g m^{-1} hr^{-1}). These multi-height sand traps can be removed once enough co-located data are collected to calibrate the SANTRI saltation instruments.
- Install SANTRI instruments so that the bottom sensor is at least 10 cm above the soil surface to prevent sensor light blockage due to rain splatter
- Use stainless-steel or UV coated conduit to protect wiring close to ground instead of aluminum conduit which reacted with salts in the soil and disintegrated at the stations where soil moisture was elevated
- Monthly field inspections and cleanings are recommended for each station while in operation.
- This air quality monitoring network was specifically designed to detect changes in the effectiveness of control measures to suppress wind-blown dust for large-scale dust control treatment areas. The capital costs are around $13,000 per station and annual operating costs are around $5,000 per station (primarily labor for maintenance). To scale this system to 1,000 acres of dust control we would recommend placing stations along transects with a station density of 1 station for every 50 acres. This results in a per acre cost of approximately $500 per acre for three years of observation. Three years of observation are expected to provide sufficient data to guide recommendations for the adaptive management process and to demonstrate the effect of vegetation

establishment and dust control measures are performing to a level to sufficient to guard against contributions of PM from the managed areas that may contribute to degradation of regional air quality.

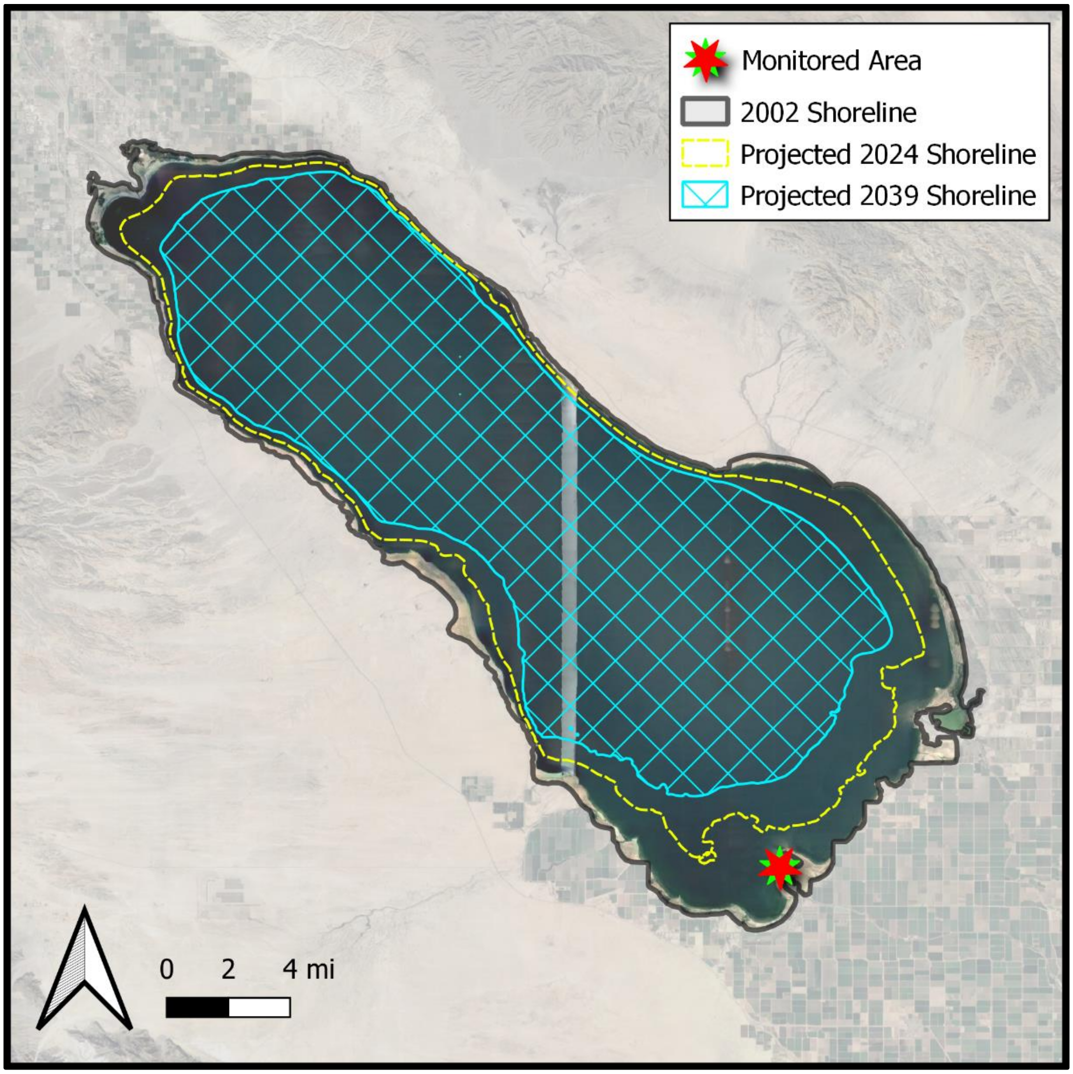
1 SCH Monitoring Network

Monitoring is required to quantitatively and precisely evaluate performance effectiveness of dust controls used at the Salton Sea. At the SCH site the strongest winds capable of generating saltation activity and dust suspension most frequently blow from the west and consequently, net mass transport occurs along that direction. To determine the relative and absolute magnitude of the mass transport, and thus the effectiveness of control areas, there is a need to measure the saltation activity and dust concentration upwind of and inside the eastern edges of the working areas. These measurements provide sufficient information to determine the difference between the locations and allocate net emission contributions. Measurements were made at multiple locations to understand the dust and sand transport variability from the surfaces that have been altered by dust control methods, such as surface roughening in the case of the SCH. It is also important to monitor the local meteorology of the area as meteorology is an important driver and constraint on wind erosion and dust emission processes.

2 Monitoring Locations Established January 2021

The general location of the instruments to monitor control effectiveness within the SCH area is shown with respect to the Salton Sea in Fig. 1.

Figure 1. General location of the air quality monitoring network, within the footprint of the SCH project at the Salton Sea.



The control effectiveness monitors are located within the SCH area. Figure 2 illustrates the predominant wind direction for the SCH site and the station locations within the SCH site, including two designated as "Primary" and four as "Satellite" stations. The instrumentation associated with these stations is described below. Figure 3 is a more zoomed-in view of the stations illustrates a change in soil sand content between the stations.

Figure 2. Predominant wind direction and location of the six stations within the SCH site.

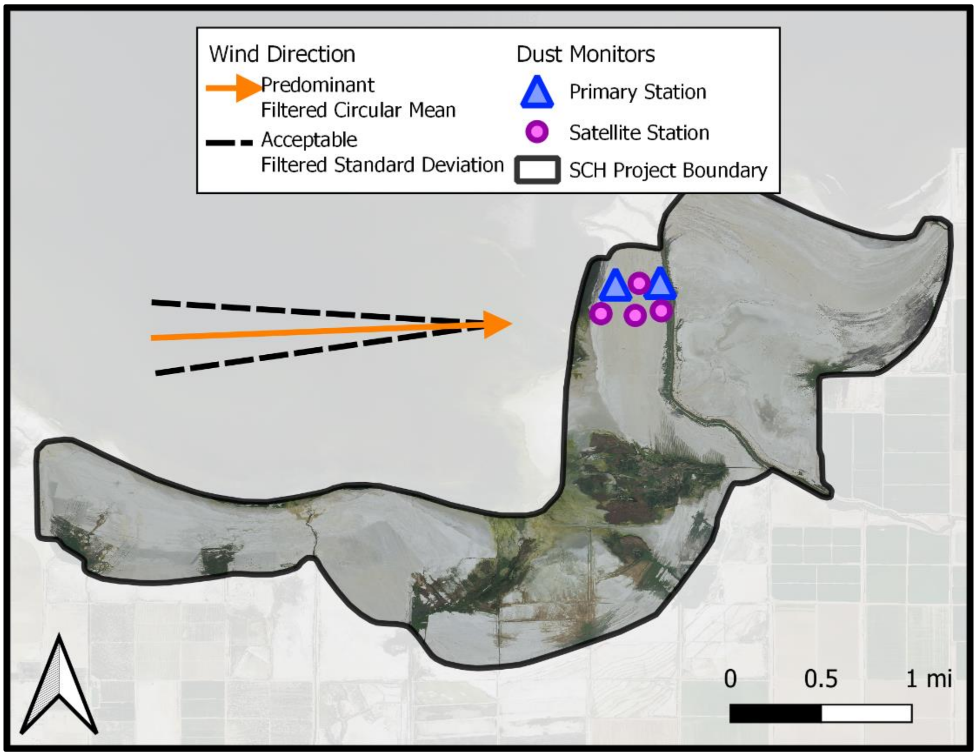
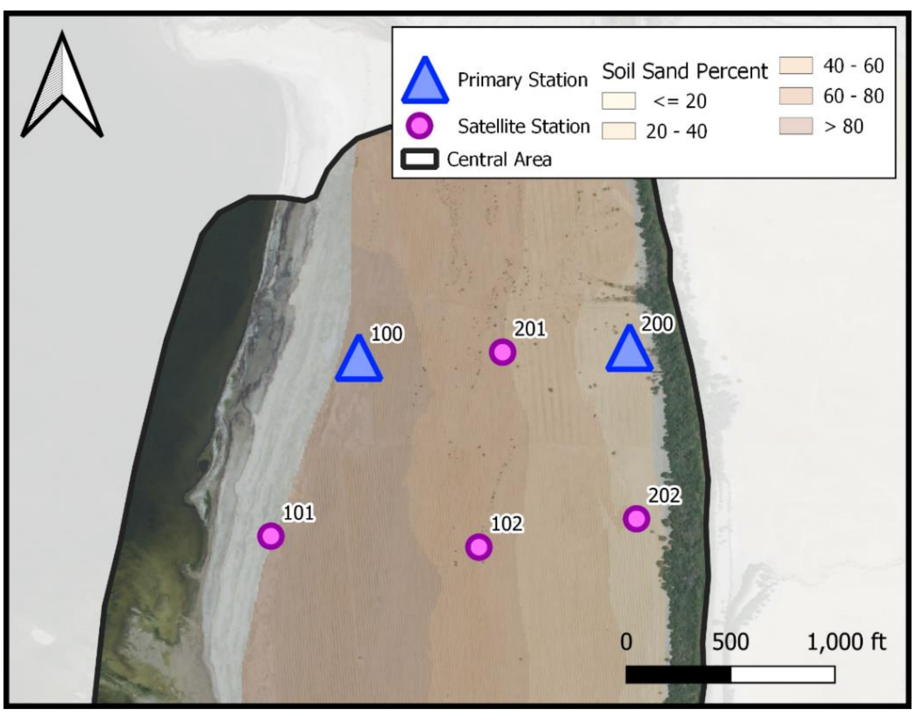


Figure 3. Soil texture and location of the six stations that comprise the monitoring network.



2.1 Instrumentation

Primary and satellite monitoring stations were used to monitor the environmental variables to evaluate dust control effectiveness. The instruments associated with these designations and the quantities they measure are provided in Table 1.

Table 1. The instruments associated with Primary and Satellite stations and the quantities they measure.

Quantity	Primary	Satellite
Wind Speed (WS, m s^{-1})	MetSENS500[a]	RM Young Wind Sentry[b]
Wind Direction (WD, degrees)	MetSENS500	RM Young Wind Sentry
Temperature (T, °C)	MetSENS500	N/A[c]
Relative Humidity (RH, %)	MetSENS500	N/A
Barometric Pressure (BP, Pa)	MetSENS500	N/A
Saltation (S, kg m^{-1} s^{-1})	SANTRI2[d]	SANTRI2
Particulate Matter ≤10 µm dia. (PM_{10}, µg m^{-3})	MetOne 212-2 Particle Profiler[e]	N/A
Soil Moisture (SM)	E-30 Sensor[f]	E-30 Sensor

[a]MetSENS500 is compact weather sensor measures wind speed and direction via an ultrasonic sensor, as well as air temperature, relative humidity, and barometric pressure, in a single, combined instrument mounted inside three double-louvered, naturally aspirated radiation shields with no moving parts
[b]RM Young Wind Sentry anemometer and vane
[c]N/A quantity not measured
[d]SANTRI2 is a sensor using optical gate sensors to count and size particles moving in saltation
[e]MetOne 212-2 Particle Profiler is laser-diode-based optical sensor that uses light scatter technology to detect, size, and count particles
[f]E-30 is a sensor using a heated probe and heat sensor to quantify soil moisture

2.2 Data Capture

Our performance goal for data capture for the SCH monitoring network is 95%. Data capture is defined as the percentage of acquired measurement values based on the measurement interval for a specific instrument and the expected number of measurements for the defined performance period, that we define here as monthly. The network data capture for each month is defined as the mean of all individual instrument capture values.

2.3 Network Performance

The percent data capture for each instrument at each station are provided in Table 2.

Table 2. Percent data capture rates by Station, month, and sensor.

Station # and Month	WS	WD	T	RH	BP	Saltation	PM	Soil Moist	Mean % Capture
100									
February	100	100	100	100	100	100	100	100	100
March	100	100	100	100	100	93	100	100	99.1
April	100	100	100	100	100	96	100	100	99
May	100	100	100	100	100	99	100	100	99
June	100	100	100	100	100	98	100	100	99
101									
February	100	100	100	100	100	100	100	100	100
March	100	100	100	100	100	87	100	100	98.4
April	100	100				95		100	98
May	100	100				100		100	100
June	100	100				98		100	99
102									
February	100	100	100	100	100	96	100	100	99.5
March	100	100	100	100	100	74	100	100	96.8
April	100	100				91		100	96
May	88	88				84		88	86
June	6	6				5		6	5
200									
February	100	100	100	100	100	100	100	100	100
March	100	100	100	100	100	90	100	100	98.8
April	100	100	100	100	100	96	100	100	99
May	100	100	100	100	100	100	100	100	100
June	100	100	100	100	100	100	98	100	99
201									
February	100	100	100	100	100	96	100	100	99.5
March	100	100	100	100	100	81	100	100	97.6
April	100	100				96		100	99

Station # and Month	WS	WD	T	RH	BP	Saltation	PM	Soil Moist	Mean % Capture
May	100	100				100		100	100
June	100	100				100		100	100
202									
February	100	100	100	100	100	100	100	100	100
March	100	100	100	100	100	100	100	100	100
April	100	100				96		100	98
May	100	100				100		100	100
June	100	100				100		100	100
System Wide % Capture for Feb.-June, 2021	97* 99**								

*including Station 102, **excluding Station 102 (datalogger failed June 2021)

Data that are initially received via the communications links are screened to determine their physical consistency. Data that may have passed the initial automated QA/QC screening, but on secondary examination reveals inconsistencies will be flagged and based on determination of its quality revealing that the values are not trustworthy, the network data capture rate will be adjusted accordingly. Data anomalies were observed in these data in terms of lost periods of time and reduction in percent data capture due to individual optical gate sensors signal averages dropping below allowable limits.

The final QA/QCed data were used to prepare monthly data summaries for the measured variables as well as quantities of interest that are related to evaluating control effectiveness.

2.4 Data Summaries

2.4.1 Winds

Data are presented as correlations between wind speeds at different locations, Station 100 vs. 200, by month. The plots of wind speed between the upwind and downwind stations are shown for the entire data set (i.e., all wind directions) and then for a constrained wind direction range (336°-326°). This range represents the direction when winds are moving perpendicular to the furrow/ridges that were aligned on the (approximate) azimuth of 29° to maximize the effectiveness of the roughness to resist wind erosion and dust emissions at this site as historical data suggest strong winds are westerly. A second data filter of wind speed >8 m s^{-1} was used as it marks the wind speed where the wind erosion system (i.e., saltation and dust emission) is likely to be activated.

These plots and the least-squares regression lines provide an effective quantification of the relation between wind conditions among the stations. The upwind stations provide the independent measure of wind speed before it encounters the dust control area. A slope value for the regression-derived relationship less than one indicates that a downwind station is experiencing lower wind speeds than an upwind station. A slope value of one would indicate equivalent conditions, and greater than one that wind speed increases downwind.

Figure 4. Correlation of 10-minute mean wind speed for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for all available data.

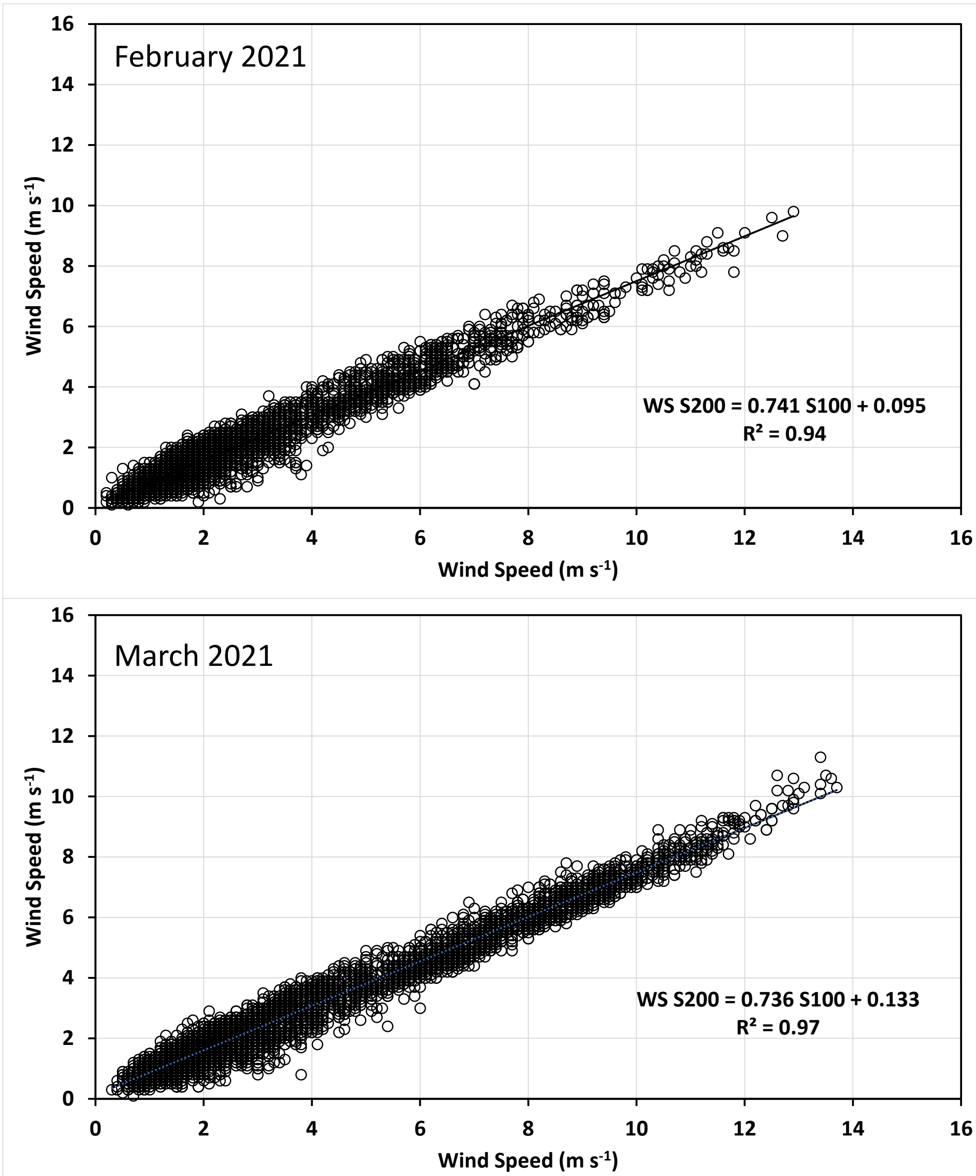


Figure 4 (cont.). Correlation of 10-minute mean wind speed for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for all available data.

