Supplement of

Abundance and viability of particle-attached and free-floating bacteria in dusty and nondust air

Wei Hu[1,2], Kotaro Murata[2,3], Chunlan Fan[2], Shu Huang[1], Hiromi Matsusaki[2], Pingqing Fu[1], Daizhou Zhang[2,*]

[1] Institute of Surface-Earth System Science, Tianjin University, Tianjin, 300072, China

[2] Faculty of Environmental and Symbiotic Sciences, Prefectural University of Kumamoto, Kumamoto, 862-8502, Japan

[3] Department of Physics, Tokyo Gakugei University, Tokyo, 184-8501, Japan

Correspondence: Daizhou Zhang (dzzhang@pu-kumamoto.ac.jp)

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Text S1 Procedure for bacterial enumeration

The particles collected on the filter were transferred into phosphate buffered saline (PBS) in two steps. First, the filter was cut into four pieces and placed in a tube containing 10 mL of PBS. The saline was prefiltered through a 0.025 µm pore filter and autoclaved. The tube was vigorously shaken with a vortex shaker for two minutes. Then, the suspension underwent ultrasonic treatment for 15 minutes to detach as many particles from the filter as possible.

The bacterial particles in the suspension were chemically fixed and stained for fluorescence-microscopic counting. The chemical fixation was carried out with 1/25 volume of 25% glutaraldehyde for 30 minutes at 4°C. The fluorescent staining of bacterial particles was performed with the LIVE/DEAD BacLight Bacterial Viability Kit (Invitrogen™, Molecular Probes Inc., Eugene, Oregon). This kit labels bacterial cells with different fluorescent colors according to cell membrane injury; nonviable cells (those with injured membranes) were stained red, and viable cells (those without membrane injuries) were stained green (Fig. S3). The applicability of the fluorescent staining kit to airborne bacteria was introduced in Murata and Zhang (2013).

To make a slide for microscopic counting, the particles in the treated suspension were filtrated and condensed on a black polycarbonate filter (25 mm diameter and 0.2 µm pore size, Advantec®, Toyo Toshi Kaisha, Ltd., Japan). The filter was placed on a glass slide and covered with a drop of immersion oil and a cover glass. For each slide, we counted viable and nonviable bacterial cells in 20 microscopic fields of 100 µm × 100 µm each with a fluorescence microscope (Eclipse 80i, Nikon Corp., Tokyo, Japan). The bacterial concentration (*C*) in each size range of the Andersen sampler was calculated using the sum of 20 fields:

$$C_{total} = \frac{(N_{viable} + N_{nonviable}) \times S_{25} \times S_{stage}}{S_{count} \times S_{47} \times V_{air}}$$

$$C_{viable} = \frac{N_{viable} \times S_{25} \times S_{stage}}{S_{count} \times S_{47} \times V_{air}}$$

$$C_{nonviable} = \frac{N_{nonviable} \times S_{25} \times S_{stage}}{S_{count} \times S_{47} \times V_{air}}$$

where N is the number of bacterial cells in 20 fields, S_{count} is the area of 20 fields, S_{25} and S_{47} represent the areas of 25 mm and 47 mm diameter filters, respectively, S_{stage} is the area of each stage plate of the Andersen sampler, and V_{air} is the volume of the sample air. The bacterial concentrations of size-segregated airborne particles were described as $\mathrm{d}C/\mathrm{dlog}D_{\mathrm{p}}$. The upper limit of the particle size was set to 20 µm because it is difficult for particles larger than 20 µm in aerodynamic diameter to remain airborne (Andreas et al., 1995;Mayol et al., 2014).

Text S2 Resuspension of aerosol particles in Andersen samplers

Bulk aerosol particles were collected on 0.2 μm pore polycarbonate filters (47 mm; Merck Millipore Ltd., Cork, Ireland) using in-line holders for 24 hours. Three pairs of aerosol samples were collected during 29–30 May, 16–17 October, and 2–3 November 2014. After collection, one particle-loading filter of each pair was placed on the top stage (Stage 0) plate of the Andersen sampler, and sterilized new filters were set on the plates of stages 1 to 7. The sampler was vacuumed (28.3 L min^{-1}) in a clean hood consistently for sample collection for 24 hours. Then, the filters were treated, and the concentrations of bacterial cells in each stage were enumerated based on the LIVE/DEAD BacLight bacterial viability assay to evaluate the amount of bacteria that fell from the upper stage to the next stage. The results showed that approximately 32% of the bacteria fell from the original filters in stage 0 to lower stages, after which approximately a half (48± 15%) of the bacteria were trapped by stage 1 and approximately one fifth (22 ±9%) of the bacteria were trapped by stage 2 (Figure S5-1). In addition, the estimated total bacterial concentrations of the Andersen sampler were compared with those determined using another holder, and the values were consistent (100±15%) with each other, indicating that bacteria smaller than 0.43 μm only accounted for a minor fraction of the free-floating bacteria.

The transfer of bacterial cells from stages 4 and 5 (nominally just over 1 μm) to stage 6 (nominally just under 1 μm) was also assessed. Two sets of bulk aerosol particles were collected on 0.2 μm pore polycarbonate filters (47 mm; Merck Millipore Ltd., Cork, Ireland) using in-line holders for 3, 12 and 24 hours, respectively in the indoor environment. One set of three samples were put on the Stage 4 plate of the Andersen sampler, and sterilized new filters were set on the plates of stages 5 to 7. Another set of three samples were put on the Stage 5 plate of the Andersen sampler, respectively, and sterilized new filters were set on the plates of stages 6 to 7. The sampler was vacuumed (28.3 L min^{-1}) in a clean hood consistently for sample collection for 3, 12 and 24 hours correspondingly. After vacuuming, all the filters were treated, and the concentrations of bacterial cells in each stage were enumerated based on the LIVE/DEAD BacLight bacterial viability assay. The results showed that on average less than 10% of the bacteria fell from the original filters in Stage 4 or 5 to lower stages (Fig. S5-2).