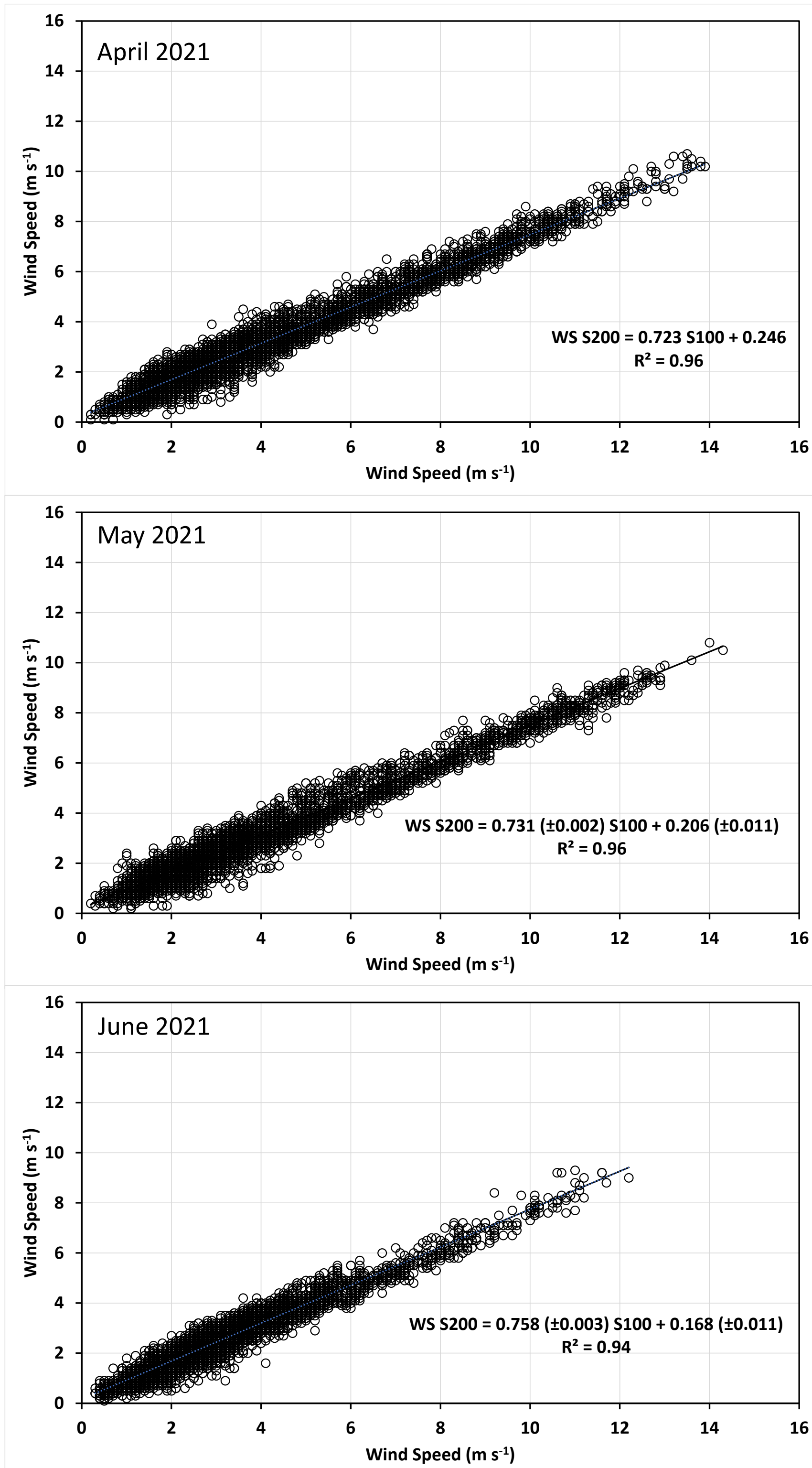


Figure 5. Correlation of 10-minute mean wind speed for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for wind direction between 236° – 326°.

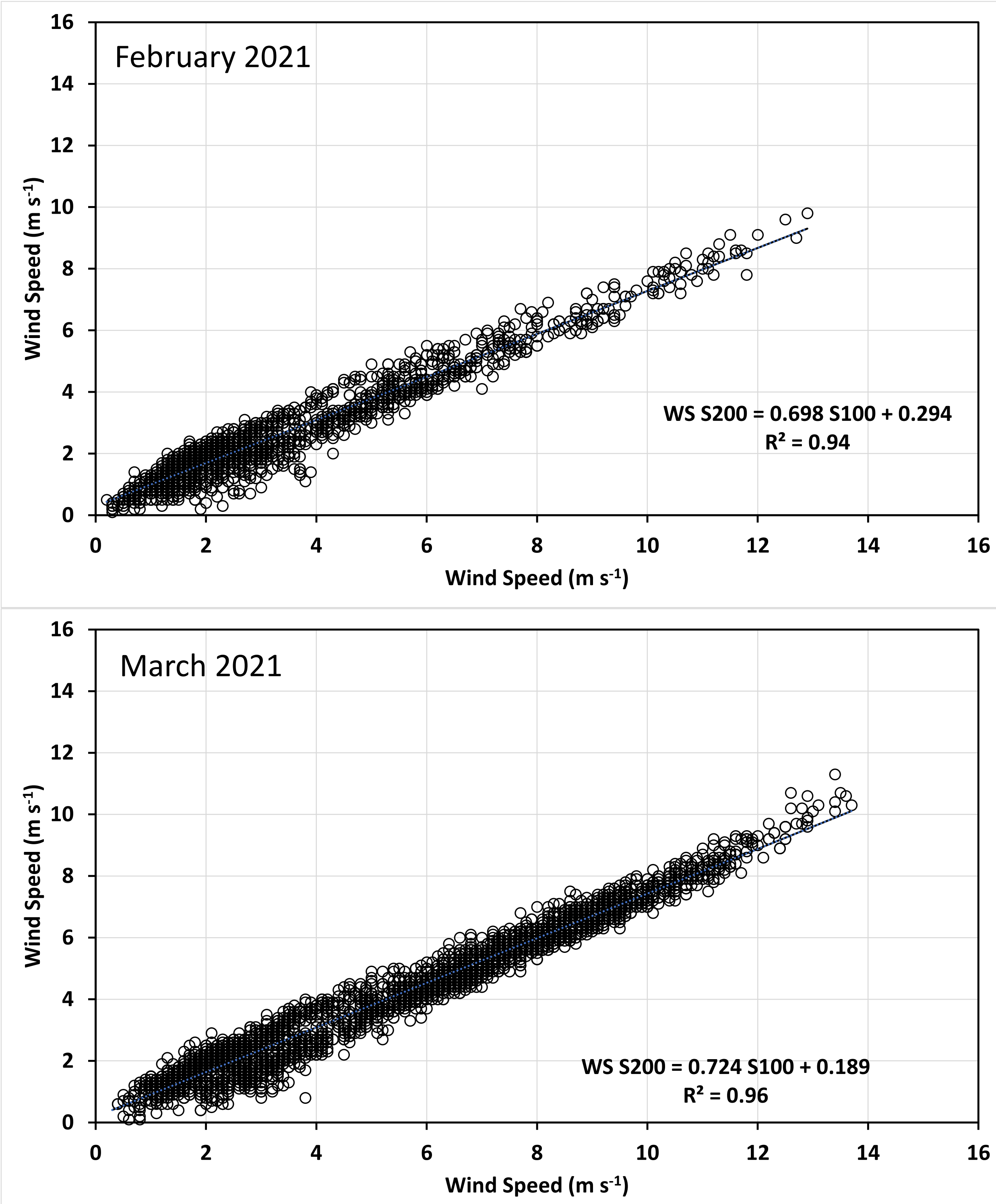


Figure 5 (cont.). Correlation of 10-minute mean wind speed for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for wind direction between 236° – 326°.

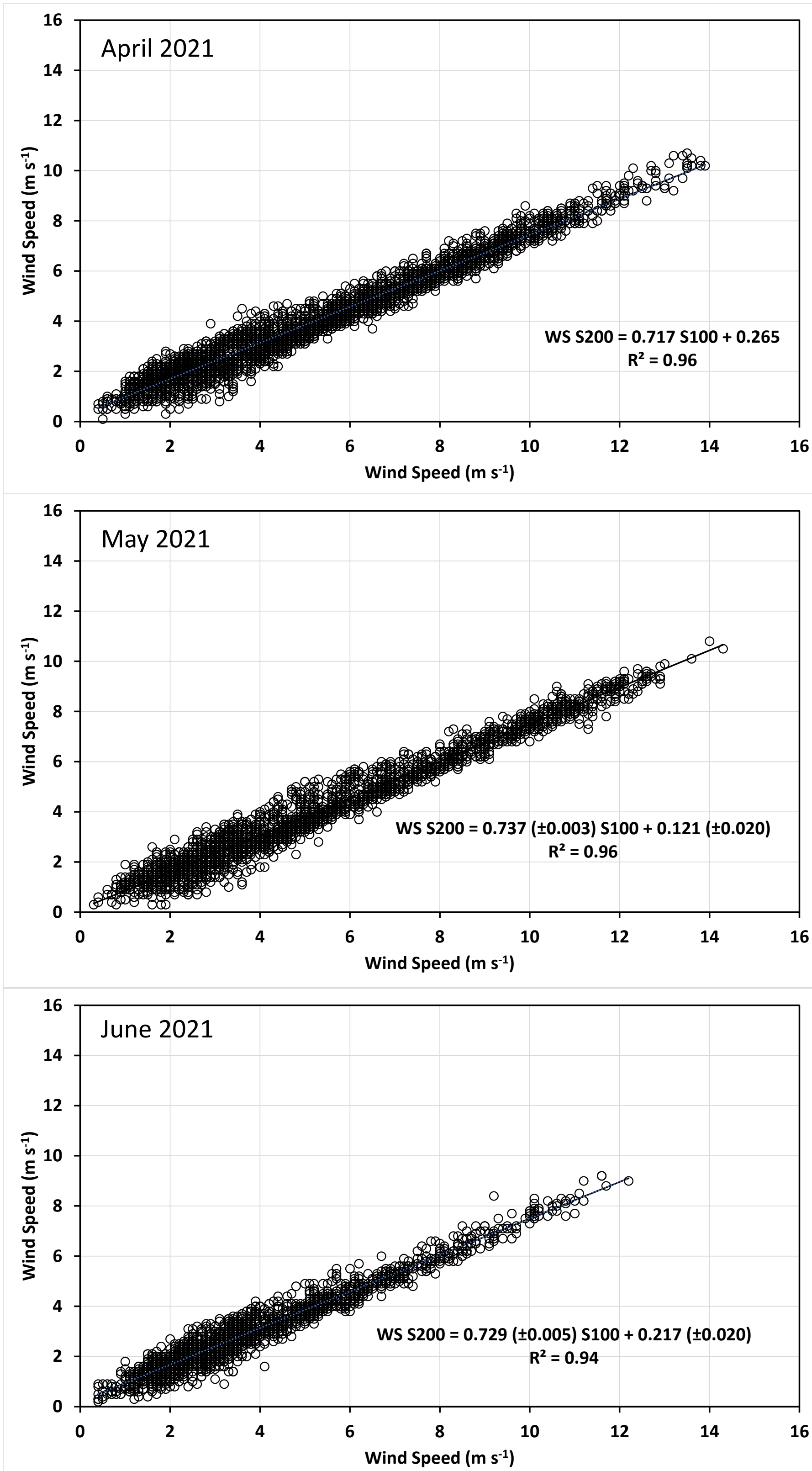
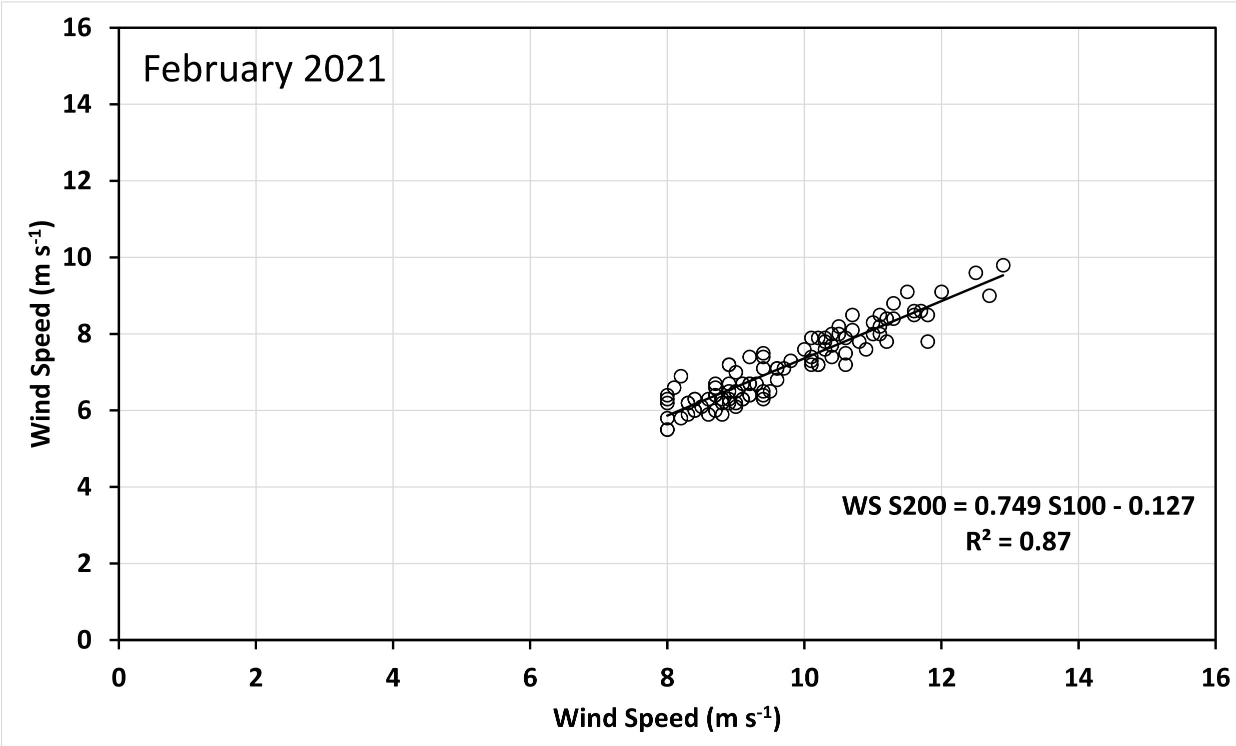


Figure 6. Correlation of 10-minute mean wind speed for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for wind direction between 236° – 326° and wind speed ≥8 m s[-1].



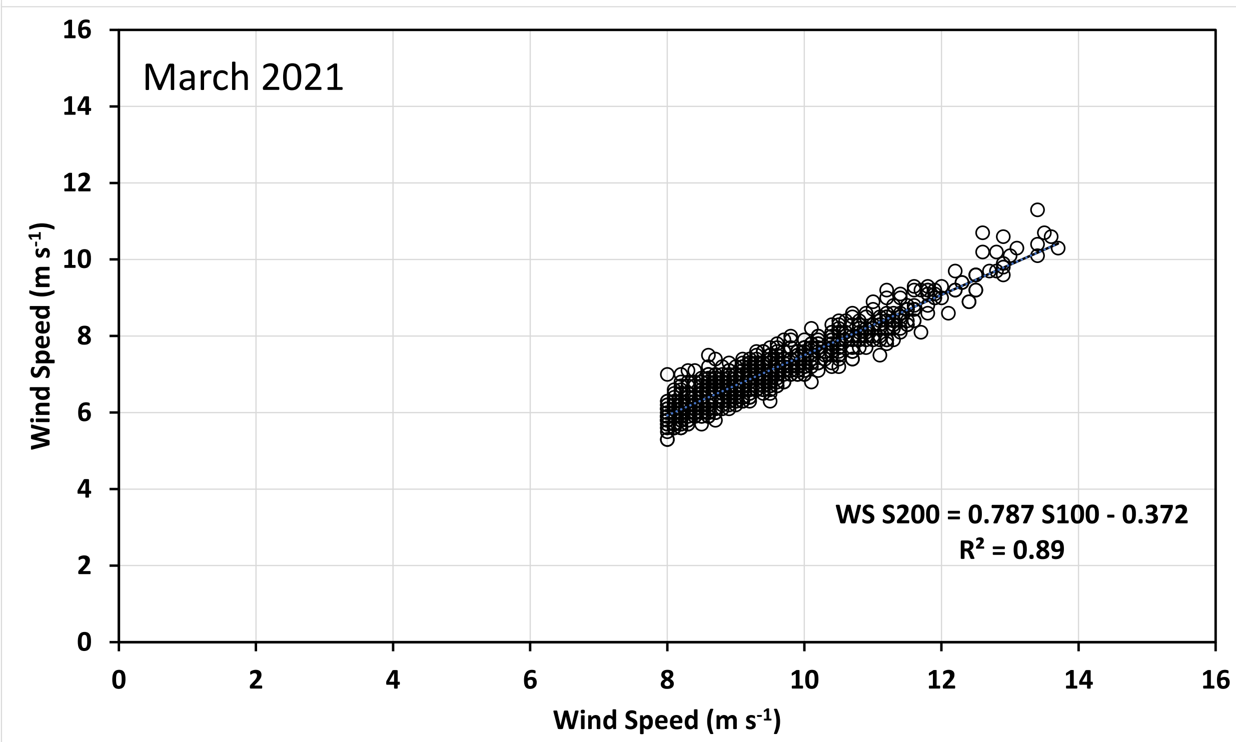
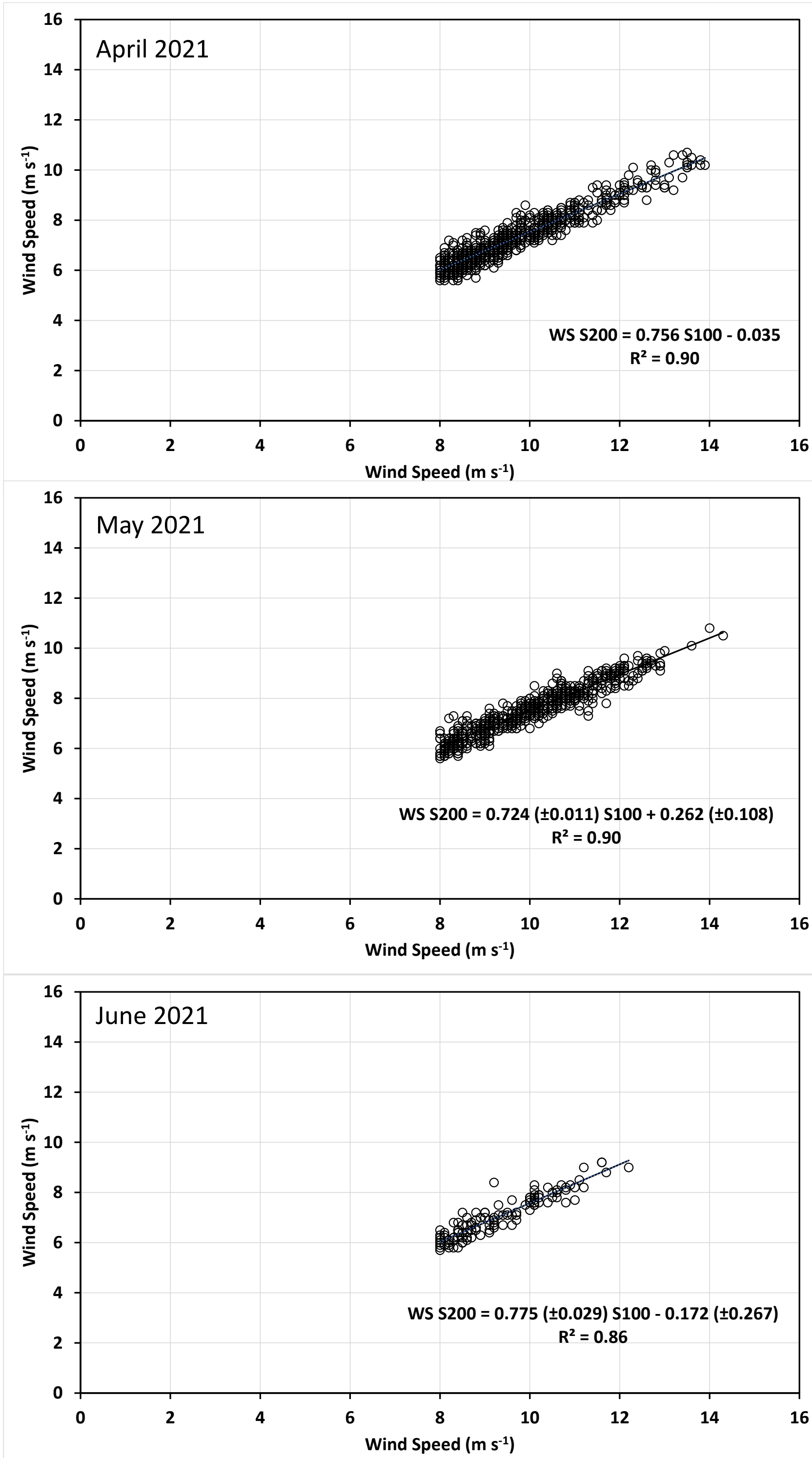


Figure 6 (cont.). Correlation of 10-minute mean wind speed for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for wind direction between 236° – 326° and wind speed ≥8 m s^{-1}.



Wind speed (WS) measured at 2.5 m A.G.L is consistently greater on the upwind (western) monitoring stations at SCH. For winds between 236°-326° the mean monthly ratios of downwind WS to upwind WS are: Feb., 0.736 (±0.037); March, 0.788 (±0.169); April, 0.717 (±0.002); May, 0.735 (±0.003); June 0.729 (±0.005), between stations 100 and 200. For winds between 236°-326° the mean monthly ratios of downwind WS to upwind WS are: Feb., 0.772 (±0.051); March, 0.765 (±0.042); April, 0.717 (±0.002); May, 0.787 (±0.004); June 0.816 (±0.013), between stations 101 and 202. Note data for June are restricted to the period 06-01-2021 to 06-07-2021.

Hours of Exceptional Wind Speed Exceedance (25 mph [11 m s^{-1}]) By Month, By Station

Exceptional wind events are typically recognized by the US EPA to occur when the hourly mean wind speed measured at 10 m above ground level (AGL) is >25 mph (11 m s^{-1}). However, the formal determinations of exceptional wind events are made by the local air pollution control districts and the US EPA. The US EPA typically requires that all anthropogenic sources that contribute to an exceedance of the 24-hour mean PM_{10} standard be controlled with Best Available Control Measures (BACM) for an exceedance to qualify as an exceptional event. If hourly wind speeds exceed 25 mph at 10 m AGL, then BACM is assumed to be overwhelmed and no longer effective. To provide an estimate of the number of hours this may be occurring across the SCH monitoring locations, the measured wind speed at 2.5 m AGL at each site is used to estimate the 10 m AGL wind speed using the wind profile power law:

$$u_{10\,m} = u_r\left(\frac{10}{z_r}\right)^{\alpha} \quad (1)$$

where $u_{10\,m}$ is the wind speed (m s^{-1}) at 10 m AGL, u_r is the wind speed (m s^{-1}) measured at the anemometer height a monitoring station, i.e., z_r=2.5 m AGL, and α is 1/7. Numbers of hours for each month and site are provided in Table 3.