To assess whether the detected single-cell bacteria had fallen from the upper stages, we calculated the ideal cell sizes of airborne bacteria collected on the 0.65 µm stage. The 50% cut-off aerodynamic diameter (D_{p50}) was calculated using the following equation:

$$D_{p50} = \sqrt{\frac{18\mu\psi N\pi \cdot Dc^3 \cdot 60}{4CQ\rho}}$$

where µ is the viscosity coefficient of air (1.8×10^{-4} g cm^{-1} s^{-1}), ψ is the inertia parameter (0.14 for 50% impaction efficiency), N is the number (216) of jet nozzles of the stage, D_c is the diameter of each jet nozzle (0.025 cm), C is the Cunningham correlation factor ($1.00 + 0.16 \times 10^{-4}/D_p$), Q is the flow rate (28300 cm^3 min^{-1}), and ρ is the density of the particle. According to the buoyant density of bacterial cells, 1.03–1.24 g cm^{-3} (Bakken and Olsen, 1983;Bratbak and Dundas, 1984), the D_{p50} of the bacterial cells collected in this study was calculated as 0.58–0.64 µm. This size range is consistent with the sizes of cells under microscopic field, although we did not measure the size of all bacterial cells. Hara et al. (2011) previously measured the size distribution of airborne bacterial cells by fluorescence microscopy and image analysis and reported a mode size of approximately 0.6 µm, which is consistent with our results. Additionally, Huffman et al. (2012) detected a peak of fluorescent biological aerosol particles at approximately 0.7 µm and 3 µm using the ultraviolet aerodynamic particle sizer (UV-APS). These results support that a single bacterial cell could be suspended in the air and collected at the lowest stage of the Andersen sampler.

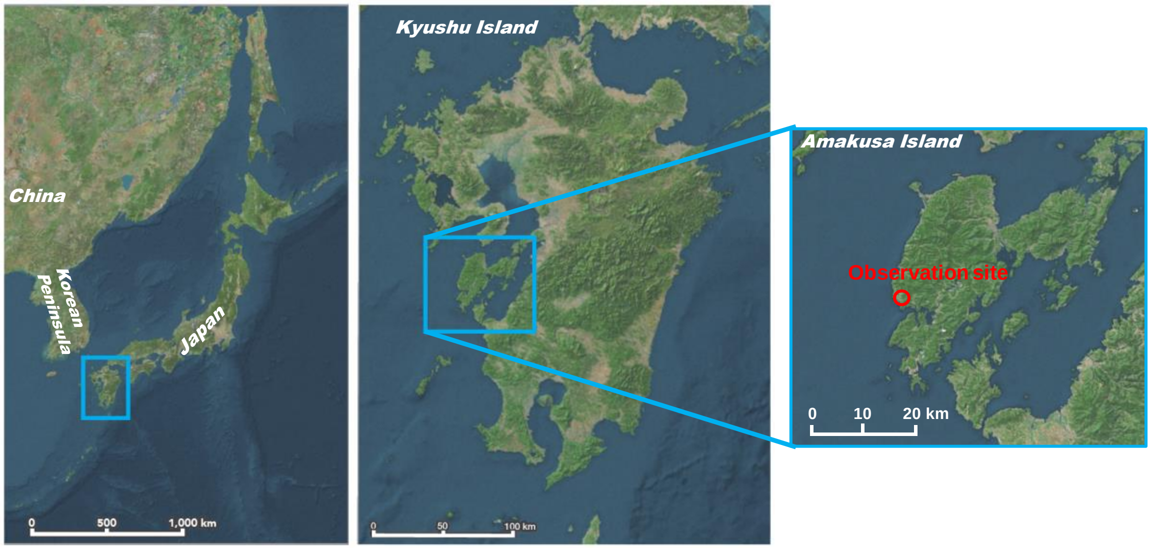

Figure S1. Location of the observation site. The map source is © Google Earth.