Table 3. Number of hours 10 m A.G.L (estimated) wind speed for each month and site >25 mph (11 m s^{-1}).

Month	Station #	# Hrs Mean Hourly WS >25 mph (11 m s^{-1})
February	100	9
	200	0
	101	12
	102	2
	201	2
	202	1
March	100	60
	200	5
	101	83
	102	20

Month	Station #	# Hrs Mean Hourly WS >25 mph (11 m s^{-1})
	201	19
	202	12
April	100	57
	200	6
	101	75
	102	22
	201	20
	202	15
May	100	58
	200	7
	101	71
	102	33
	201	30
	202	18
June	100	10
	200	0
	101	15
	102	1
	201	4
	202	2

2.4.2 Saltation

SANTRI real-time saltation measuring instruments were deployed at all the SCH monitoring locations. In April 2021 Big Spring Number 8 saltation traps (Fryrear, 1986*) were installed to collect height-resolved samples of the particles moving in saltation at the SCH site for establishing the site-specific vertical saltation mass flux profile. This information was used to convert the height resolved SANTRI particle count data to an estimate of mass flux (g m^{-1} hr^{-1}). The conversion of the SANTRI optical count data to saltation flux is described in Appendix A.

*Fryrear, D.W. (1986), A field dust sampler, Journal of Soil and Water Conservation, 41, 117-120.

Time series data comparing the mean hourly saltation flux (g m^{-1} hr^{-1}) at a station with its associated mean hourly wind speed data are shown in Fig. 7 for the northern transect stations at SCH, i.e., Station 100, Station 201 and Station 200. Time series data comparing the mean hourly saltation flux (g m^{-1} hr^{-1}) at the southern transect stations, i.e., Station 101, Station 102 and Station 202 are shown in Fig. 8. These figures indicate that along the west to east transects of stations at the SCH site there were periods of time when the saltation signal and the wind speed responded (i.e., increase) in near synchronization. Under conditions of elevated wind speed that do not have an associated increase in PM_{10}, other environmental factors were likely acting to modulate this relation that dampened the emission response.

Figure 7. Time series of hourly mean wind speed and saltation flux for the northern transect of stations at SCH.

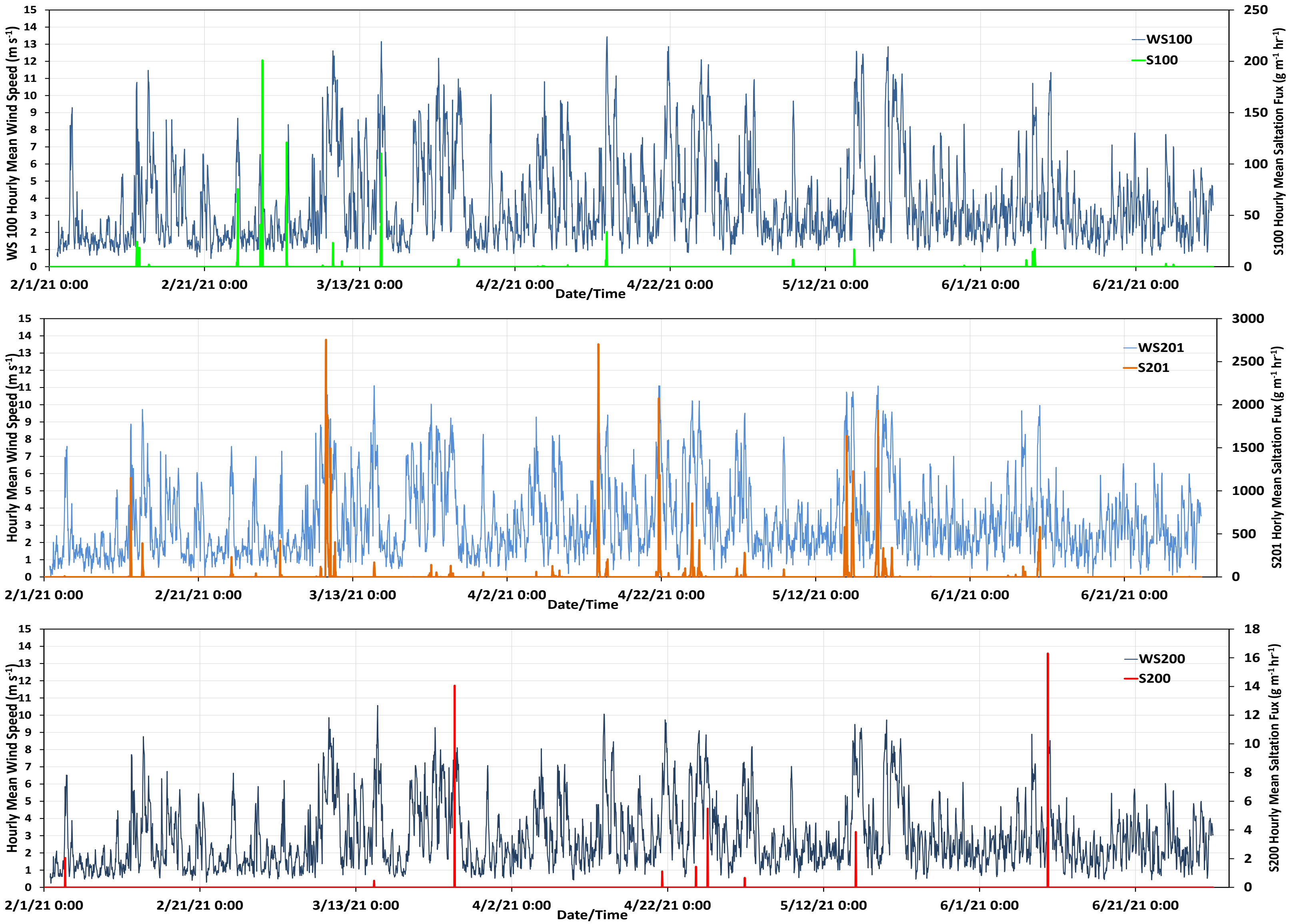
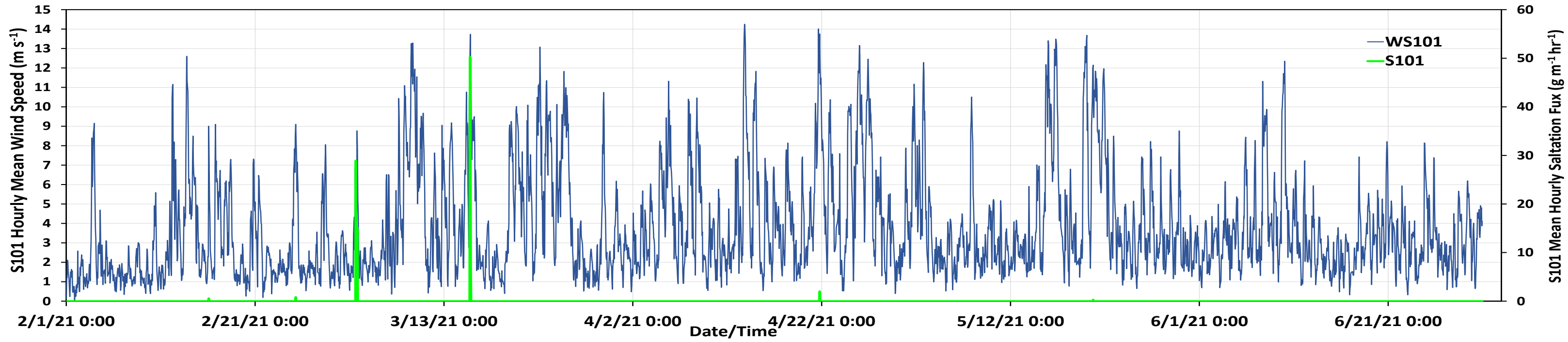
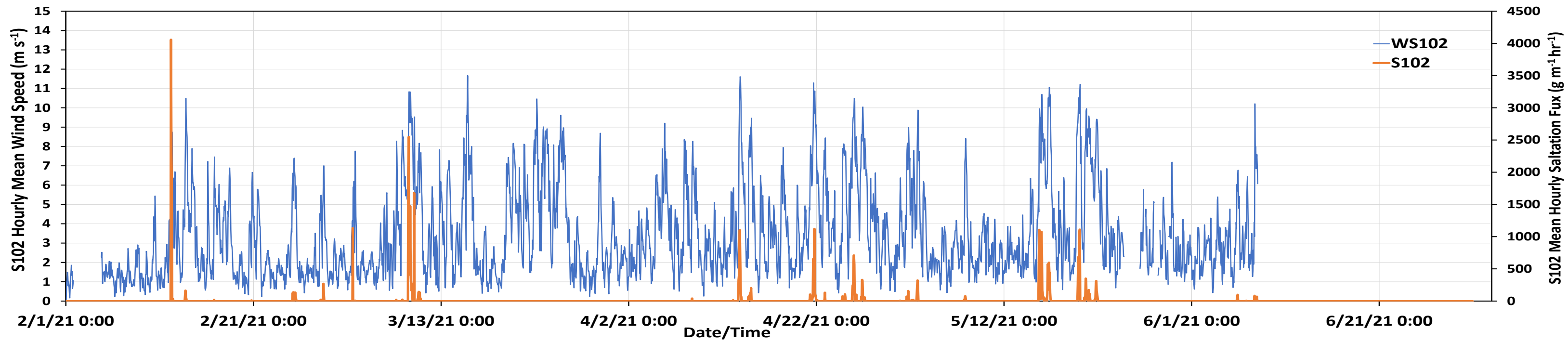
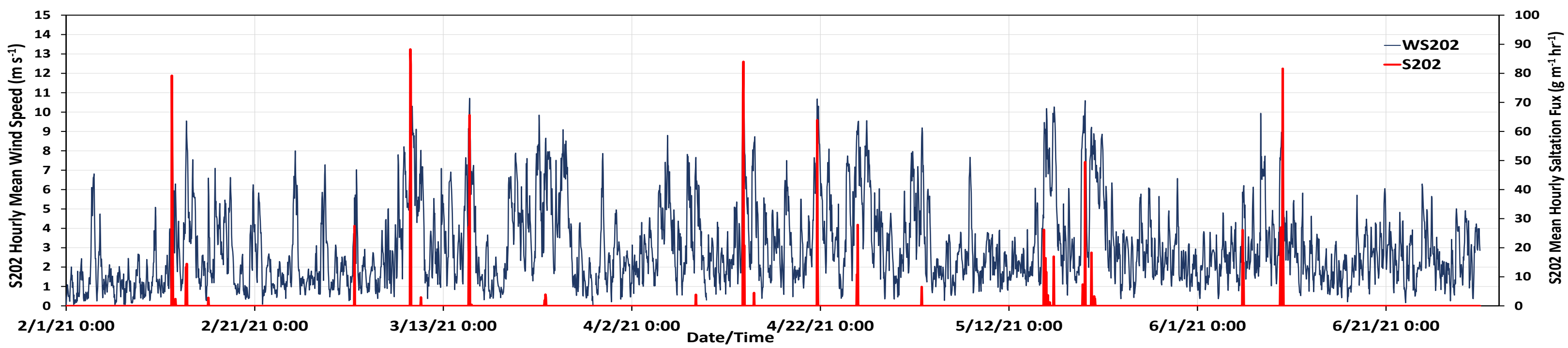


Figure 8. Time series of hourly mean wind speed and saltation flux for the southern transect of stations at SCH.







During the intervals when saltation flux was observed to respond to wind speed (Figs. 7 and 8), saltation flux scaled predictably with wind speed at Stations 100, 201, 101 and 202. No relations were observed between saltation flux and wind speed at Stations 101 and 200, which can be attributed to its infrequency of occurrence. The relation between mean saltation flux for 1 m s^{-1} wind speed bins for Stations 100 and 201 are shown in Fig 9 for Stations 101, 102, and Fig. 10 for Station 202. The relations presented in Figs. 9 and 10, suggest that mean hourly wind speed needs to exceed 8 m s^{-1} measured at 2.5 m above ground level (AGL) to cause localized saltation, but as Fig. 7 and 8 show, saltation does not always occur once this hourly mean value is exceeded, which is likely due to other environmental factors such as wind direction, subsurface moisture, and relative humidity. It also appears that wind speed measured at a station to the west of another station on the transect can be used to predict saltation activity at the station located east of it. This is a result of the strong correlations between wind speed at the three stations along both transects (e.g., Figs. 4-6).

For the February to June monitoring interval (3600 hours) the total hours in which saltation was observed for the northern transect sites were: Station 100, 41; Station 201, 263; Station 200, 10. For the monitoring interval the percentages of time that saltation was observed at each station were: Station 100, 1.1%; Station 201, 7.3%; Station 200, 0.3%. The area of greatest saltation flux and duration was observed at Station 201, which is the middle location between Stations 100 and 200. This is attributable to the sandy soils of the interior area of the SCH site as well as the presence of loose sand that had accumulated following the surface roughening and prior to the placement of the Stations. This may have been from sand moving into the area during wind driven sand transport events bringing sand from the western upwind areas. A portion of this loose sand may have also been accumulating due to the breakup of weak clods created by tillage in the sandy areas of the site.

Similar to the stations in the northern transect, saltation across the southern transect of stations was also observed to occur intermittently through the monitoring period and is most active at the interior Station 102. For the February to June monitoring interval the total hours in which saltation was observed for the southern transect sites were: Station 101, 9; Station 102, 205; Station 202, 50. For the entire monitoring interval the percentages of time these represent that saltation was observed at each station were: Station 101, 0.3%; Station 101, 5.7%; Station 202, 1.4%.

The interior of the SCH site along the northern transect of stations had the most active saltation during the monitoring period, however, it can be demonstrated that this did not result in significant quantities of sand moving from the interior reaching the eastern edge of the SCH site. The fractional difference in total sand flux (i.e., the sum of the hourly sand flux values) between the western station (S100, 480 g m^{-1} hr^{-1}) and the middle station (S201, 57864 g m^{-1} hr^{-1}) was an increase by a factor of 120 (Fig. 11). The change in total saltation flux from the middle station (S201) to the eastern station (S200, 42 g m^{-1} hr^{-1}) decreased by a factor of 1382, indicating that most of the saltation in the interior portion of SCH was not reaching the eastern edge. Comparing the western edge total saltation flux (S100) with the eastern edge (S200), total flux on the eastern edge was 11.5 times less (Fig. 11).

The interior of the SCH site along the southern transect of stations was also the most active area for saltation during the monitoring period. The fractional difference in total sand flux between the western station (S101, 156 g m^{-1} hr^{-1}) and the middle station (S102, 50763 g m^{-1} hr^{-1}) was an

Figure 9. The relations between mean hourly saltation flux and mean hourly wind speed at Stations 100 (wind speed ≥8.5 m s^{-1}) and 201 (wind speed ≥6.5 m s^{-1}) on the northern transect of stations at SCH.

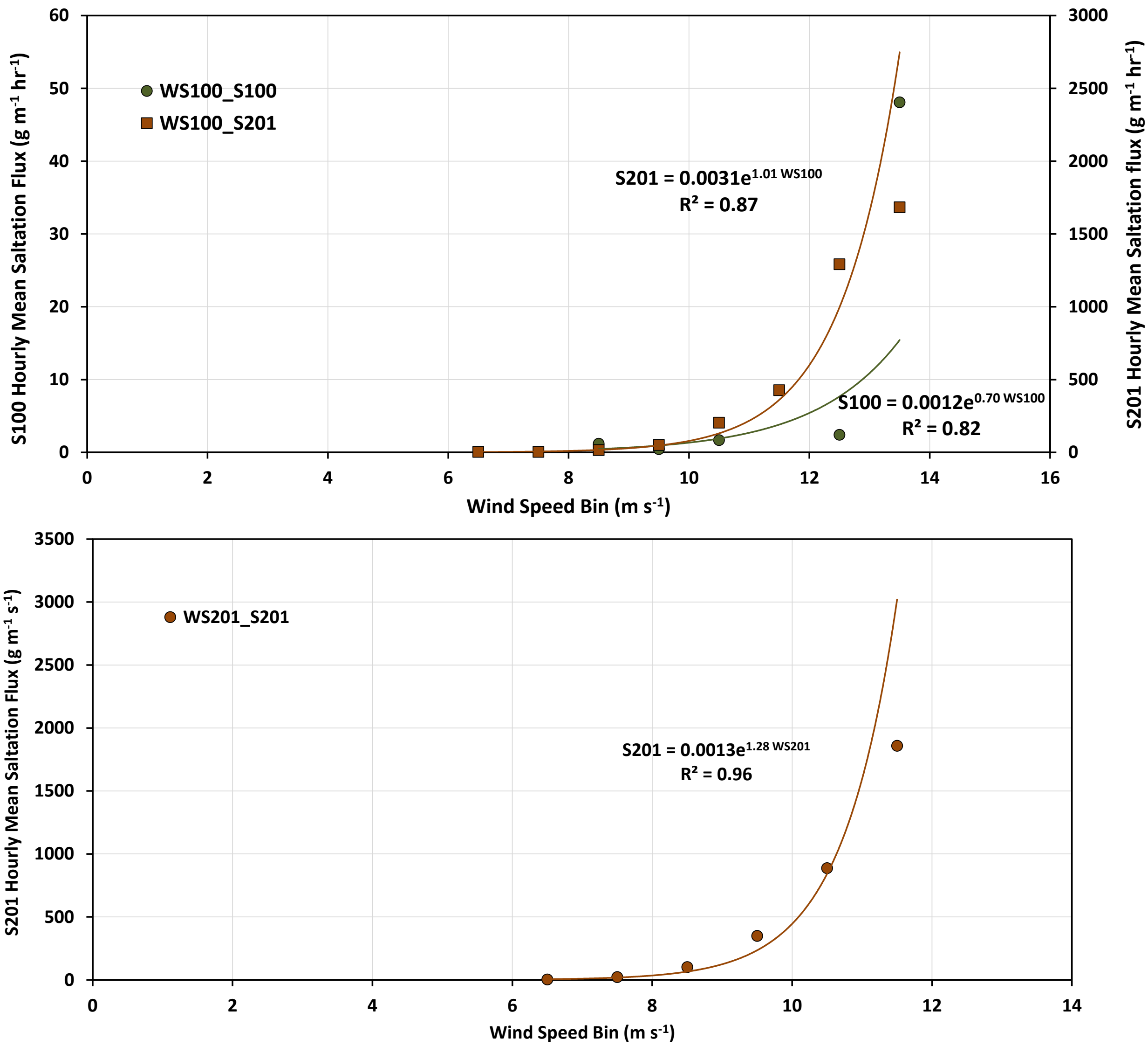
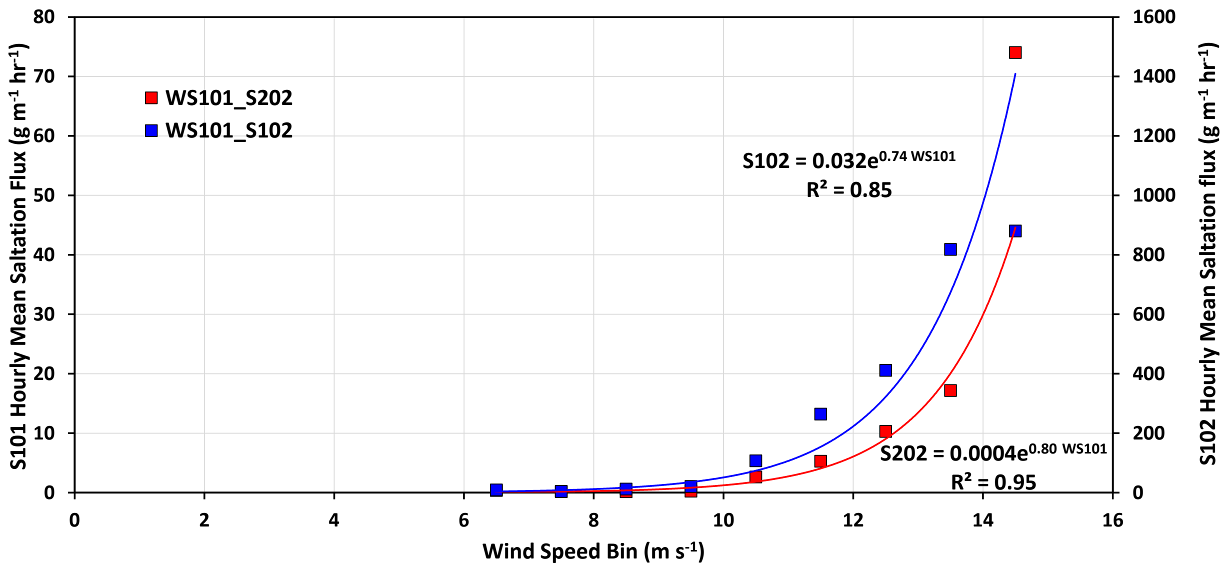
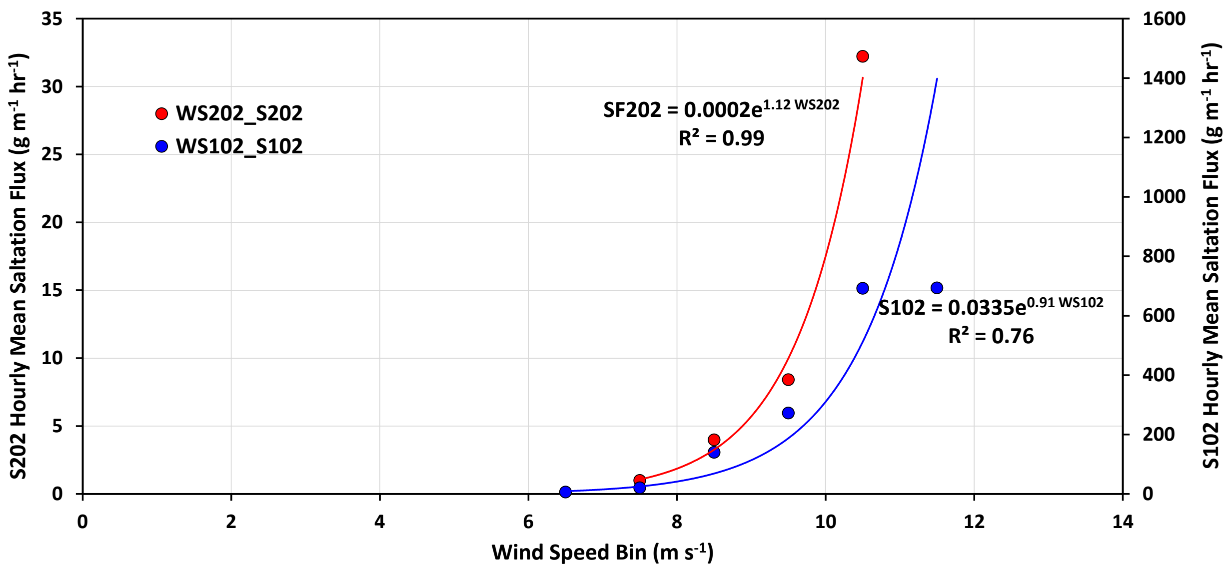