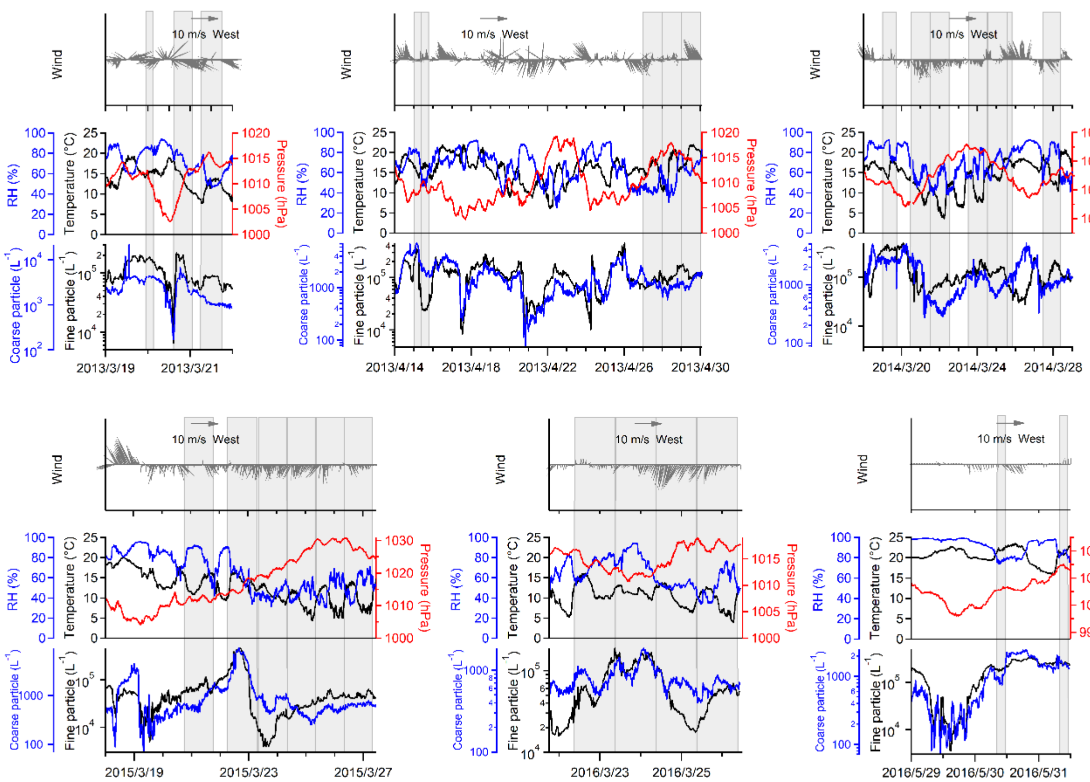

Figure S2. Time series of meteorological conditions and airborne particle number concentrations during the observations. Each sampling period is indicated with a gray shadow.

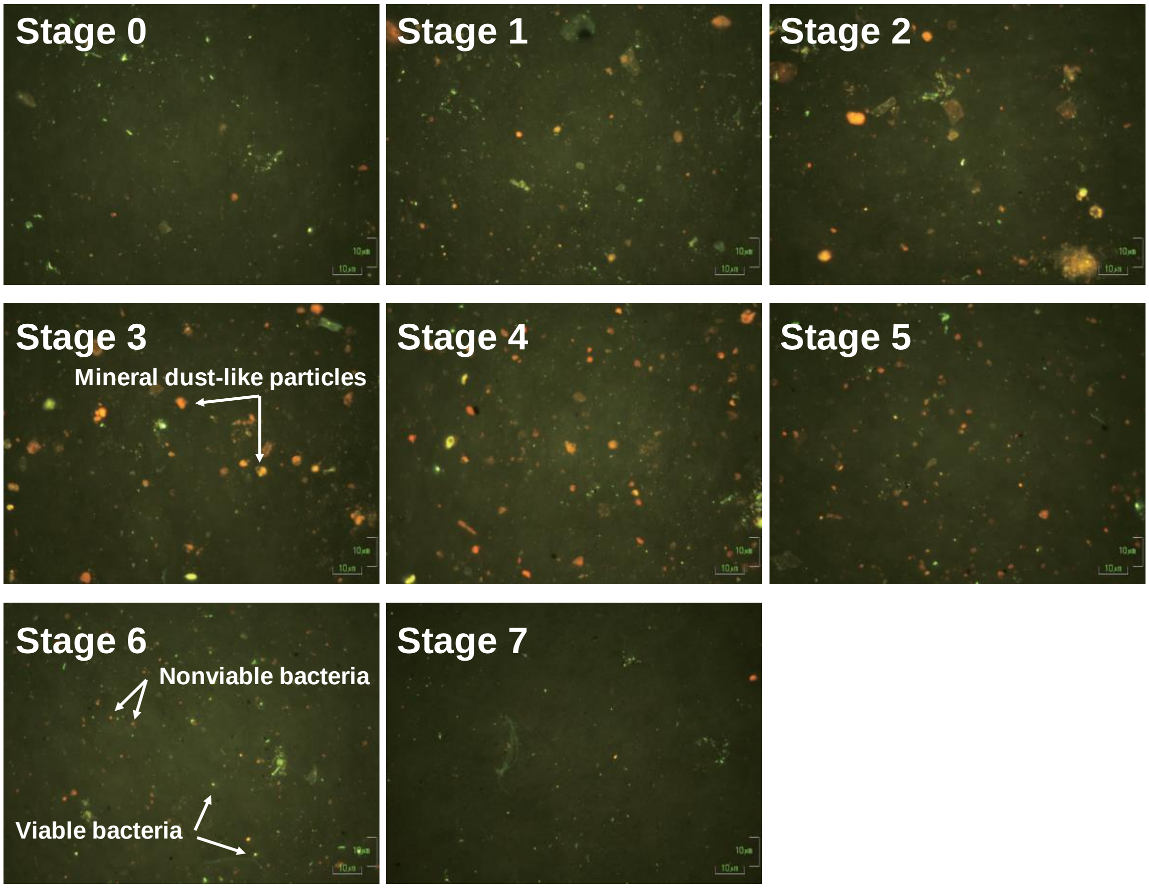

Figure S3. Images of one set of stained samples (20 March 2013; dust period) under epifluorescence microscopy field.

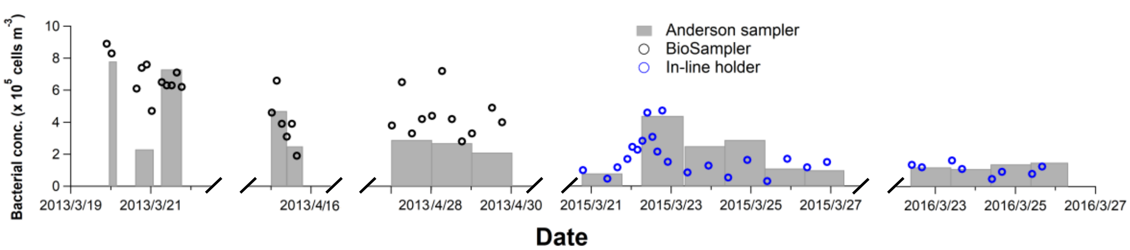

Figure S4. Comparison between the results of the Andersen sampler and the BioSampler (2013) / in-line holders (2015–2016). The flow rate for the BioSampler/holder was 10–12.5 L min^{-1}, and the collection duration was 1–2 hours. More details on sample collection with the BioSampler and the in-line holder are available in Murata and Zhang (2016) and Hu et al. (2017), respectively. The discrepancy between the results of the Andersen sampler and the other two samplers might have been caused by the different sampling durations and collection efficiencies of the samplers (e.g., for the Andersen sampler, there was a loss of bacteria due to bouncing, and the size fraction smaller than 0.43 µm was missing).

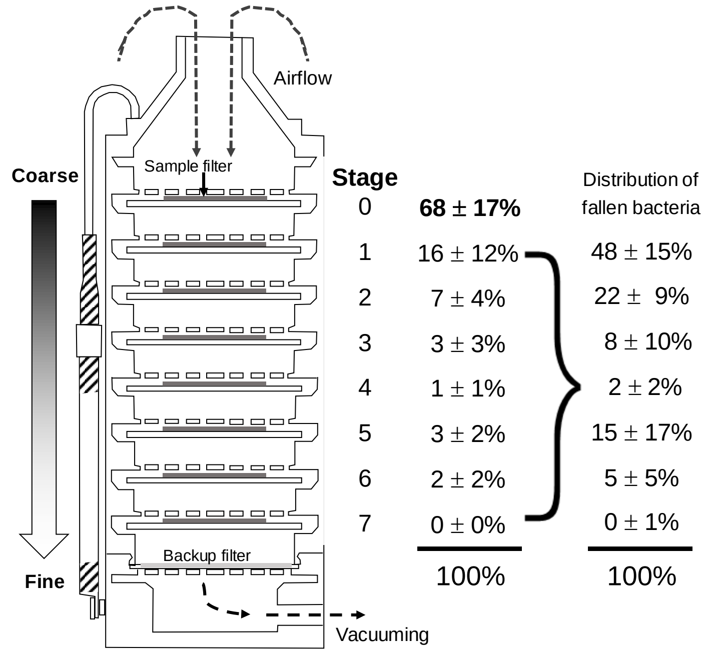

Figure S5-1. Percentages of residual bacterial cells after the sampler was run for 24 h. If no bacteria fall from the top stage, the percentage in bold should be nearly 100%. The actual percentage was 68%, indicating that 32% of the bacteria fell from the top stage. The distribution of fallen bacteria is shown in the right column. The fallen bacteria were mostly in the second and third stages and did not affect the lower stages of the sampler.

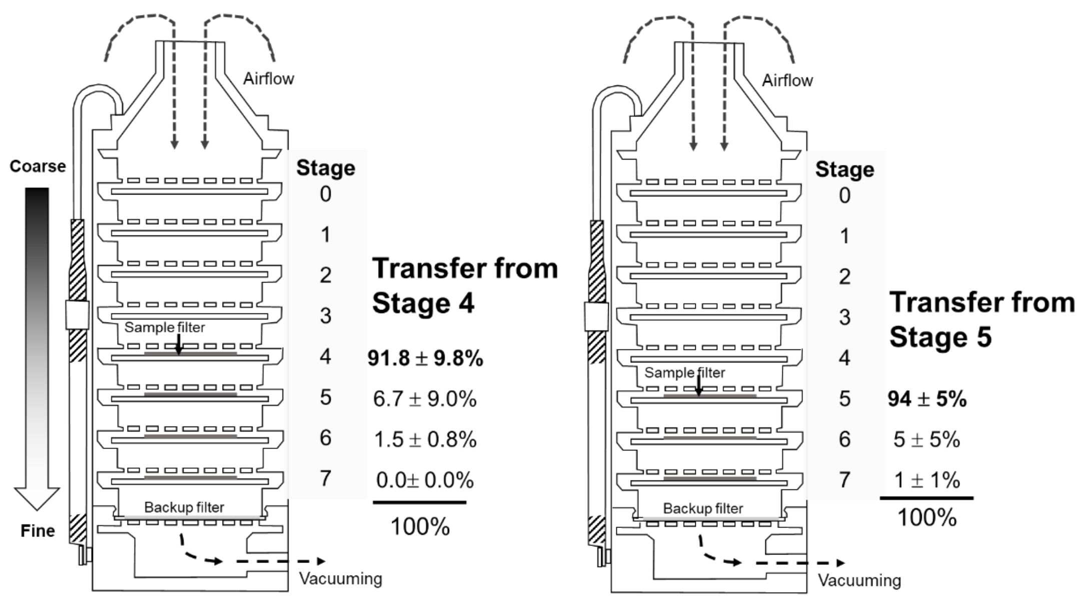

Figure S5-2. The distribution of bacterial cells fallen from Stage 4 (left) and Stage 5 (right) to lower stages. Averagely less than 10% of the bacteria fell from the original filters in Stage 4 or 5 to lower stages.