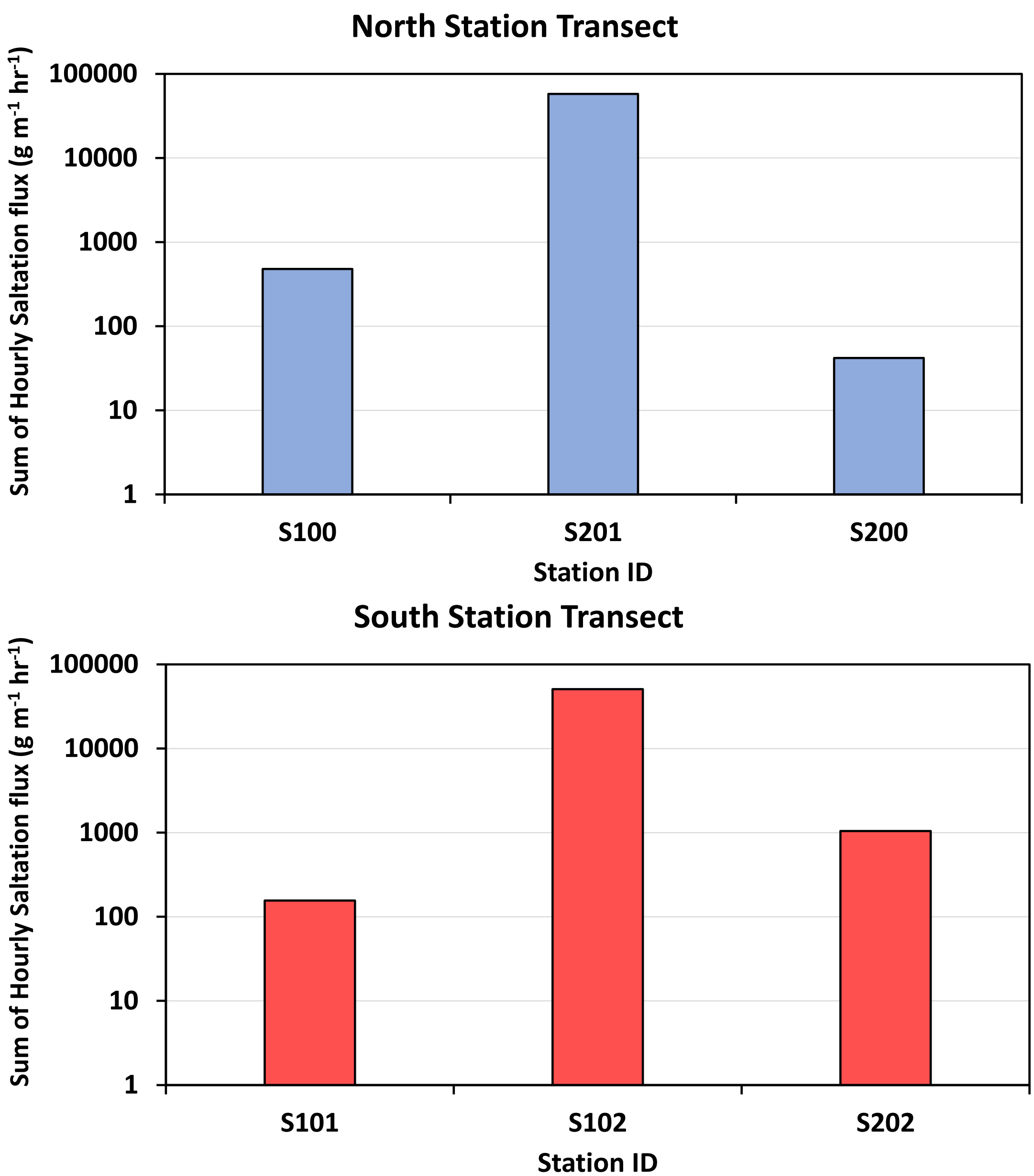
Figure 10. The relations between mean hourly saltation flux and mean hourly wind speed ≥6.5 m s^{-1} at Stations 101 and 202 on the southern transect of stations at SCH.





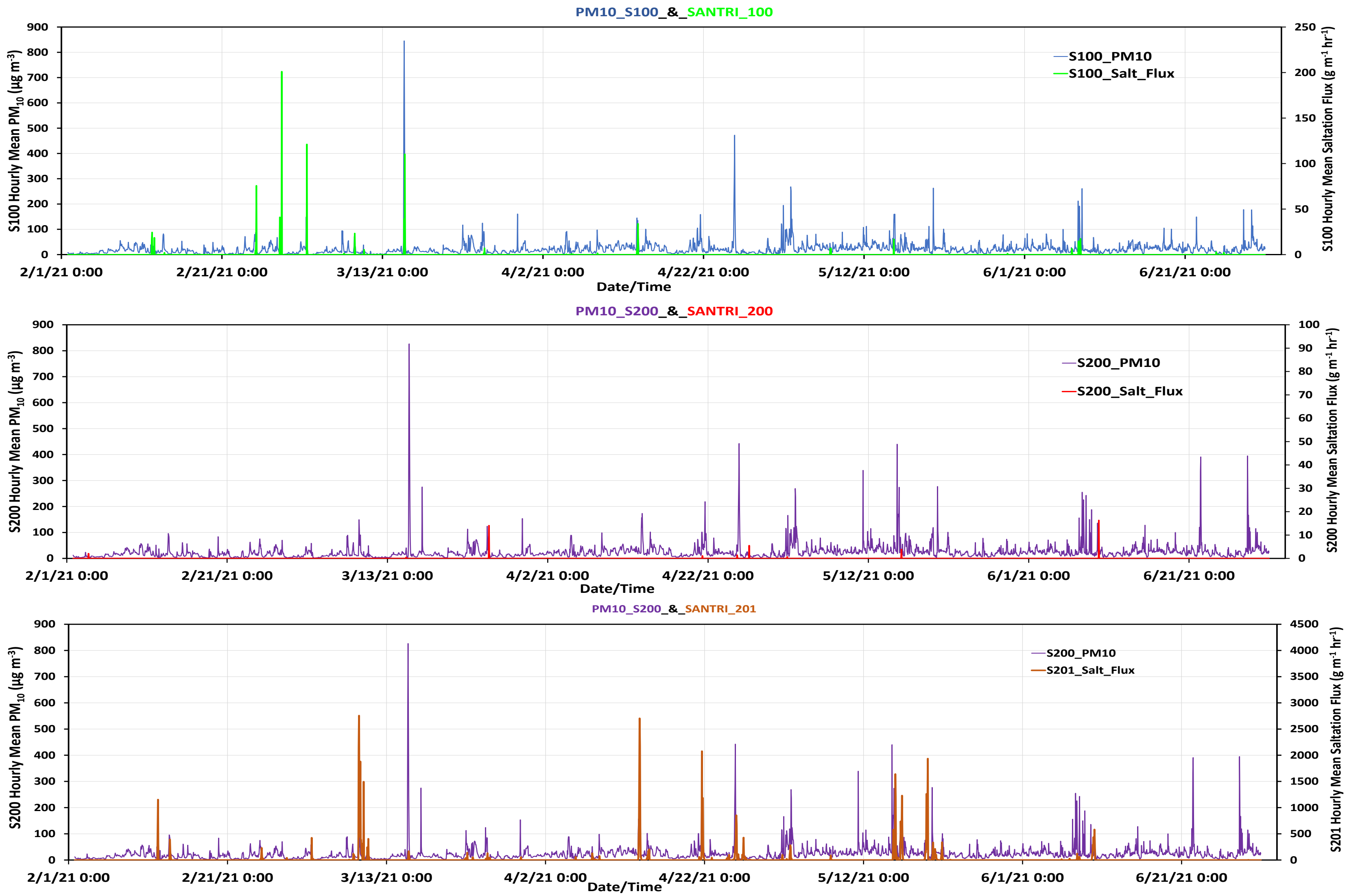
increase by a factor of 326 (Fig. 11). The change in total saltation flux from the middle station (S102) to the eastern station (S202, 1043 g m^{-1} hr^{-1}) was a decrease by a factor of 49, corroborating the results of the northern transect that most of the saltation in the interior portion of SCH is not reaching the eastern edge (Fig. 11). Comparing the western edge total saltation flux (S101) with the eastern edge (S202), total flux on the eastern edge is greater by a factor of 7 (Fig. 11).

Figure 11. The sums of hourly saltation flux for the monitoring period February-June at the Stations in the northern and southern transects of the site.



Time series data comparing the PM_{10} at a station with its associated SANTRI saltation flux data are shown in Fig. 12 for Station 100 (PM_{10} at S100 and SANTRI at S100); for Station 200 (PM_{10} at S200 and SANTRI at S200); and for Station 201 (PM_{10} at S200 and SANTRI at S201) where PM_{10} at S200 is the closest monitor in the downwind direction and may be influenced by saltation at Station 201. These figures indicate that along the northern transect of stations at the SCH site there were periods of time when the PM_{10} signal and the saltation flux signal responded (i.e., increases) in near synchronization. This suggests that local saltation activity may have caused an increase in

Figure 12. Time series data of PM_{10} (blue and purple lines) and saltation flux, northern stations (100 top [green], 201 middle [orange], and 200 bottom panel [red]) at SCH site.



the PM_{10}, however the duration of these excursions of high PM_{10} are relatively short lived usually less than one hour. In addition, there were no scaling relations observed between mean hourly PM_{10} and mean hourly saltation flux at Stations 100 and 200, or between mean hourly PM_{10} and hourly mean saltation flux for Station 202 and 200, where Station 202 is upwind of Station 200.

2.4.3 Particulate Matter

The Federal and State standards for 24-hour mean concentrations of PM10 are 150 µg m^{-3} and 50 µg m^{-3}, respectively. To provide an indicator of the potential for the exceedance of these standards the number of occurrences for mean hourly PM_{10} values ≥50 and 150 µg m^{-3} for Stations 100 and 200 are tracked and shown in Table 4.

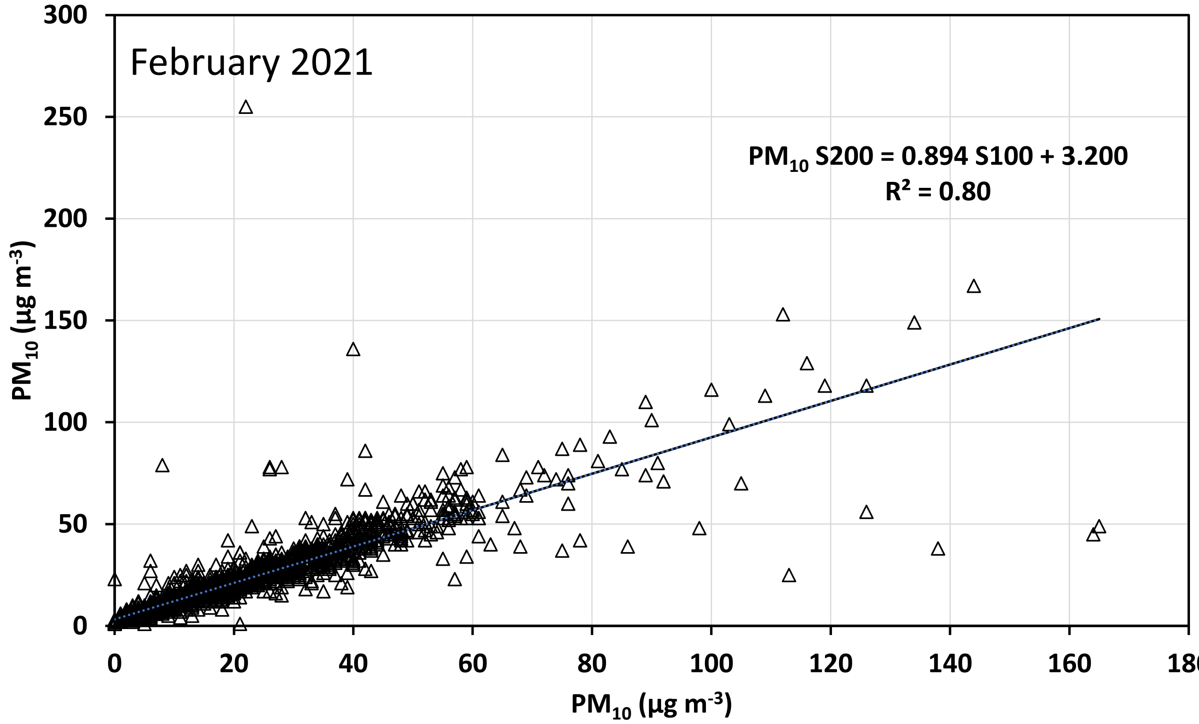
Table 4. Number of occurrences for mean hourly PM_{10} values ≥50 and 150 µg/m^3 for Stations 100 and 200

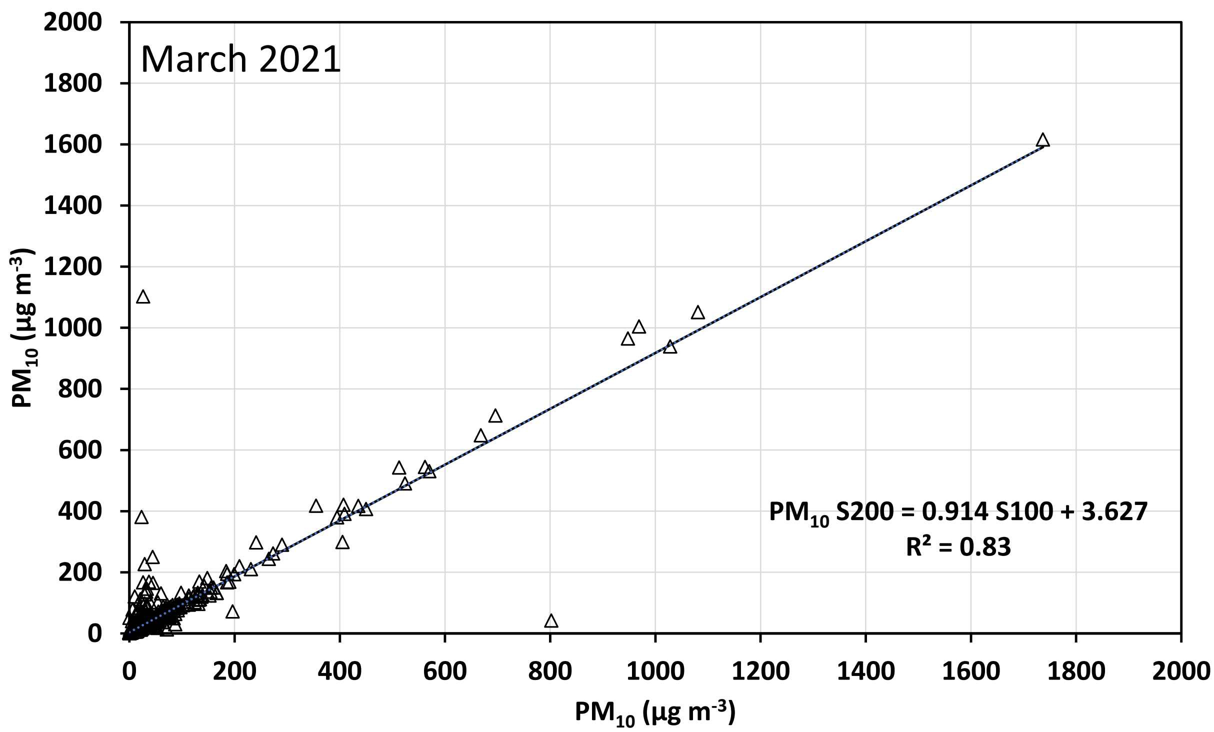
	100		200	
Month	**#Hrs >150 µg m^{-3}**	**#Hrs >50 µg m^{-3}**	**#Hrs >150 µg m^{-3}**	**#Hrs >50 µg m^{-3}**
Feb	0	15	0	22
March	5	36	6	41
April	5	51	7	51
May	7	71	9	91
June	5	43	12	67

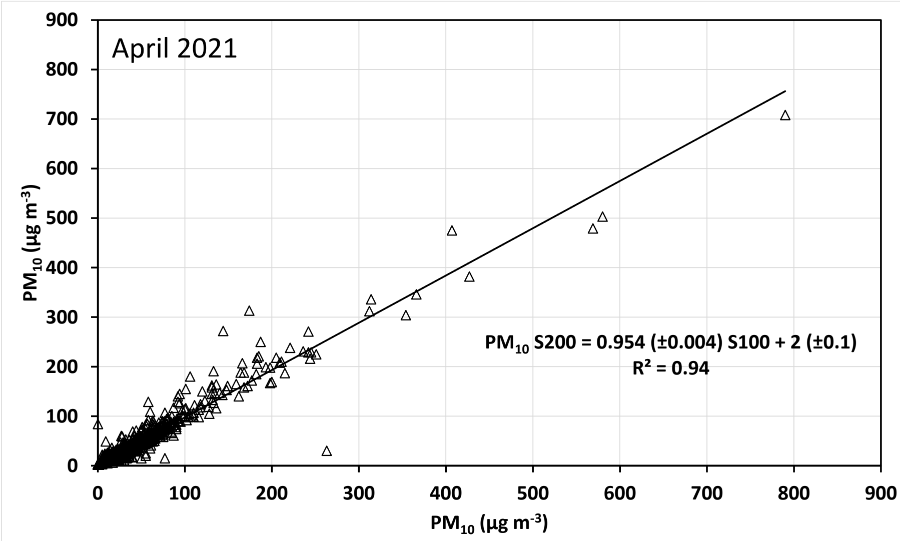
Correlation PM_{10}, Station 100 vs. 200, By Month

The relations between 10-minute mean PM_{10} concentrations for stations 100 and 200 are shown in Figs. 13 through 16. A slope value for the correlation relation <1.10 indicates that there has not been an increase in the PM_{10} between the upwind and downwind PM_{10} at the SCH site above the expectation of 90% dust control. The relation is examined for: 1) all available data, 2) data acquired for the wind direction range 236° – 326°, and 3) data acquired for the wind direction range 236° – 326° and wind speed ≥8 m s^{-1} (saltation may be active), and 4) for wind direction between 236° – 326°, PM_{10}≥50 µg m^{-3}, and wind speed ≥8 m s^{-1} (saltation may be active and PM_{10} levels if sustained could lead to a State Air Quality exceedance). The first quarter's PM_{10} data indicate that there has been no measurable increase across upwind and downwind PM_{10} monitors at the SCH monitors for all wind speeds that occurred for the wind direction range 236° – 326° when winds blow across the SCH site.

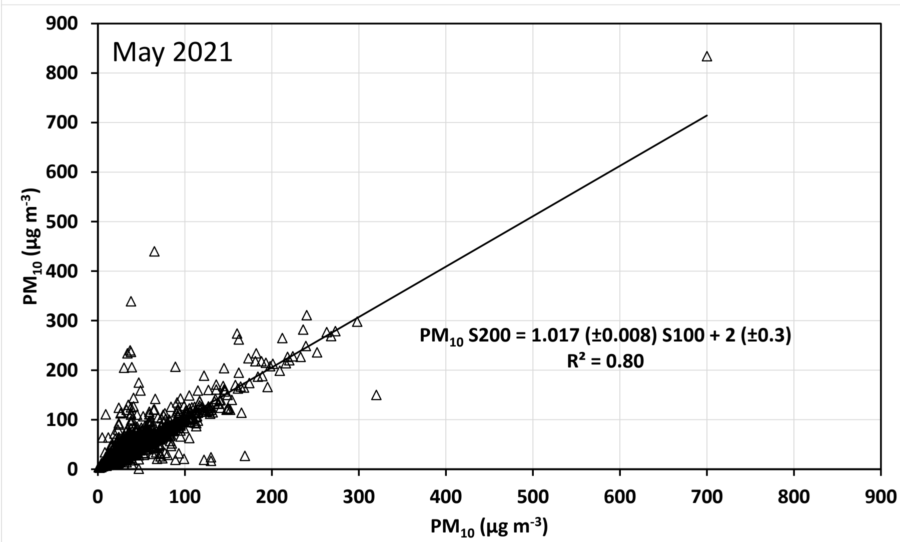
Figure 13. Correlation of 10-minute mean PM_{10} for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for all available data.