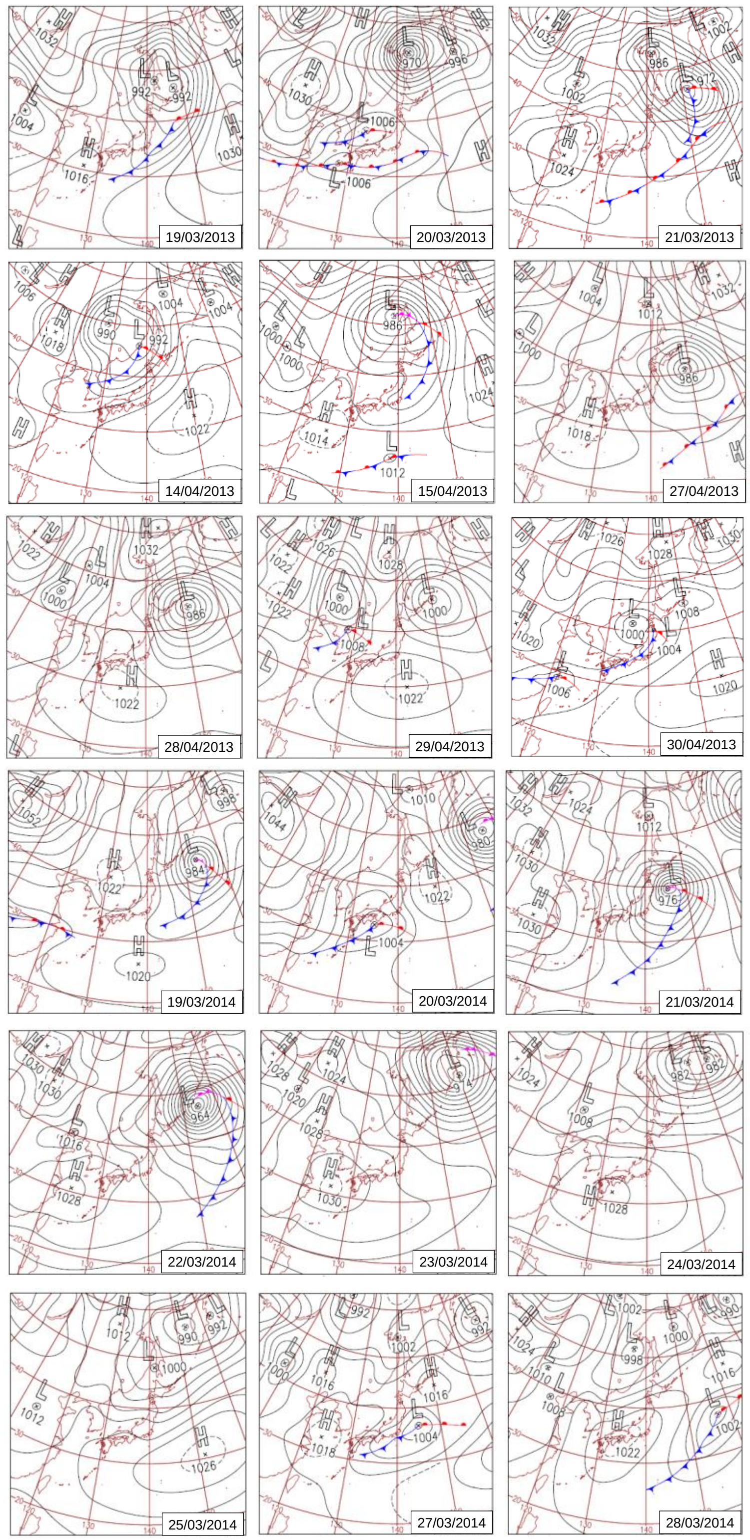

Figure S6-1. Daily weather charts (9:00 am JST every day) during the sampling periods. The data were downloaded from the Japan Meteorological Agency (http://www.data.jma.go.jp/fcd/yoho/hibiten/index.html).

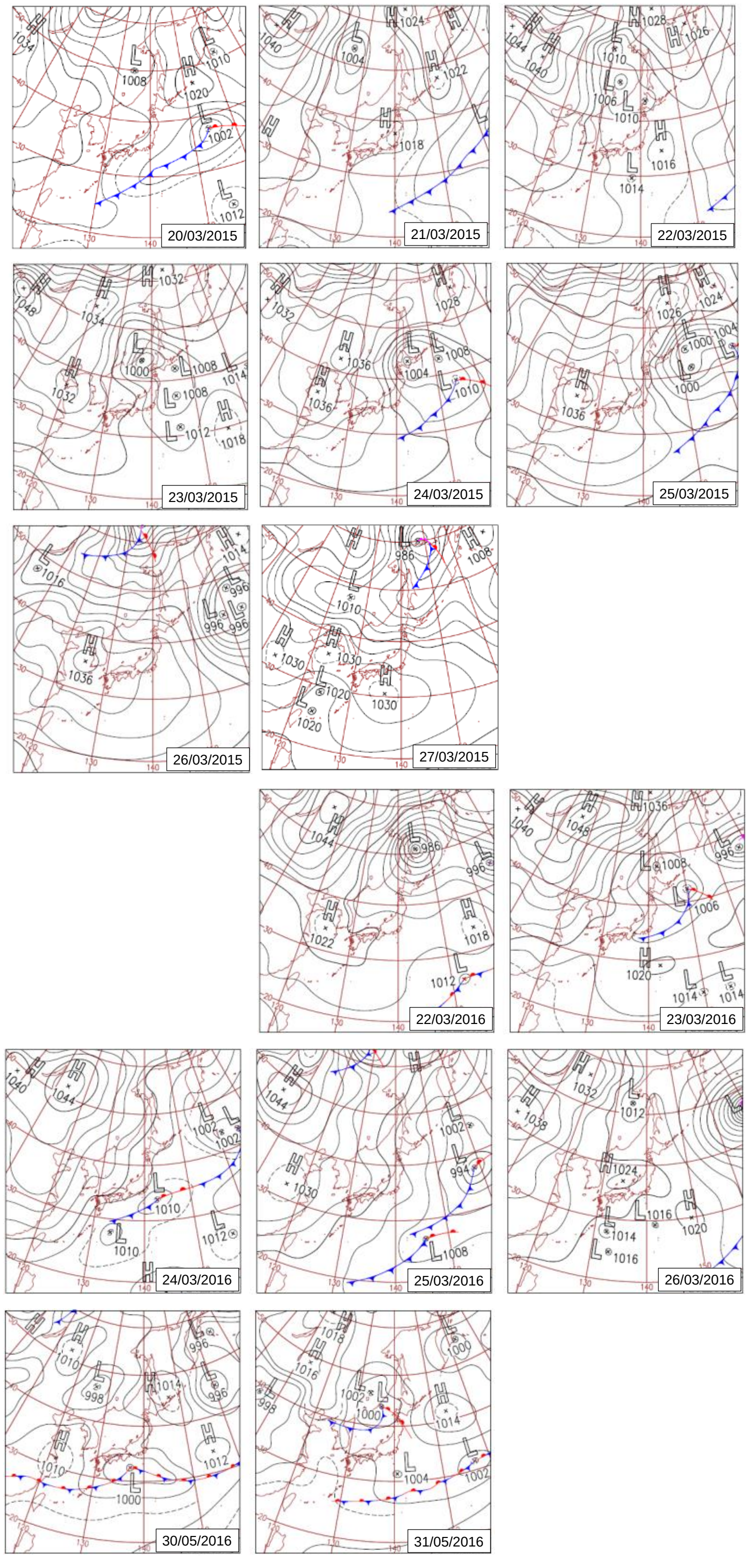

Figure S6-2. Continued.

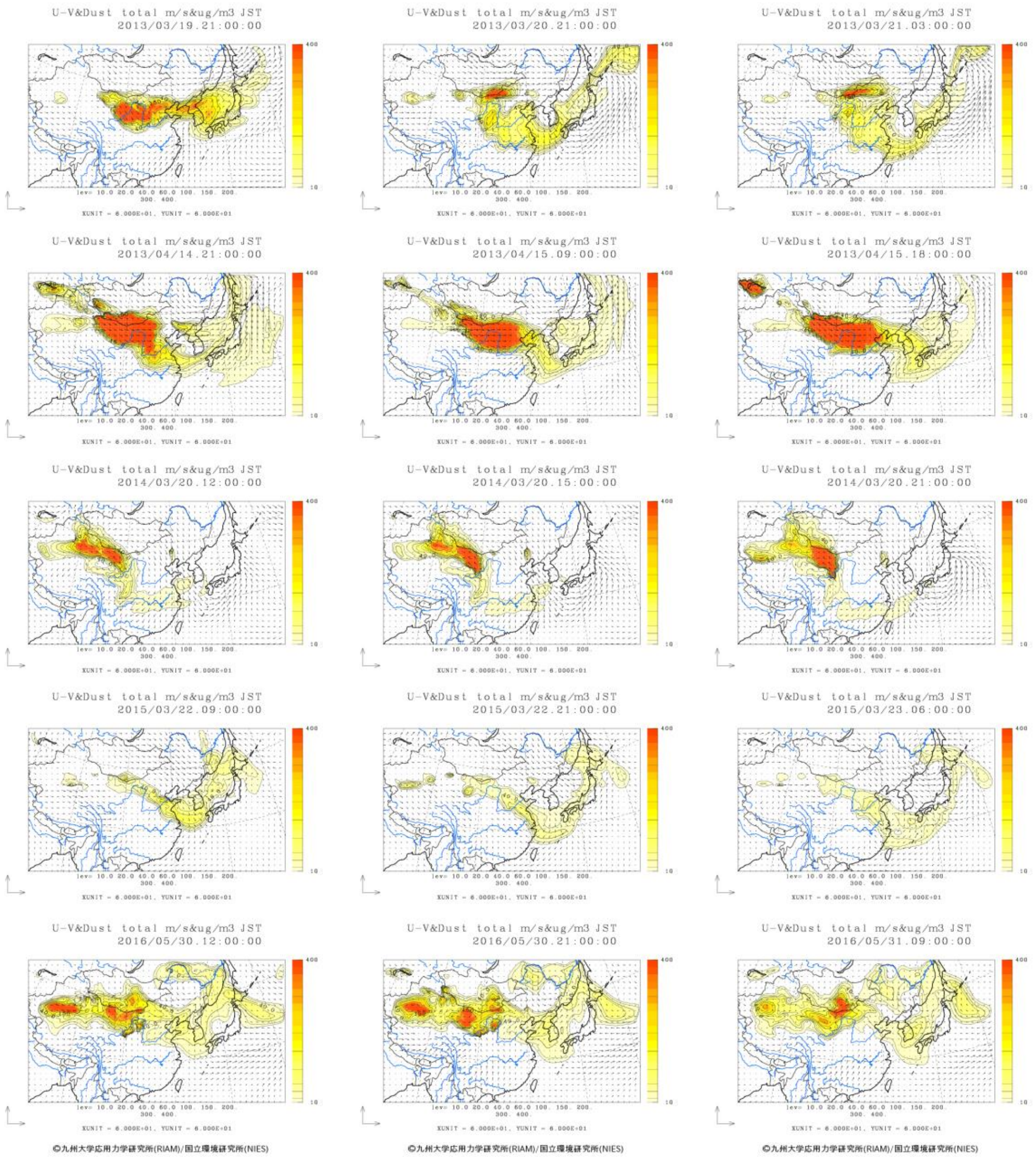

Figure S7. Spatial distributions of Asian dust in the east Asian region during the observed dust events. The data were forecasted by online RIAM/CGER/NIES-CFORS (Chemical weather FORecasting System; http://www-cfors.nies.go.jp/~cfors/).