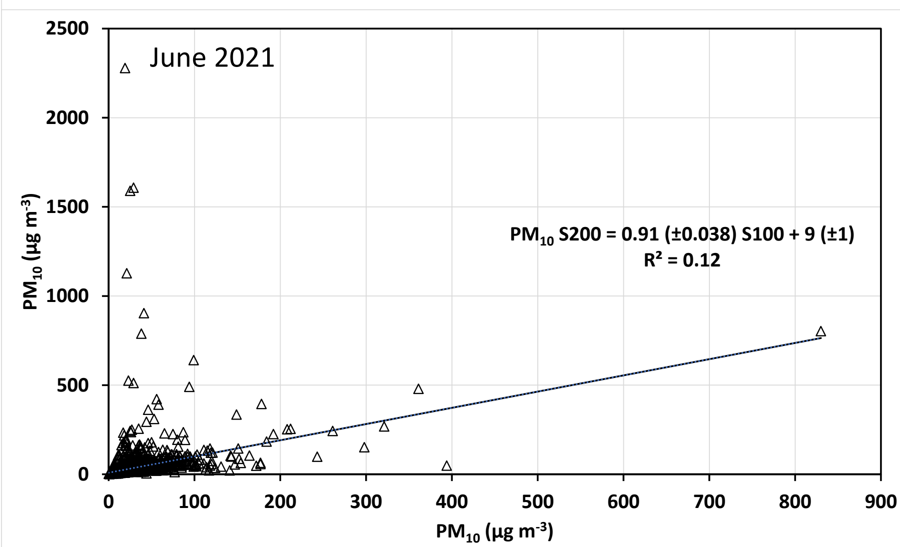




April 2021
PM10 S200 = 0.954 (±0.004) S100 + 2 (±0.1)
R² = 0.94
PM10 (µg m-3)
PM10 (µg m-3)
0
100
200
300
400
500
600
700
800
900

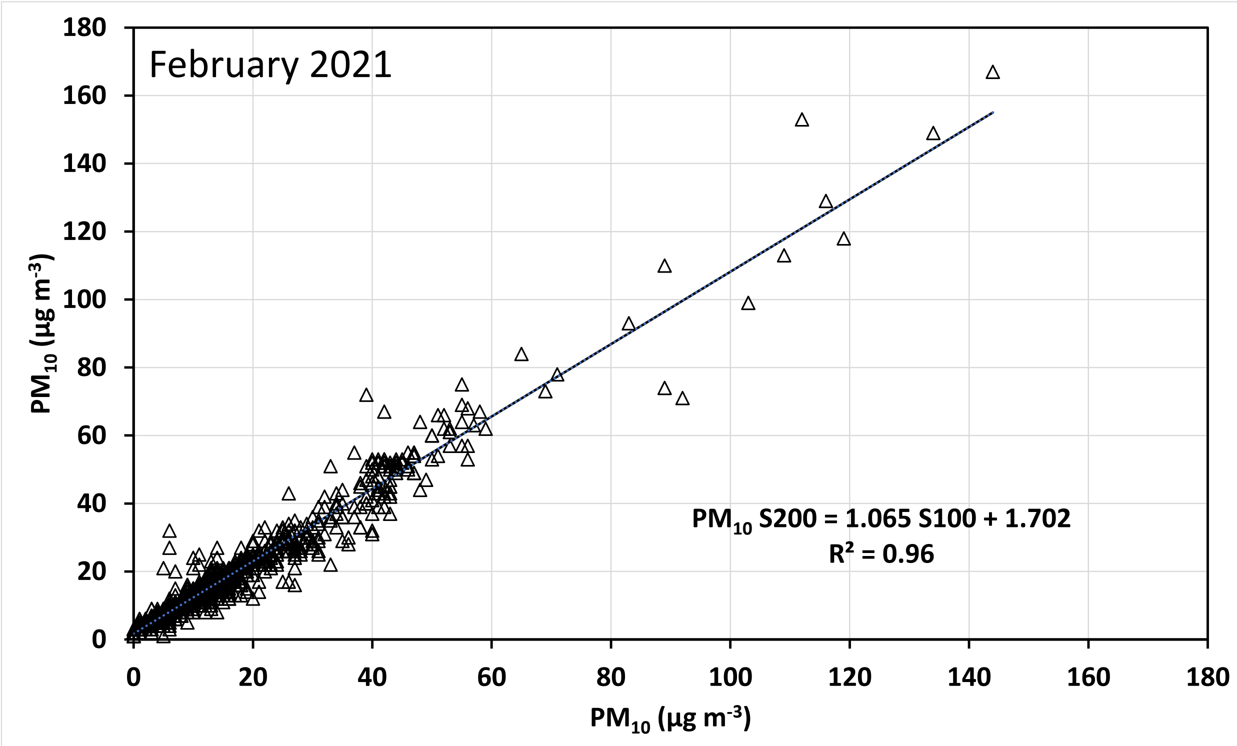


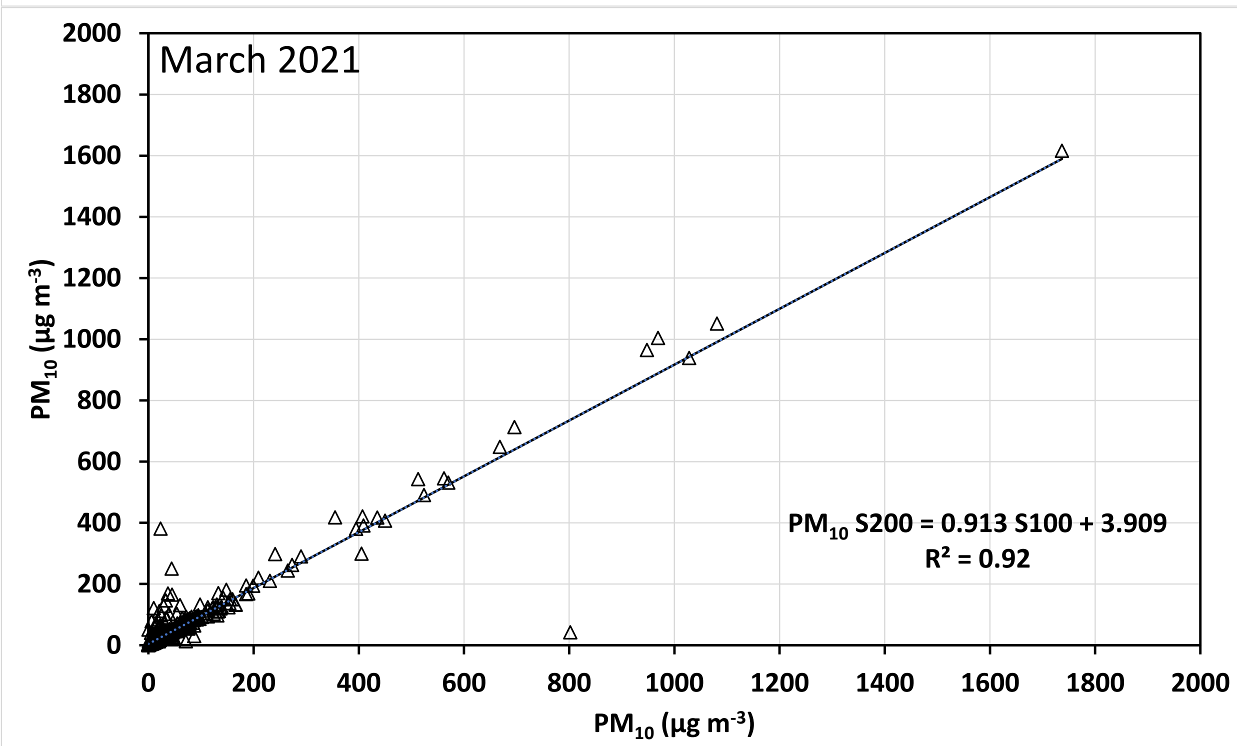
May 2021
PM10 S200 = 1.017 (±0.008) S100 + 2 (±0.3)
R² = 0.80
PM10 (µg m-3)
PM10 (µg m-3)
0
100
200
300
400
500
600
700
800
900



June 2021
PM10 S200 = 0.91 (±0.038) S100 + 9 (±1)
R² = 0.12
PM10 (µg m-3)
PM10 (µg m-3)
0
500
1000
1500
2000
2500
100
200
300
400
500
600
700
800
900

Figure 14. Correlation of 10-minute mean PM_{10} for Stations 100 (downwind, x-axis) and 200 (upwind, y-axis) for wind direction between 236° – 326°. Note the red triangle datum is an extreme outlier.





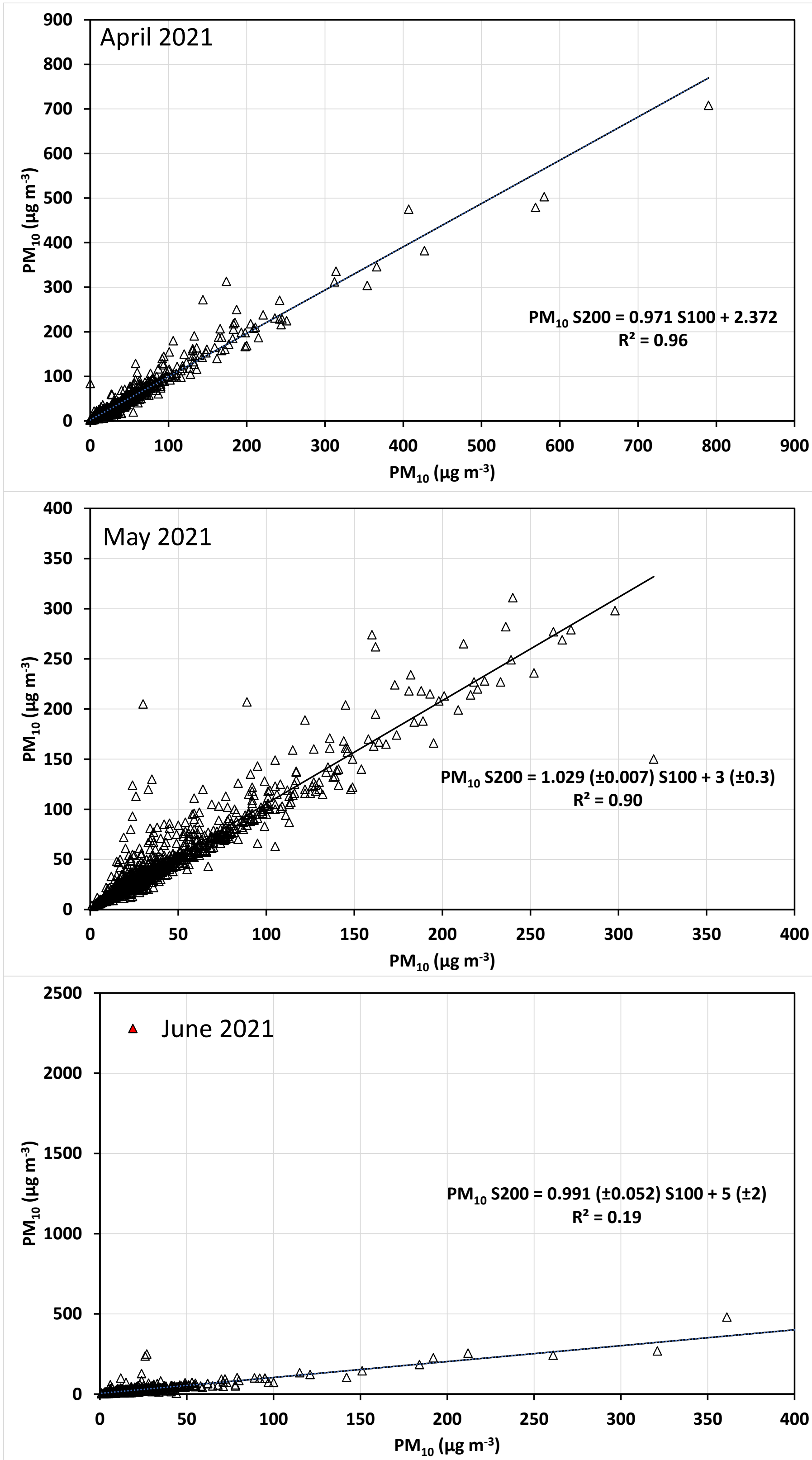
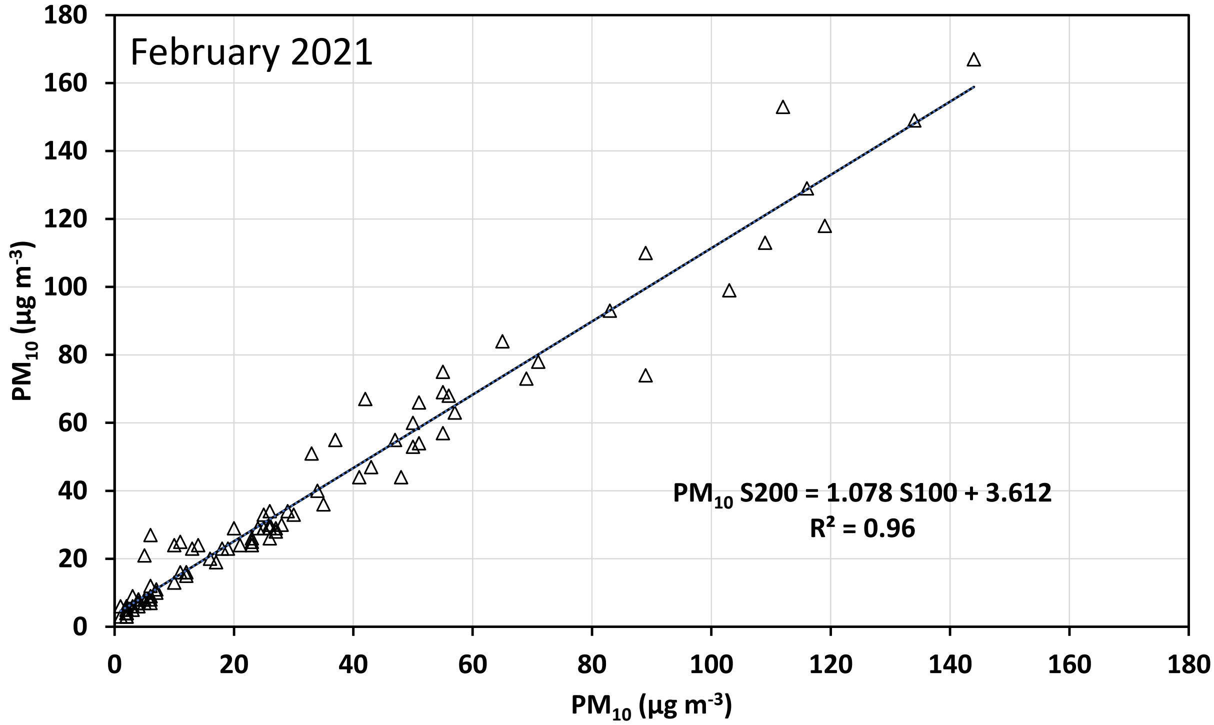
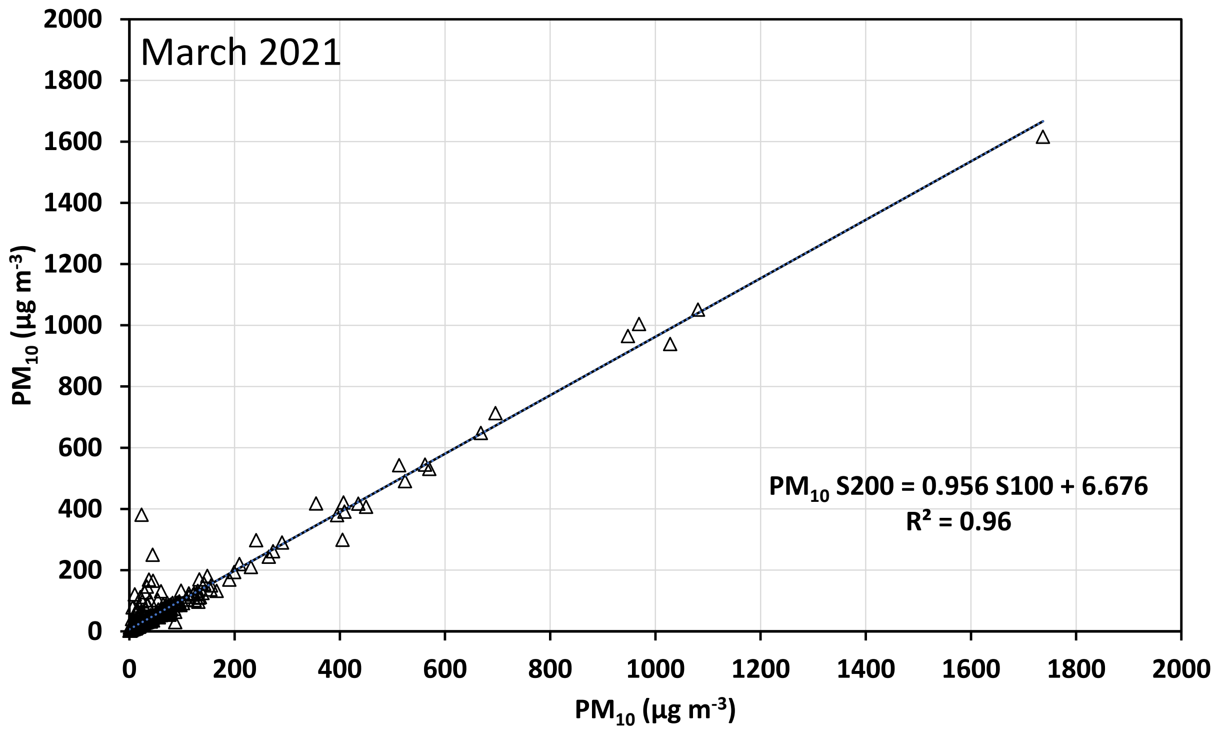
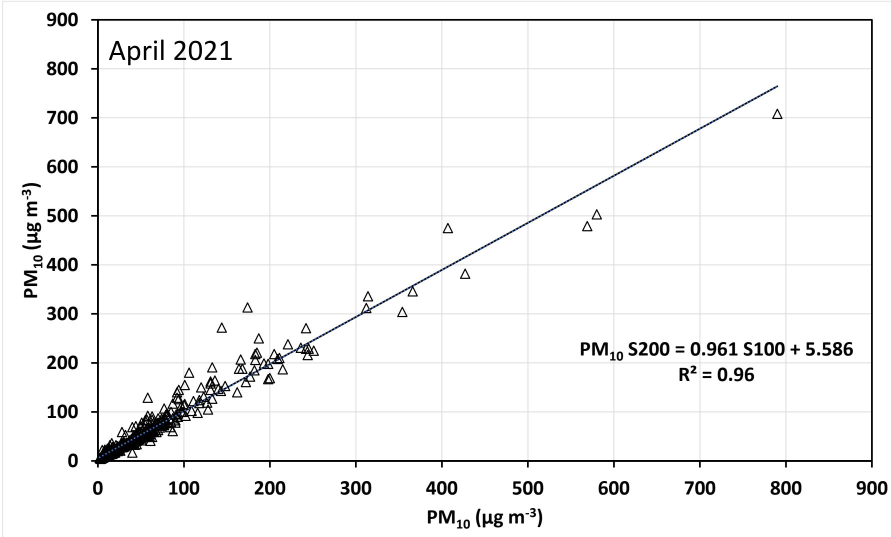
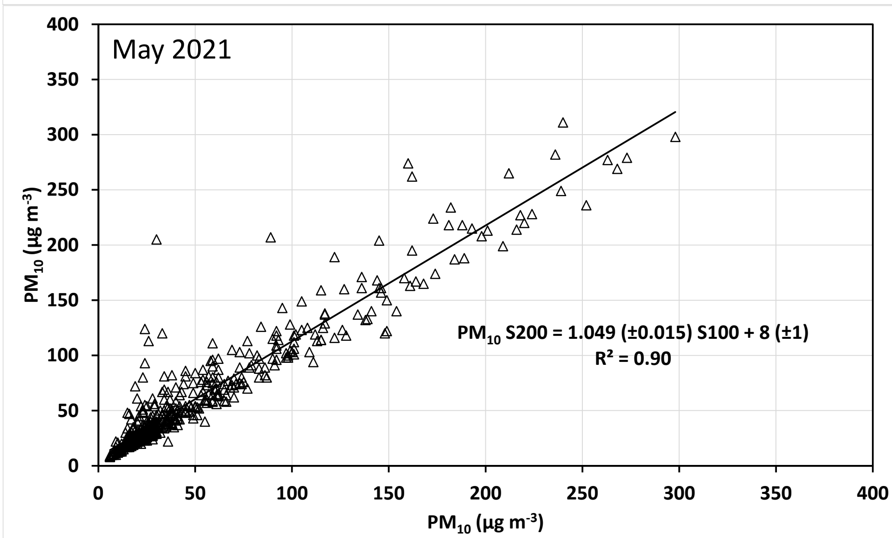

April 2021
PM_{10} S200 = 0.971 S100 + 2.372
R^2 = 0.96
May 2021
PM_{10} S200 = 1.029 (±0.007) S100 + 3 (±0.3)
R^2 = 0.90
June 2021
PM_{10} S200 = 0.991 (±0.052) S100 + 5 (±2)
R^2 = 0.19
PM_{10} (µg m^{-3})
PM_{10} (µg m^{-3})

Figure 15. Correlation of 10-minute mean PM_{10} for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for wind direction between 236° – 326° and wind speed ≥8 m s^{-1}.