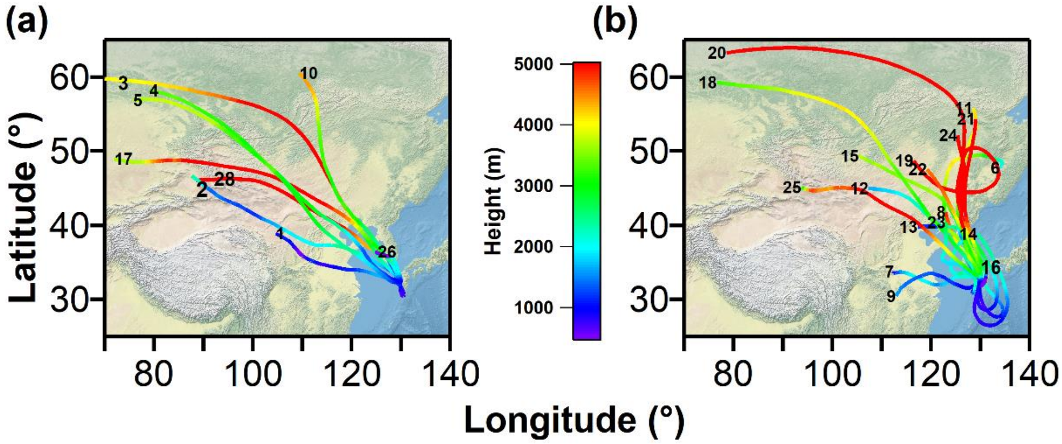

Figure S8. Seventy-two-hour backward trajectories of air parcels (http://ready.arl.noaa.gov/HYSPLIT.php) at 1000 m at the sampling site during the dusty (a) and nondust (b) periods. The map source is the IgorGIS package of IGOR Pro.

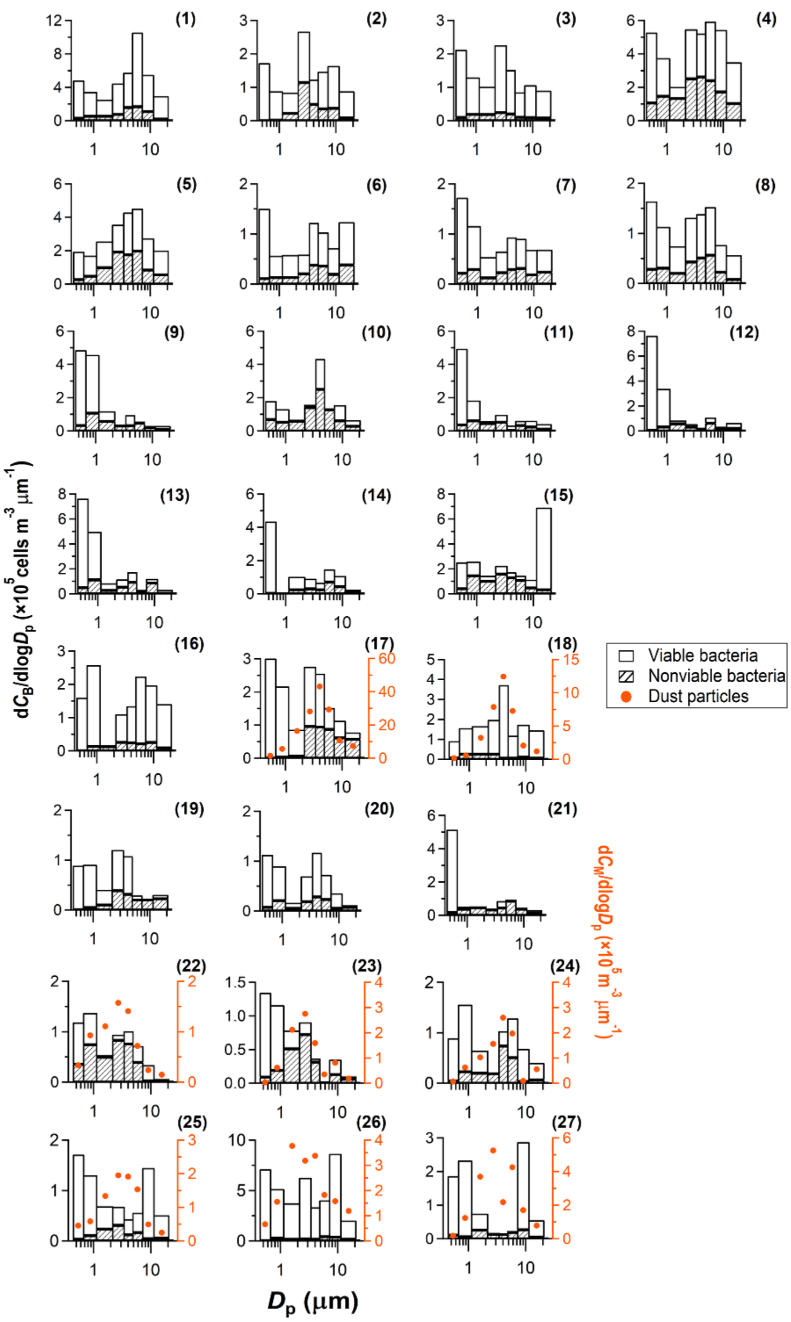

Figure S9. Concentrations of viable and nonviable bacteria (C_B) and mineral dust-like particles (C_M) in size-segregated airborne particles during the sampling periods. All x axes indicate particle size (D_p), left y axes indicate dC_B /dlog D_p (black), and right y axes indicate dC_M /dlog D_p (orange). The upper limit of particle size was set to 20 µm because it is difficult for particles larger than 20 µm in aerodynamic diameter to remain airborne (Andreas et al., 1995;Mayol et al., 2014). During dust periods (Samples 1, 2, 3, 4, 5, 10, 17, 26, and 27), the size distribution of bacteria-associated particles showed two modes. During seven cases of nondust periods (Samples 9, 11, 12, 13, 14, 21, 23), the size distribution showed a mono-mode in the size fraction 0.43–1.1 µm. In samples from the other nondust periods (Samples 6, 7, 8, 16, 19, 20, 22, 24, and 25), except for Samples 15 and 18, the bacteria-associated particles showed bimodal size distributions.

Table S1. Information of samplings.