April 2021
PM10 S200 = 0.961 S100 + 5.586
R² = 0.96
PM10 (µg m-3)
PM10 (µg m-3)
0
100
200
300
400
500
600
700
800
900


May 2021
PM10 S200 = 1.049 (±0.015) S100 + 8 (±1)
R² = 0.90
PM10 (µg m-3)
PM10 (µg m-3)
0
50
100
150
200
250
300
350
400

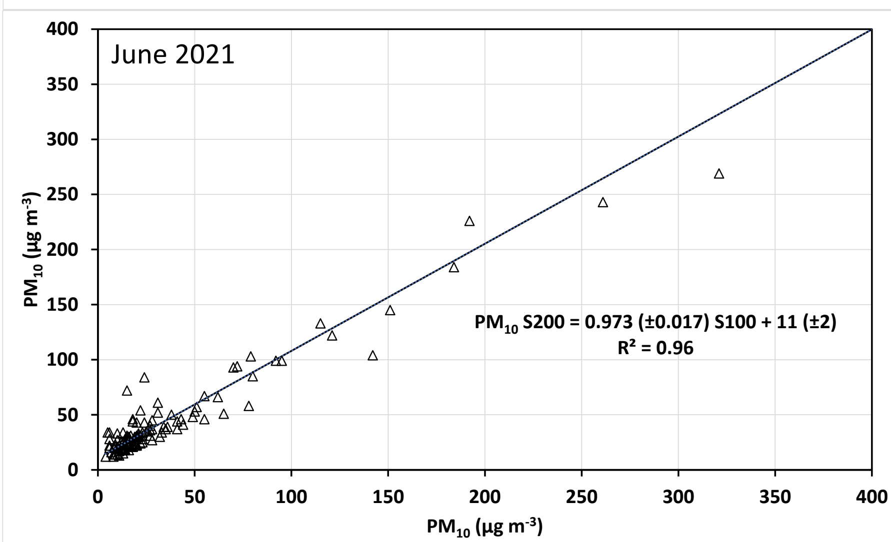
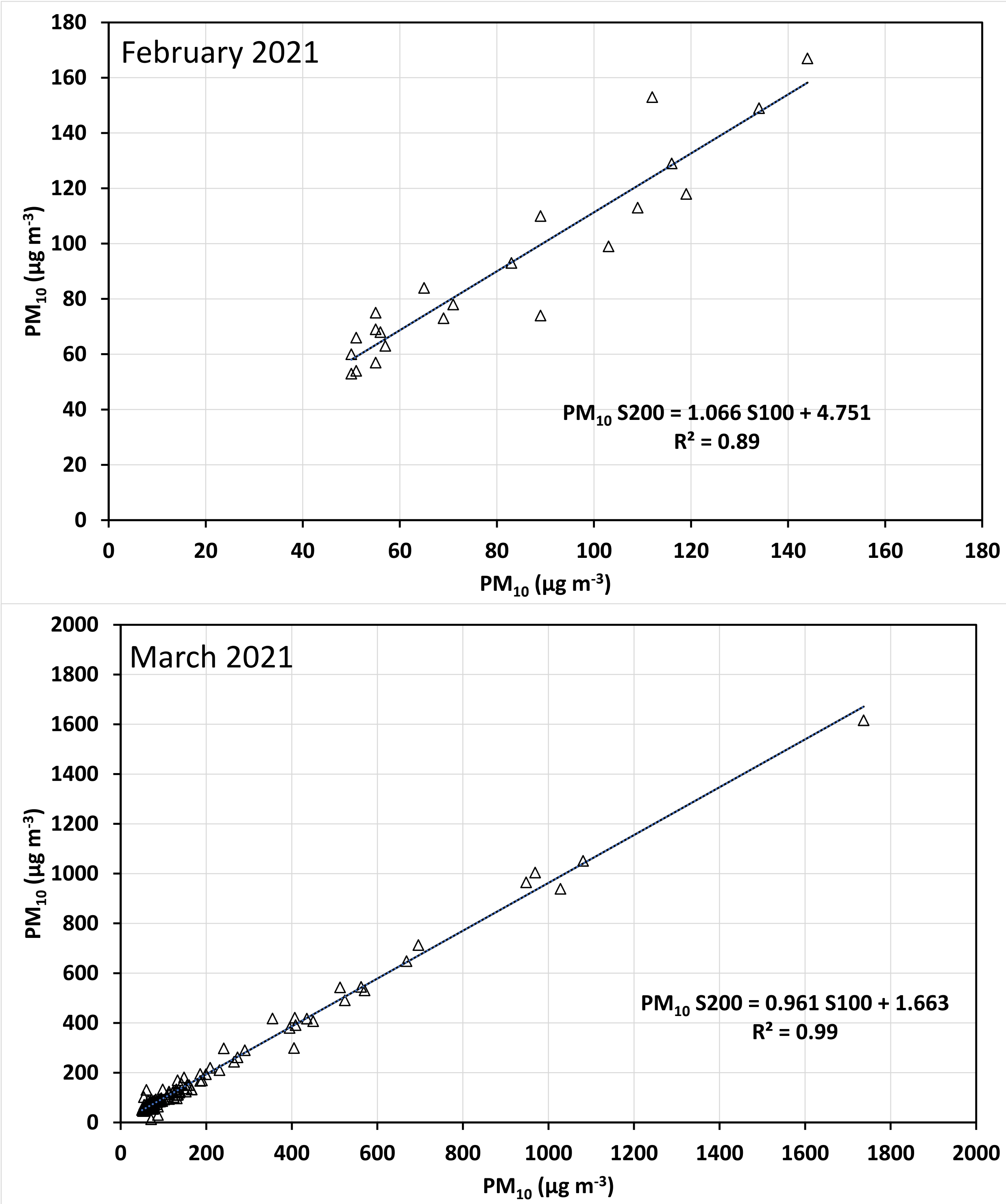
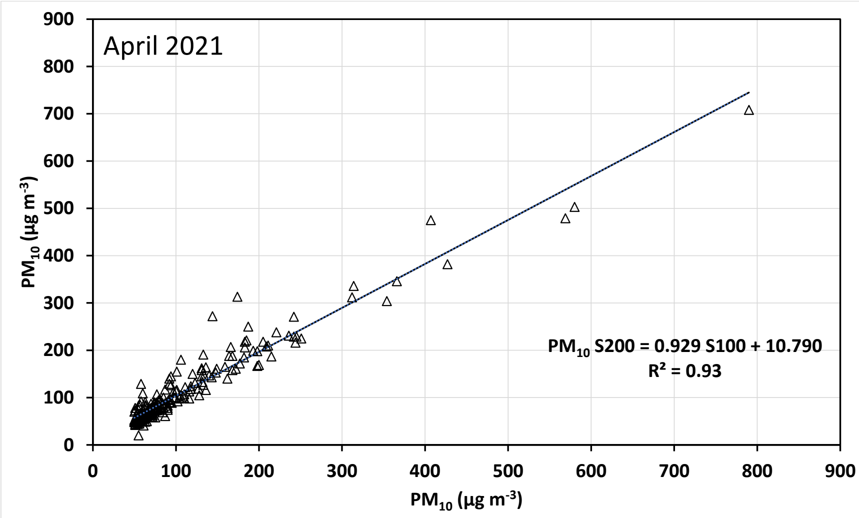
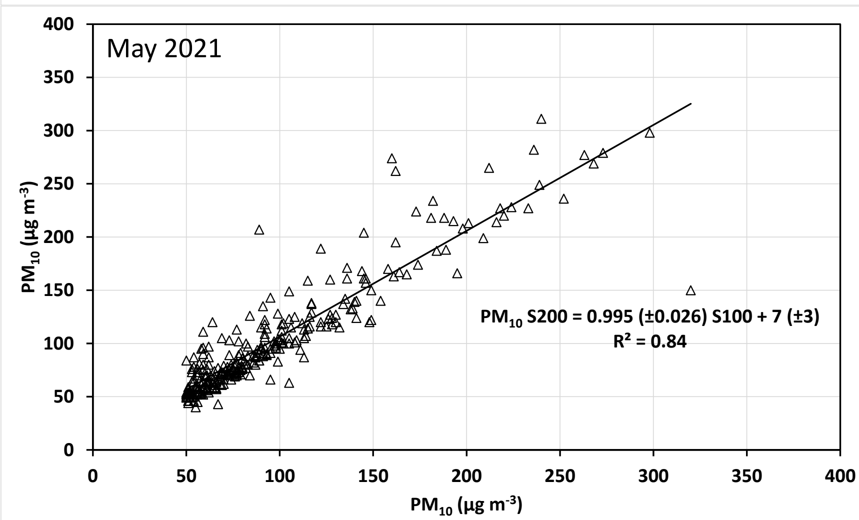
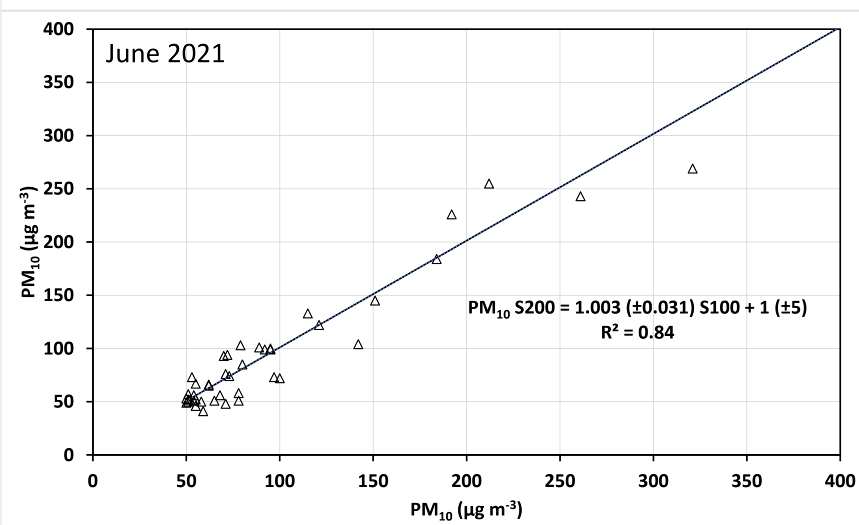

June 2021
PM10 S200 = 0.973 (±0.017) S100 + 11 (±2)
R² = 0.96
PM10 (µg m-3)
PM10 (µg m-3)
0
50
100
150
200
250
300
350
400

Figure 16. Correlation of 10-minute mean PM_{10} for Stations 100 (upwind, x-axis) and 200 (downwind, y-axis) for wind direction between 236° – 326°, $PM_{10} \geq 50$ µg m^{-3}, and wind speed ≥8 m s^{-1}.




April 2021
PM10 S200 = 0.929 S100 + 10.790
R² = 0.93
PM10 (µg m-3)
PM10 (µg m-3)


May 2021
PM10 S200 = 0.995 (±0.026) S100 + 7 (±3)
R² = 0.84
PM10 (µg m-3)
PM10 (µg m-3)


June 2021
PM10 S200 = 1.003 (±0.031) S100 + 1 (±5)
R² = 0.84
PM10 (µg m-3)
PM10 (µg m-3)

3 Ancillary Data

3.1 Precipitation

Table 5. Monthly precipitation totals (mm).

Station #	February	March	April	May	June
100	0	9.9	0	0	0
200	0	8.9	0	0	0

3.2 Wind Roses by Site and Month

Figure 17. SCH station wind roses, February 2021.

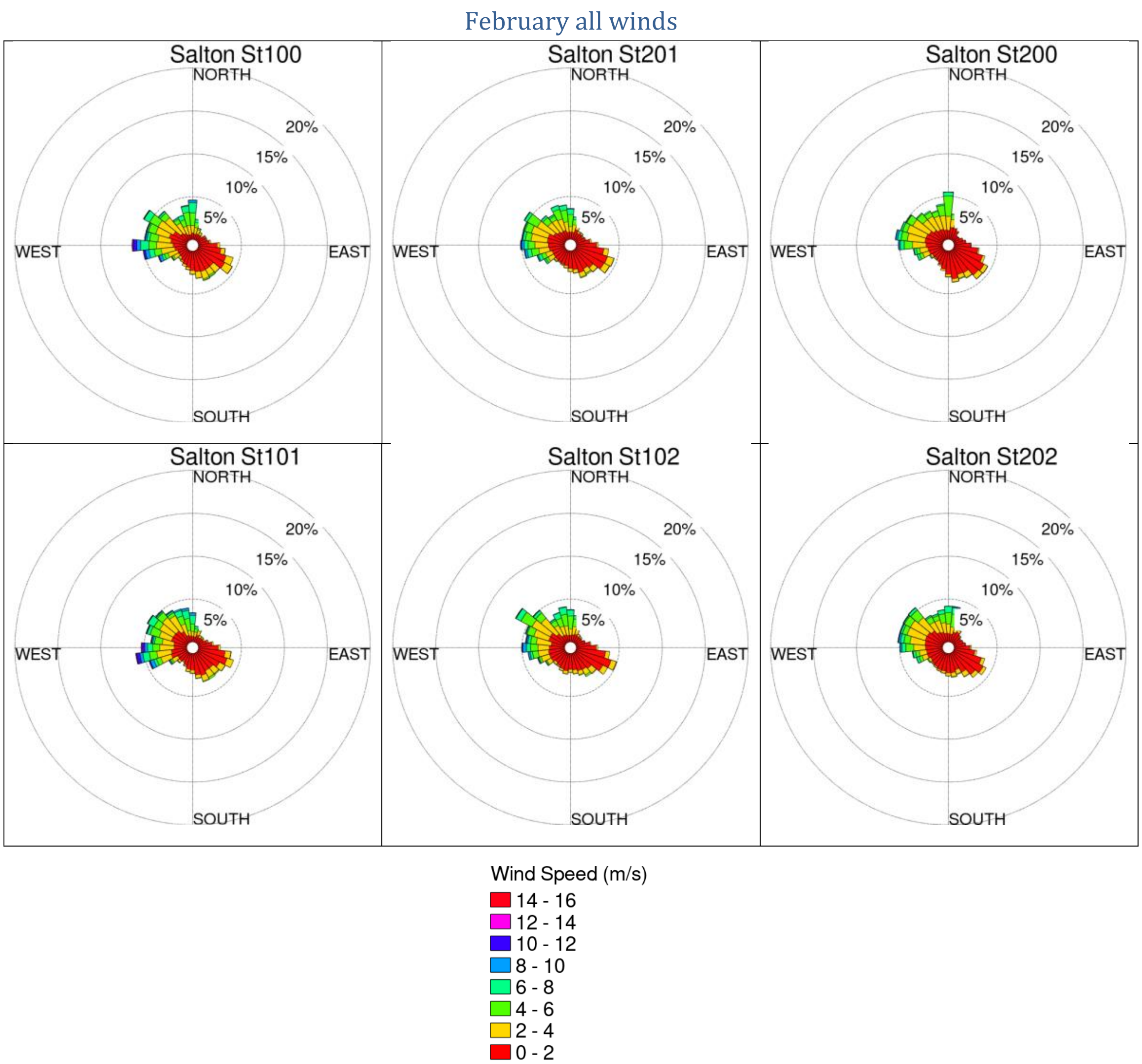


Figure 18. SCH station wind roses, March 2021.

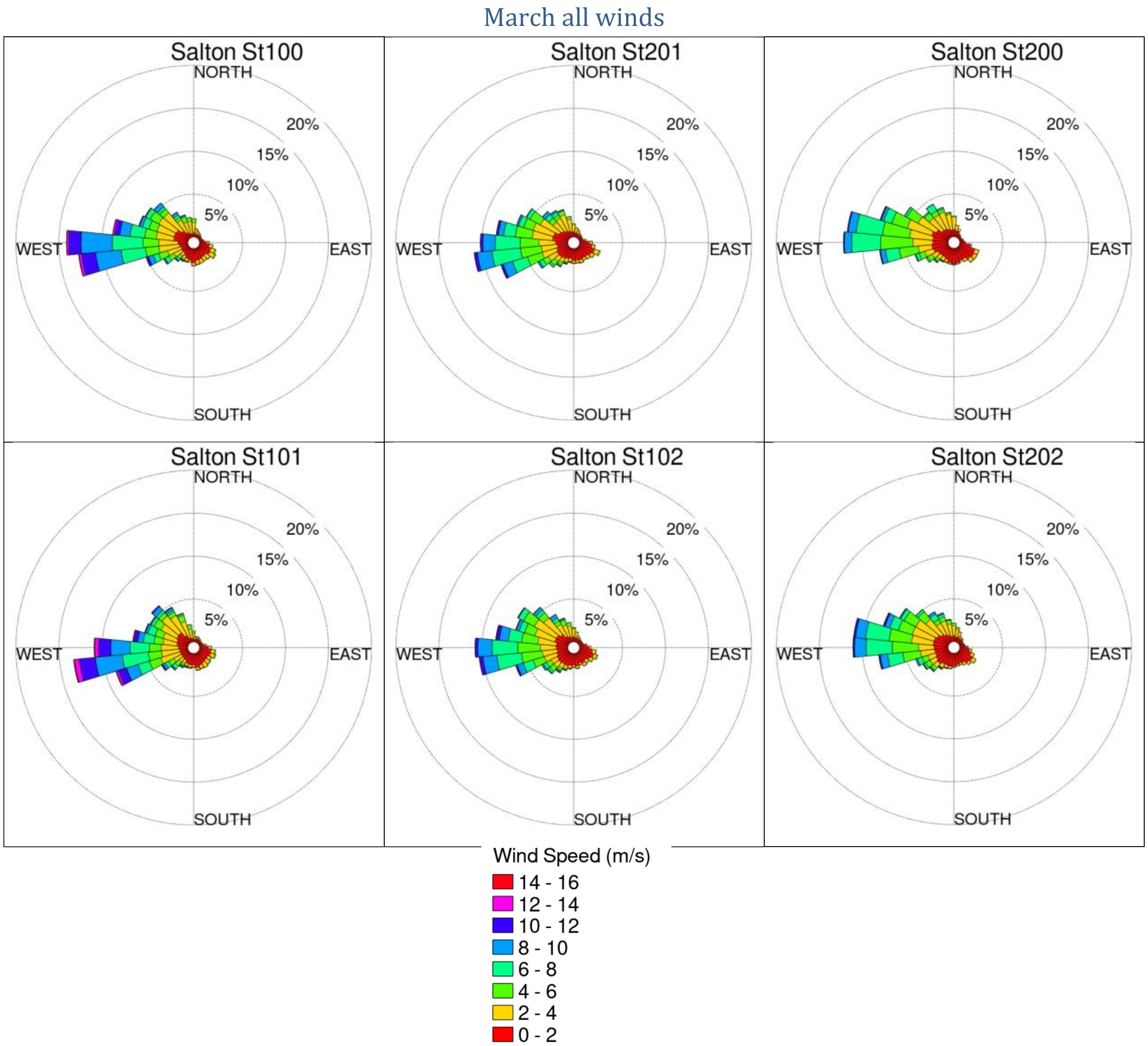


Figure 19. SCH station wind roses, April 2021.

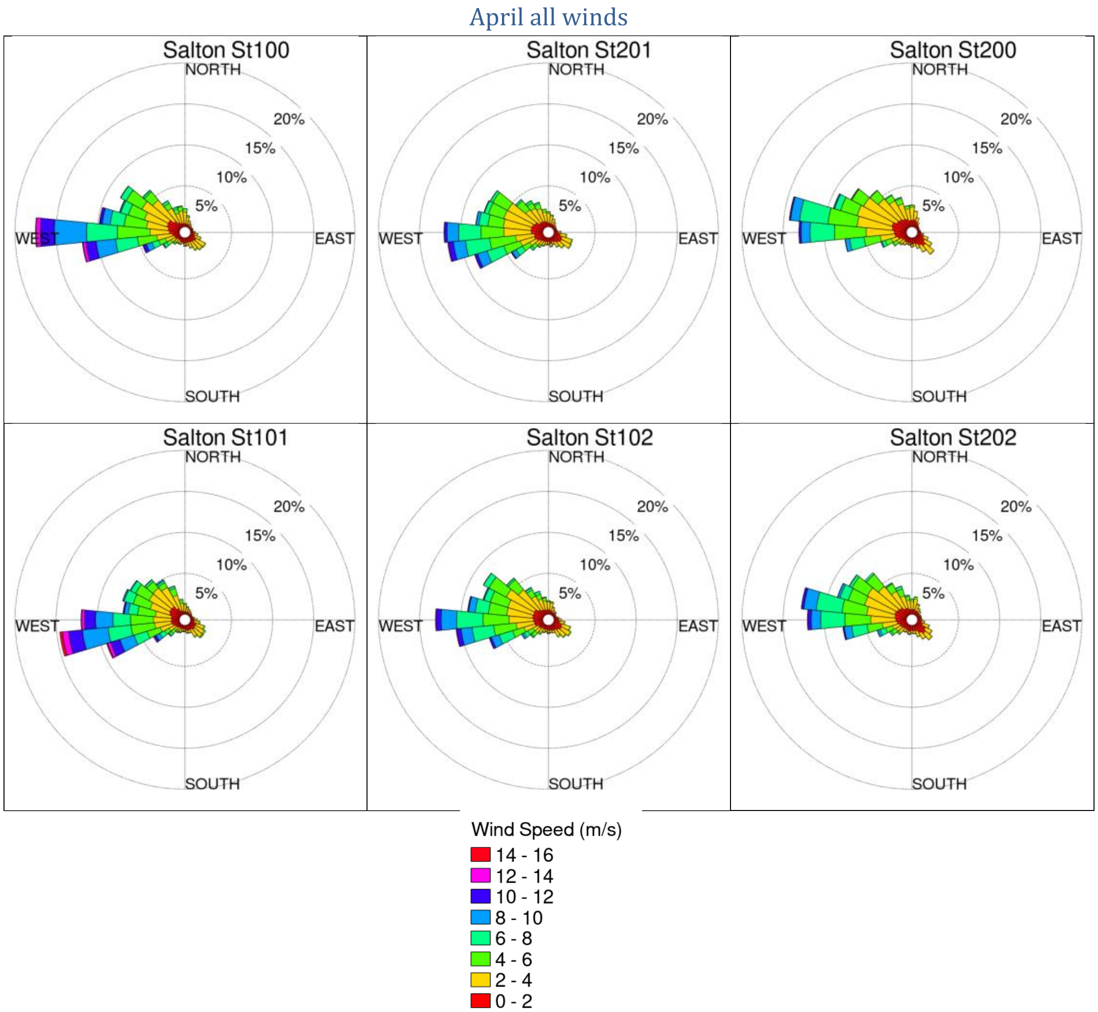


Figure 20. SCH station wind roses, May 2021.

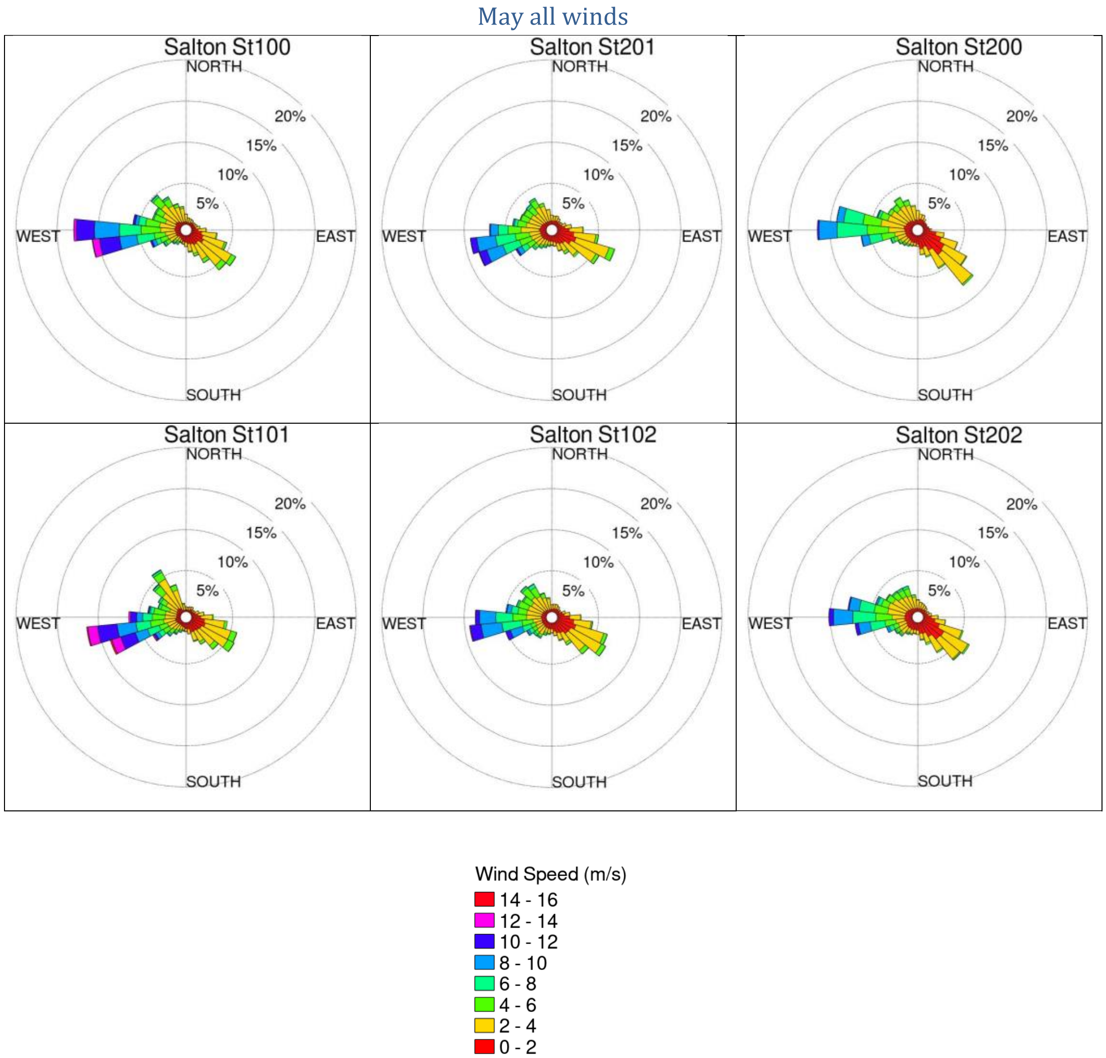
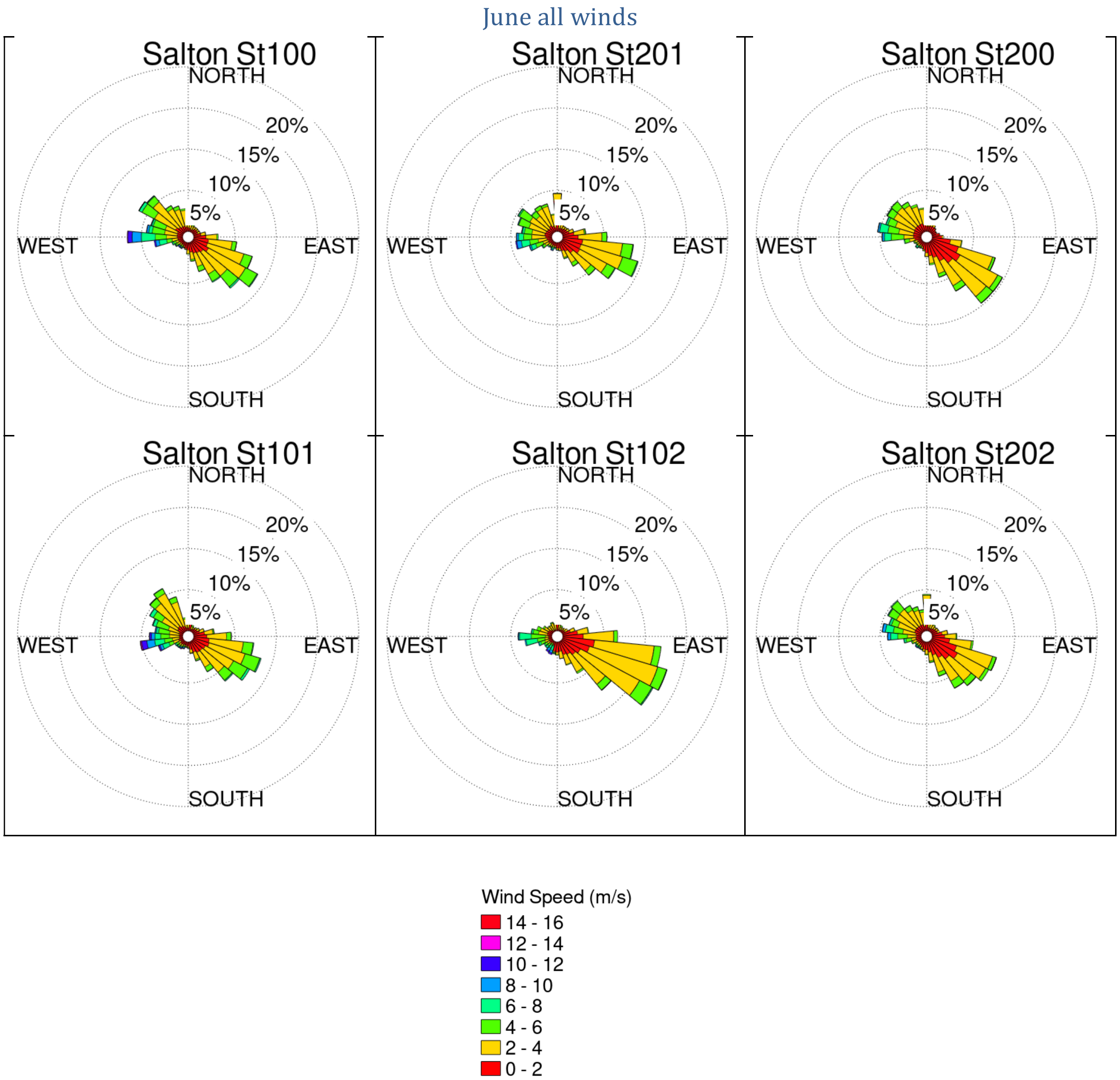


Figure 21. SCH station wind roses, June 2021.



Appendix A: Record of Station Maintenance

Desert Research Institute Activities

April 07-2021

1. Clean SANTRI2 sensors
2. Install BSNEs at stations 100,101, 200, and 201 next to SANTRI2 sensors
3. Install bird spikes on top cross arm with DWR personnel
4. Test wind sentry for motion and possible dust accumulation in the bearings
5. Clean solar panels
6. Review sensor data in real-time at each station

May-2021

June-2021

Removal of MetOne instruments, Stations 100 and 200

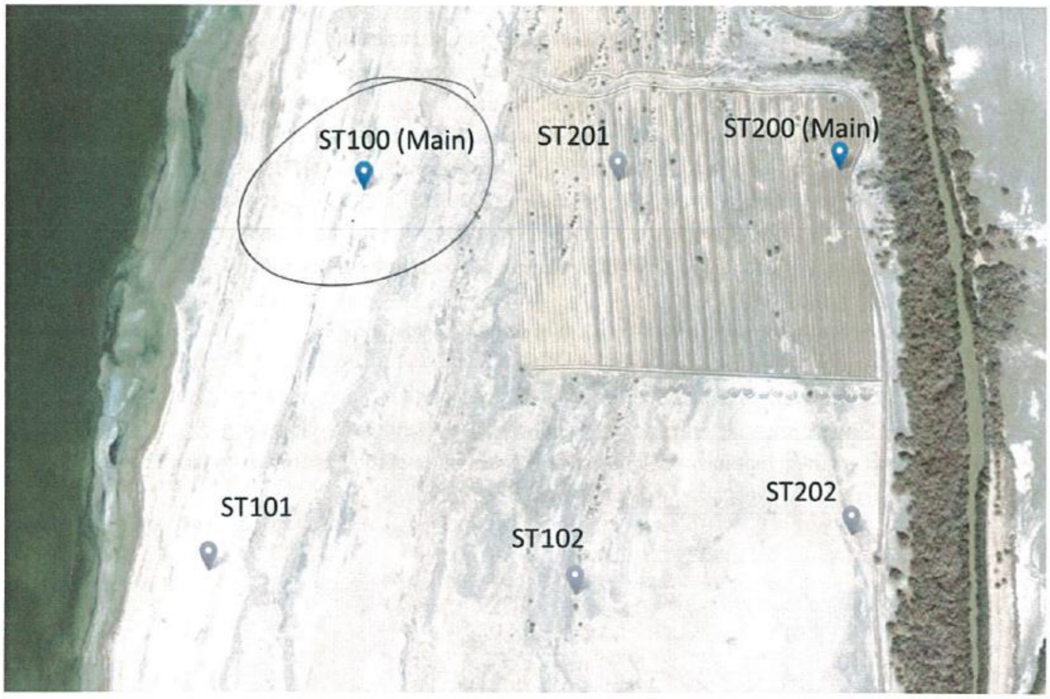
July 2021

August 2021

Removal of all stations from SCH site

Department of Water Resources Activities

SCH Stations



Station Inspection Checklist

Station Number	100
Start Time	5/13/21 0917

R. Cavanaugh
R. Fastenau

1. Record date and time when station is visited and when the work starts ✓
2. Visually inspect the station on the outside for any signs of damage or missing components ✓
3. Inspect the sensor wiring entering the datalogger enclosure for any signs of damage ✓
4. Inspect solar panel wiring and clean the solar panel if dirty ✓
5. Inspect inside the rain gage bucket and make sure it is clean ✓
6. Inspect wind sentry instrument and make sure wind cups and wind wane are rotating freely ✓
7. Spin the wins cups on anemometers are listen for any grinding noisy (note the stations where wind cups are spinning with any additional resistance) ✓ N/A
8. Turn off the station power on the solar charge controller by pressing the right bottom button before cleaning the optical sensors on the SANTRI instrument ✓
9. Verify the power is off by making sure datalogger LED is permanently off ✓
10. Proceed to wipe and clean each optical sensor on the SANTRI instrument using clean and dry cotton Q tip ✓
11. Once sensor cleaning is complete turn the power back on using the same charge controller button ✓
12. Verify datalogger power is back on by checking the datalogger red LED which should blink once every few seconds ✓

13. Inspect the sand traps running behind or to the side of the SANTRI instruments to see how much mass is inside of each collection tray ✓
14. Each tray is made of two parts that slide open to reveal the pan where the saltation sand and dust particles are collected. Slide the top away from the bottom and be careful not to spill any collected material inside the pan. If is windy this step should be done inside a vehicle to minimize particle loss. The material inside the collection trays should be collected if it exceeds about 2 grams (a penny weights around 2.5 grams and dime weights 2.27 grams) in the bottom trap which should have most collected mass. In that case each collection tray should be collected and emptied into a plastic zip lock bag. Bags should be marked with station number (see station map on the first page) and tray number (1 for bottom, 2 for middle, and 3 for top). Plastic bag should also be also marked with a collection date and time (Ex : 201-2 July 12, 21 13:35 would indicate sample collected from middle trap on station 201 on July 12 at 13:35). Given that the sand and dust could stick to the bottom of the pan it would be very useful to have a small bristle brush to scrape the particle off and make it easier to collect into a plastic bag.
15. Once the samples are collected, place the trays in their original location. ✓
16. Note any issues and problems you see with the station ✓
17. Take pictures of the stations and instruments ✓
18. Take pictures of the surrounding areas as well to show how the landscape is changing ✓
19. Note and record anything that might be unusual and pertinent to station operation and data collection ✓
20. Note the date and time when all the work on the station is complete ✓

End Time	0930

1 sample collected

SCH Stations

Station Inspection Checklist

Station Number 201	
Start Time 5/13/21	0936

R. Cavanaugh
R. Fastenau

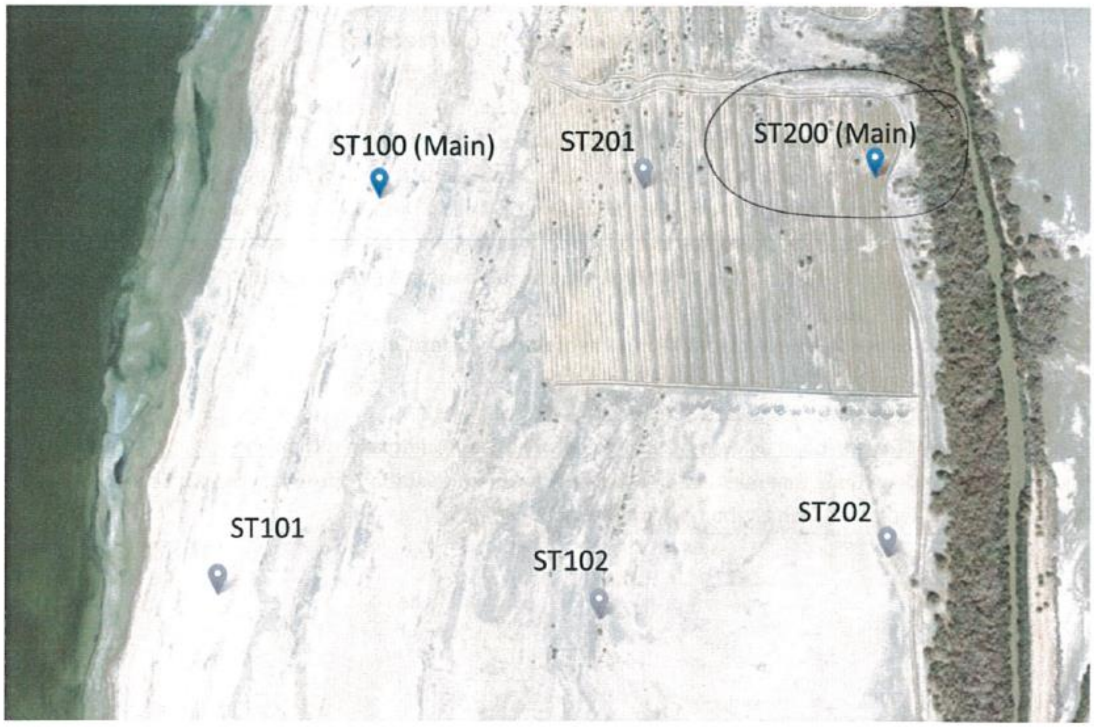
1. Record date and time when station is visited and when the work starts ✓
2. Visually inspect the station on the outside for any signs of damage or missing components ✓
3. Inspect the sensor wiring entering the datalogger enclosure for any signs of damage ✓
4. Inspect solar panel wiring and clean the solar panel if dirty ✓
5. Inspect inside the rain gage bucket and make sure it is clean N/A
6. Inspect wind sentry instrument and make sure wind cups and wind wane are rotating freely ✓
7. Spin the wins cups on anemometers are listen for any grinding noisy (note the stations where wind cups are spinning with any additional resistance) ✓
8. Turn off the station power on the solar charge controller by pressing the right bottom button before cleaning the optical sensors on the SANTRI instrument ✓
9. Verify the power is off by making sure datalogger LED is permanently off ✓
10. Proceed to wipe and clean each optical sensor on the SANTRI instrument using clean and dry cotton Q tip ✓
11. Once sensor cleaning is complete turn the power back on using the same charge controller button ✓
12. Verify datalogger power is back on by checking the datalogger red LED which should blink once every few seconds ✓

13. Inspect the sand traps running behind or to the side of the SANTRI instruments to see how much mass is inside of each collection tray
14. Each tray is made of two parts that slide open to reveal the pan where the saltation sand and dust particles are collected. Slide the top away from the bottom and be careful not to spill any collected material inside the pan. If is windy this step should be done inside a vehicle to minimize particle loss. The material inside the collection trays should be collected if it exceeds about 2 grams (a penny weights around 2.5 grams and dime weights 2.27 grams) in the bottom trap which should have most collected mass. In that case each collection tray should be collected and emptied into a plastic zip lock bag. Bags should be marked with station number (see station map on the first page) and tray number (1 for bottom, 2 for middle, and 3 for top). Plastic bag should also be also marked with a collection date and time (Ex : 201-2 July 12, 21 13:35 would indicate sample collected from middle trap on station 201 on July 12 at 13:35). Given that the sand and dust could stick to the bottom of the pan it would be very useful to have a small bristle brush to scrape the particle off and make it easier to collect into a plastic bag.
15. Once the samples are collected, place the trays in their original location.
16. Note any issues and problems you see with the station
17. Take pictures of the stations and instruments
18. Take pictures of the surrounding areas as well to show how the landscape is changing
19. Note and record anything that might be unusual and pertinent to station operation and data collection
20. Note the date and time when all the work on the station is complete

End Time 0953

3 samples collected

SCH Stations



Station Inspection Checklist

Station Number	200
Start Time	5/13/21 0958

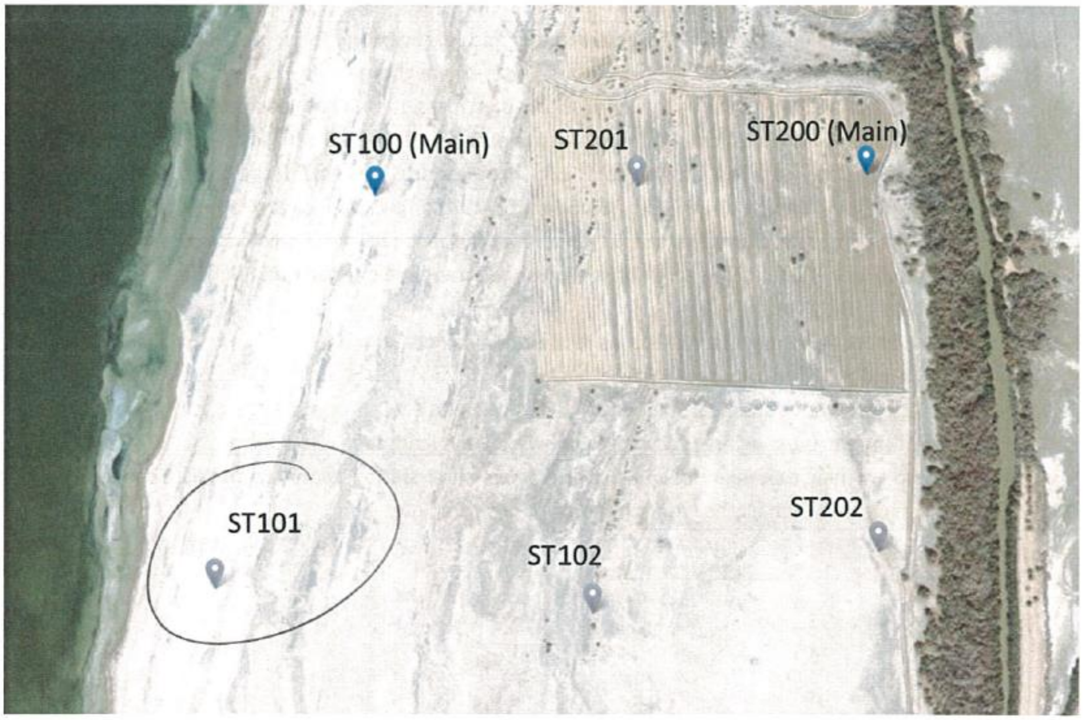
R. Cavanaugh
R. Fastenau

1. Record date and time when station is visited and when the work starts ✓
2. Visually inspect the station on the outside for any signs of damage or missing components ✓
3. Inspect the sensor wiring entering the datalogger enclosure for any signs of damage ✓
4. Inspect solar panel wiring and clean the solar panel if dirty ✓
5. Inspect inside the rain gage bucket and make sure it is clean ✓
6. Inspect wind sentry instrument and make sure wind cups and wind wane are rotating freely
7. Spin the wins cups on anemometers are listen for any grinding noisy (note the stations where wind cups are spinning with any additional resistance)
8. Turn off the station power on the solar charge controller by pressing the right bottom button before cleaning the optical sensors on the SANTRI instrument ✓
9. Verify the power is off by making sure datalogger LED is permanently off ✓
10. Proceed to wipe and clean each optical sensor on the SANTRI instrument using clean and dry cotton Q tip ✓
11. Once sensor cleaning is complete turn the power back on using the same charge controller button ✓
12. Verify datalogger power is back on by checking the datalogger red LED which should blink once every few seconds ✓

13. Inspect the sand traps running behind or to the side of the SANTRI instruments to see how much mass is inside of each collection tray ✓
14. Each tray is made of two parts that slide open to reveal the pan where the saltation sand and dust particles are collected. Slide the top away from the bottom and be careful not to spill any collected material inside the pan. If is windy this step should be done inside a vehicle to minimize particle loss. The material inside the collection trays should be collected if it exceeds about 2 grams (a penny weights around 2.5 grams and dime weights 2.27 grams) in the bottom trap which should have most collected mass. In that case each collection tray should be collected and emptied into a plastic zip lock bag. Bags should be marked with station number (see station map on the first page) and tray number (1 for bottom, 2 for middle, and 3 for top). Plastic bag should also be also marked with a collection date and time (Ex : 201-2 July 12, 21 13:35 would indicate sample collected from middle trap on station 201 on July 12 at 13:35). Given that the sand and dust could stick to the bottom of the pan it would be very useful to have a small bristle brush to scrape the particle off and make it easier to collect into a plastic bag. N/A
15. Once the samples are collected, place the trays in their original location. ✓
16. Note any issues and problems you see with the station ✓
17. Take pictures of the stations and instruments ✓
18. Take pictures of the surrounding areas as well to show how the landscape is changing ✓
19. Note and record anything that might be unusual and pertinent to station operation and data collection ✓
20. Note the date and time when all the work on the station is complete ✓

End Time	1005

SCH Stations



Station Inspection Checklist

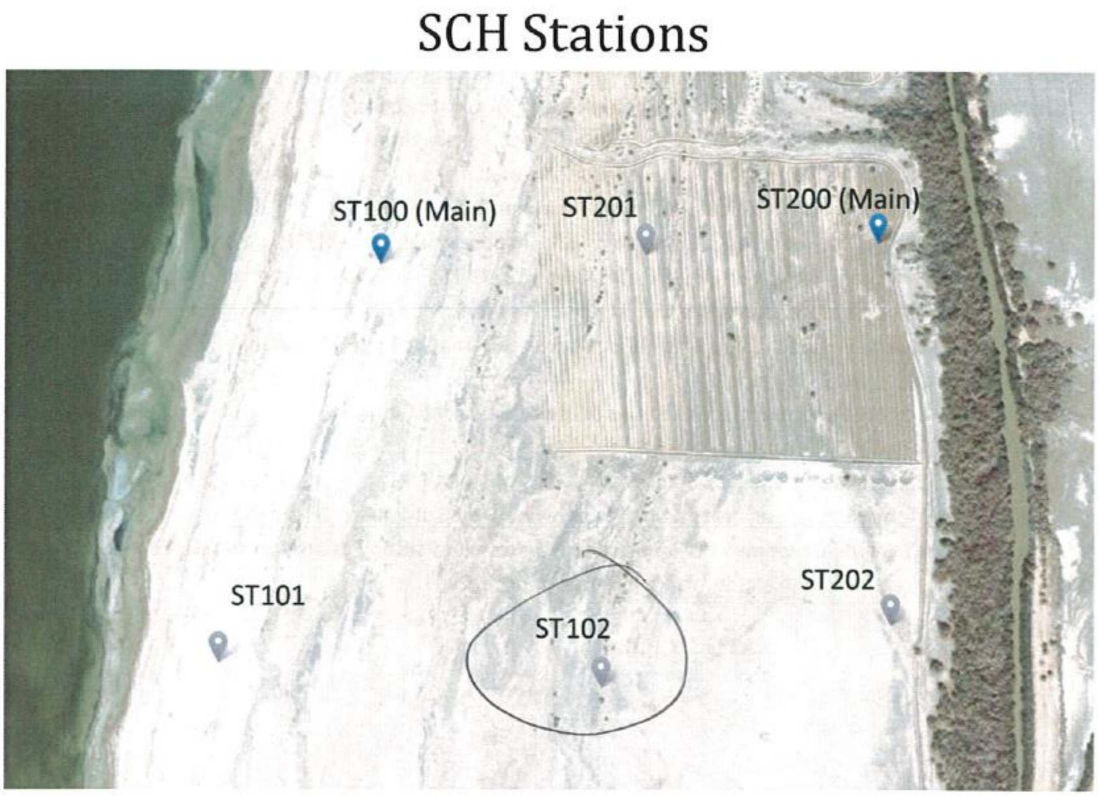
Station Number	101
Start Time	5/13/21 0856

R. Cavanaugh
R. Fastenau

1. Record date and time when station is visited and when the work starts ✓
2. Visually inspect the station on the outside for any signs of damage or missing components ✓
3. Inspect the sensor wiring entering the datalogger enclosure for any signs of damage ✓
4. Inspect solar panel wiring and clean the solar panel if dirty ✓
5. Inspect inside the rain gage bucket and make sure it is clean N/A
6. Inspect wind sentry instrument and make sure wind cups and wind wane are rotating freely ✓
7. Spin the wins cups on anemometers are listen for any grinding noisy (note the stations where wind cups are spinning with any additional resistance) ✓
8. Turn off the station power on the solar charge controller by pressing the right bottom button before cleaning the optical sensors on the SANTRI instrument ✓
9. Verify the power is off by making sure datalogger LED is permanently off ✓
10. Proceed to wipe and clean each optical sensor on the SANTRI instrument using clean and dry cotton Q tip ✓
11. Once sensor cleaning is complete turn the power back on using the same charge controller button ✓
12. Verify datalogger power is back on by checking the datalogger red LED which should blink once every few seconds ✓

13. Inspect the sand traps running behind or to the side of the SANTRI instruments to see how much mass is inside of each collection tray ✓
14. Each tray is made of two parts that slide open to reveal the pan where the saltation sand and dust particles are collected. Slide the top away from the bottom and be careful not to spill any collected material inside the pan. If is windy this step should be done inside a vehicle to minimize particle loss. The material inside the collection trays should be collected if it exceeds about 2 grams (a penny weights around 2.5 grams and dime weights 2.27 grams) in the bottom trap which should have most collected mass. In that case each collection tray should be collected and emptied into a plastic zip lock bag. Bags should be marked with station number (see station map on the first page) and tray number (1 for bottom, 2 for middle, and 3 for top). Plastic bag should also be also marked with a collection date and time (Ex : 201-2 July 12, 21 13:35 would indicate sample collected from middle trap on station 201 on July 12 at 13:35). Given that the sand and dust could stick to the bottom of the pan it would be very useful to have a small bristle brush to scrape the particle off and make it easier to collect into a plastic bag. None were over 2g.
15. Once the samples are collected, place the trays in their original location.
16. Note any issues and problems you see with the station ✓
17. Take pictures of the stations and instruments ✓
18. Take pictures of the surrounding areas as well to show how the landscape is changing ✓
19. Note and record anything that might be unusual and pertinent to station operation and data collection ✓
20. Note the date and time when all the work on the station is complete ✓

End Time	0910



Station Inspection Checklist

Station Number	102
Start Time	5/13/21 8:40 am

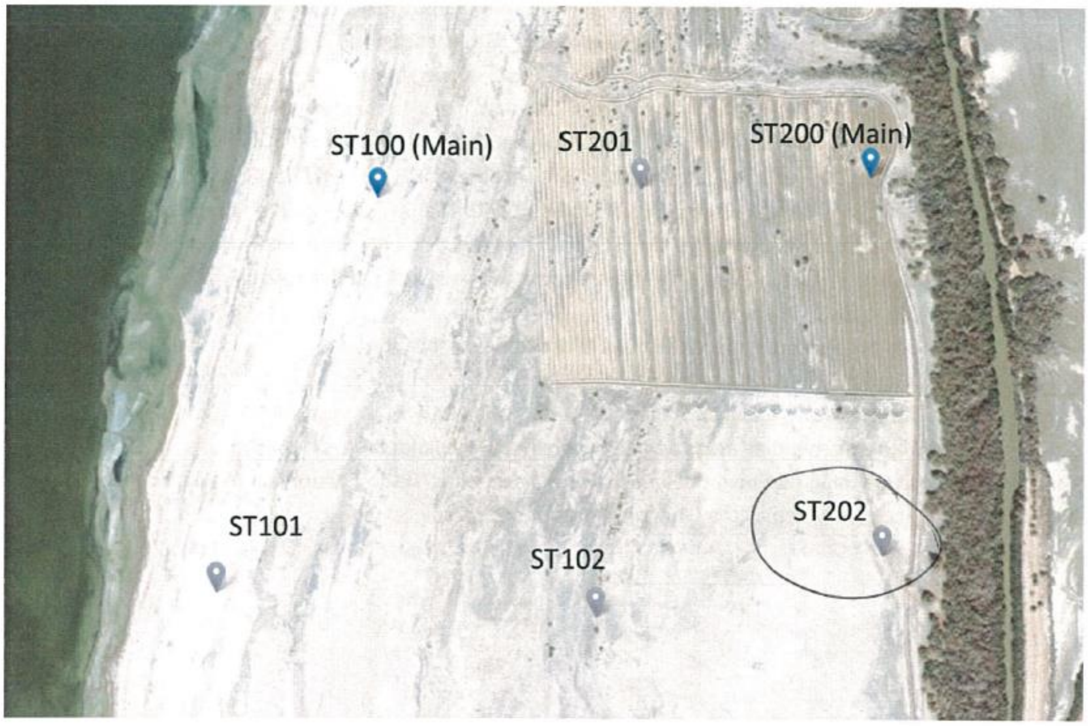
R. Cavanaugh
R. Fastenau

1. Record date and time when station is visited and when the work starts ✓
2. Visually inspect the station on the outside for any signs of damage or missing components ✓
3. Inspect the sensor wiring entering the datalogger enclosure for any signs of damage ✓
4. Inspect solar panel wiring and clean the solar panel if dirty ✓
5. Inspect inside the rain gage bucket and make sure it is clean N/A
6. Inspect wind sentry instrument and make sure wind cups and wind wane are rotating freely ✓
7. Spin the wins cups on anemometers are listen for any grinding noisy (note the stations where wind cups are spinning with any additional resistance) ✓
8. Turn off the station power on the solar charge controller by pressing the right bottom button before cleaning the optical sensors on the SANTRI instrument ✓
9. Verify the power is off by making sure datalogger LED is permanently off ✓
10. Proceed to wipe and clean each optical sensor on the SANTRI instrument using clean and dry cotton Q tip ✓
11. Once sensor cleaning is complete turn the power back on using the same charge controller button ✓
12. Verify datalogger power is back on by checking the datalogger red LED which should blink once every few seconds ✓

13. Inspect the sand traps running behind or to the side of the SANTRI instruments to see how much mass is inside of each collection tray N/A
14. Each tray is made of two parts that slide open to reveal the pan where the saltation sand and dust particles are collected. Slide the top away from the bottom and be careful not to spill any collected material inside the pan. If is windy this step should be done inside a vehicle to minimize particle loss. The material inside the collection trays should be collected if it exceeds about 2 grams (a penny weights around 2.5 grams and dime weights 2.27 grams) in the bottom trap which should have most collected mass. In that case each collection tray should be collected and emptied into a plastic zip lock bag. Bags should be marked with station number (see station map on the first page) and tray number (1 for bottom, 2 for middle, and 3 for top). Plastic bag should also be also marked with a collection date and time (Ex : 201-2 July 12, 21 13:35 would indicate sample collected from middle trap on station 201 on July 12 at 13:35). Given that the sand and dust could stick to the bottom of the pan it would be very useful to have a small bristle brush to scrape the particle off and make it easier to collect into a plastic bag.
15. Once the samples are collected, place the trays in their original location. ✓
16. Note any issues and problems you see with the station ✓
17. Take pictures of the stations and instruments ✓
18. Take pictures of the surrounding areas as well to show how the landscape is changing ✓
19. Note and record anything that might be unusual and pertinent to station operation and data collection ✓
20. Note the date and time when all the work on the station is complete ✓

End Time	0845

SCH Stations



Station Inspection Checklist

Station Number	202
Start Time	5/13/21 8:20am

R.Cavanaugh
R. Fastenau

1. Record date and time when station is visited and when the work starts ✓
2. Visually inspect the station on the outside for any signs of damage or missing components ✓
3. Inspect the sensor wiring entering the datalogger enclosure for any signs of damage ✓
4. Inspect solar panel wiring and clean the solar panel if dirty ✓
5. Inspect inside the rain gage bucket and make sure it is clean ✓ N/A
6. Inspect wind sentry instrument and make sure wind cups and wind wane are rotating freely ✓
7. Spin the wins cups on anemometers are listen for any grinding noisy (note the stations where wind cups are spinning with any additional resistance) ✓
8. Turn off the station power on the solar charge controller by pressing the right bottom button before cleaning the optical sensors on the SANTRI instrument ✓
9. Verify the power is off by making sure datalogger LED is permanently off ✓
10. Proceed to wipe and clean each optical sensor on the SANTRI instrument using clean and dry cotton Q tip ✓
11. Once sensor cleaning is complete turn the power back on using the same charge controller button ✓
12. Verify datalogger power is back on by checking the datalogger red LED which should blink once every few seconds ✓

13. Inspect the sand traps running behind or to the side of the SANTRI instruments to see how much mass is inside of each collection tray N/A
14. Each tray is made of two parts that slide open to reveal the pan where the saltation sand and dust particles are collected. Slide the top away from the bottom and be careful not to spill any collected material inside the pan. If is windy this step should be done inside a vehicle to minimize particle loss. The material inside the collection trays should be collected if it exceeds about 2 grams (a penny weights around 2.5 grams and dime weights 2.27 grams) in the bottom trap which should have most collected mass. In that case each collection tray should be collected and emptied into a plastic zip lock bag. Bags should be marked with station number (see station map on the first page) and tray number (1 for bottom, 2 for middle, and 3 for top). Plastic bag should also be also marked with a collection date and time (Ex : 201-2 July 12, 21 13:35 would indicate sample collected from middle trap on station 201 on July 12 at 13:35). Given that the sand and dust could stick to the bottom of the pan it would be very useful to have a small bristle brush to scrape the particle off and make it easier to collect into a plastic bag.
15. Once the samples are collected, place the trays in their original location.
16. Note any issues and problems you see with the station None
17. Take pictures of the stations and instruments ✓
18. Take pictures of the surrounding areas as well to show how the landscape is changing
19. Note and record anything that might be unusual and pertinent to station operation and data collection ✓
20. Note the date and time when all the work on the station is complete ✓

End Time	8:29 am

3.3 Department of Water Resources Activities

13. Inspect the sand traps running behind or to the side of the SANTRI instruments to see how much mass is inside of each collection tray N/A
14. Each tray is made of two parts that slide open to reveal the pan where the saltation sand and dust particles are collected. Slide the top away from the bottom and be careful not to spill any collected material inside the pan. If is windy this step should be done inside a vehicle to minimize particle loss. The material inside the collection trays should be collected if it exceeds about 2 grams (a penny weights around 2.5 grams and dime weights 2.27 grams) in the bottom trap which should have most collected mass. In that case each collection tray should be collected and emptied into a plastic zip lock bag. Bags should be marked with station number (see station map on the first page) and tray number (1 for bottom, 2 for middle, and 3 for top). Plastic bag should also be also marked with a collection date and time (Ex : 201-2 July 12, 21 13:35 would indicate sample collected from middle trap on station 201 on July 12 at 13:35). Given that the sand and dust could stick to the bottom of the pan it would be very useful to have a small bristle brush to scrape the particle off and make it easier to collect into a plastic bag.
15. Once the samples are collected, place the trays in their original location.
16. Note any issues and problems you see with the station None
17. Take pictures of the stations and instruments ✓
18. Take pictures of the surrounding areas as well to show how the landscape is changing
19. Note and record anything that might be unusual and pertinent to station operation and data collection ✓
20. Note the date and time when all the work on the station is complete ✓

End Time	8:29 am

Appendix B: Converting SANTRI Optical Count Data to Saltation Flux

SANTRI (SANd TRansport Instrument) measures the amount of blockage in a 1 mm diameter beam of light that travels between an infrared LED and a phototransistor spaced 2 cm apart caused by saltating sand particles passing through the sensing volume. Using this method SANTRI instruments can detect single or multiple sand grains moving through the sensing volume by scanning individual sensor photodetectors at high frequency. The current version of the instrument SANTRI2 is 60 cm long and designed to be installed vertically with respect to the ground surface. SANTRI2 has five sensors spaced 10 cm apart to detect change in sand transport over multiple heights with the first sensor 2 cm from the base of the instrument). SANTRI2 can report each sensor response at a rate of 1 Hz (i.e., once-per-second), but for monitoring saltation at the SCH site data were recorded as 1 minute mean values from 60, 1 second readings. SANTI2 instruments were collocated with BSNE instruments (Fryrear, 1986*) to calibrate the SANTRI2 optical sensor response to the mass accumulations at multiple heights collected using the BSNE sampler.

The following procedure was used to calibrate average 1-minute SANTRI2 data with the collocated BSNE to convert the optical counts to mass flux (g m^{-1} hr^{-1}):

1. Collect and weight BSNE samples at multiple heights after high wind events and when individual BSNE collector mass exceeds 2 grams
2. Note BSNE collection start and stop period
3. Fit an exponential decay function to the accumulated mass values and their respective collection heights
4. Integrate the regression derived function from step 3 from between 5 cm and 200 cm to compute total sand transport over the period of collection. The total sand transport amount is used to calibrate the SANTRI2 response over the same time interval of data collection
5. SANTRI2 sensor was installed so that bottom sensor was 5 cm from the ground and sensors above that were positioned at 15, 25,35, and 45 cm, respectively. As the optical gate sensor closest to the ground was sometimes blocked due to rain splatter for extended time periods, only sensors at 15, 25, 35, and 45 cm were used to derive the sand flux profile, which is in the same range of collection heights of the BSNE instrument, i.e., 10, 35, and 65 cm above the ground surface
6. The 1 minute SANTRI2 data were filtered to remove any data when the sensor average response (a quality check value for the OGS sensors) values was <2000, which ensures that sensors were operating properly and not blocked
7. The data were further filtered based on the Flux2-3 values for each sensor (Flux2-3 represents optical flux of particles greater than approximately 80 µm in diameter) by computing the difference in Flux2-3 readings for the sensor below it. Data were removed if this difference was <10
8. Using these filtered data (after steps 6 and 7) the 1-minute Flux2-3 readings for each hour were summed to provide the total hourly optical flux for each sensor at the 4 heights
9. An exponential decay function was fit to the total hourly optical flux as a function of height data for each hour. If the correlation coefficient (R^2) of the best-fit regression was <0.85 that hour was removed. In practice, all R^2 values were above 0.85 so no hourly data were rejected based on this criterion

10. Integrate the regression derived function from step 9 for each hour between 5 cm and 200 cm (similar to step 4 above). The integrated value is the total hourly optical flux due to the passage of saltation particles for all 4 sensors.
11. The hourly optical flux is summed for the start and end time period when BSNE samples were collocated with the SANTRI
12. Divide the total sand transport from step 4 in units of mass per length per time with the total from step 11. This value represents the scaling factor between the BSNE mass flux and SANTRI2 optical flux
13. Apply the scaling factor from step 12 to hourly flux data from step 11 to convert optical count hourly flux to hourly mass flux

*Fryrear, D.W. (1986), A field dust sampler, Journal of Soil and Water Conservation, 41, 117-120.

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