Sample ID	Year	Starting time (UTC+9:00)	Ending time (UTC+9:00)	Duration	Synoptic weather
1	2013	19 Mar 22:50	20 Mar 03:00	04 h 10 min	Prefront
2		20 Mar 14:37	21 Mar 01:07	10 h 30 min	Postfront
3		21 Mar 06:00	21 Mar 18:00	12 h	Approaching anticyclone
4		14 Apr 23:55	15 Apr 09:02	09 h 07 min	Pre-/postfront
5		15 Apr 09:17	15 Apr 18:30	09 h 12 min	Approaching anticyclone
6		27 Apr 00:00	28 Apr 00:00	24 h	Approaching anticyclone
7		28 Apr 00:01	29 Apr 00:01	24 h	Anticyclone
8		29 Apr 00:02	30 Apr 00:02	24 h	Anticyclone+prefront
9	2014	19 Mar 00:05	19 Mar 17:35	17 h 30 min	Prefront
10		20 Mar 12:00	21 Mar 12:00	24 h	Postfront
11		21 Mar 12:00	22 Mar 12:10	24 h 10 min	Approaching anticyclone
12		23 Mar 12:40	24 Mar 12:40	24 h	Anticyclone
13		24 Mar 12:40	25 Mar 12:30	23 h 50 min	Anticyclone
14		25 Mar 12:30	25 Mar 19:45	07 h 15 min	Anticyclone
15		27 Mar 11:23	28 Mar 08:40	21 h 27 min	Approaching anticyclone
16	2015	20 Mar 18:10	21 Mar 18:10	24 h	Postfront
17		22 Mar 06:03	23 Mar 06:50	24 h 47 min	Approaching anticyclone
18		23 Mar 07:58	24 Mar 08:00	24 h 02 min	Approaching anticyclone
19		24 Mar 08:03	25 Mar 08:02	23 h 59 min	Anticyclone
20		25 Mar 08:02	26 Mar 08:02	24 h	Anticyclone
21		26 Mar 08:05	27 Mar 07:30	23 h 25 min	Anticyclone
22	2016	22 Mar 09:04	23 Mar 09:02	23 h 58 min	Anticyclone
23		23 Mar 09:00	24 Mar 09:00	24 h	Pre-/postfront
24		24 Mar 09:00	25 Mar 09:00	24 h	Postfront/Anticyclone
25		25 Mar 09:00	26 Mar 07:00	22 h	Anticyclone
26		30 May 08:15	30 May 11:15	03 h	Postfront
27		31 May 07:50	31 May 10:50	03 h	Approaching anticyclone

Table S2. Concentration and viability of total, free-floating and particle-attached bacteria. The concentration of coarse particles (>1 μm) and the ratio of particle-attached bacteria to coarse particles are also listed. The percentages of free-floating and particle-attached bacteria are given in the parentheses.

Sample ID	**Dust condition**	**Coarse particles (10^5 m^{-3})**	**Total bacteria**		**Free-floating bacteria**		**Particle-attached bacteria (PAB)**		
			Concentration (10^5 cells m^{-3})	Viability (%)	Concentration (10^5 cells m^{-3})	Viability (%)	Concentration (10^5 cells m^{-3})	Viability (%)	PAB/Coarse particles (%)
1	Dusty	41	7.8	84	1.7 (21)	90	6.1 (79)	82	15
2		32	2.3	77	0.5 (23)	99	1.8 (77)	71	6
3		12	2.2	89	0.7 (30)	91	1.6 (70)	88	13
4		52	7.3	61	1.8 (25)	71	5.4 (75)	58	11
5		21	4.7	63	0.7 (16)	79	3.9 (84)	60	19
10		16	2.5	40	0.6 (25)	61	1.9 (75)	33	11
17		88	2.9	73	1.0 (36)	99	1.9 (64)	59	2
26		10	8.2	95	2.5 (30)	97	5.7 (70)	95	59
27		15	1.9	87	0.9 (46)	96	1.0 (54)	78	7
6	Nondust	13	1.5	75	0.4 (27)	88	1.1 (73)	70	9
7		12	1.5	74	0.6 (39)	82	0.9 (61)	69	8
8		14	0.8	98	0.2 (31)	99	0.5 (69)	98	4
9		26	2.7	73	1.9 (71)	84	0.8 (29)	45	3
11		4	2.1	72	1.3 (64)	85	0.8 (36)	51	18
12		14	2.9	83	2.1 (73)	96	0.8 (27)	48	6
13		9	3.6	75	2.5 (70)	86	1.1 (30)	50	12
14		13	1.9	77	0.8 (42)	99	1.1 (58)	62	9
15		10	4.4	65	1.0 (24)	61	3.4 (76)	66	35
16		16	2.5	89	0.9 (35)	96	1.6 (65)	85	10
18		15	2.9	91	0.5 (18)	86	2.4 (82)	92	16
19		9	1.1	72	0.4 (35)	96	0.7 (65)	59	7
20		10	1.0	77	0.4 (41)	85	0.6 (59)	72	6
21		13	1.7	63	1.0 (63)	89	0.6 (37)	18	5
22		8	1.2	40	0.5 (43)	56	0.7 (57)	28	9
23		12	1.1	59	0.5 (48)	88	0.6 (52)	32	5
24		7	1.4	72	0.5 (38)	88	0.8 (62)	62	12
25		6	1.5	85	0.6 (40)	95	0.9 (60)	78	15

Table S3. Data for Figures 1 and S9. Concentrations of viable (VB) and nonviable (NVB) bacteria (dC_B /dlog D_p, cells m^{-3} μm^{-1}) and mineral dust-like particles (dC_M /dlog D_p, particles m^{-3} μm^{-1}) in size-segregated airborne particles during the sampling periods.

Sample ID	Concentration \ Size range (μm)	11-20	7-11	4.7-7	3.3-4.7	2.1-3.3	1.1-2.1	0.65-1.1	0.43-0.65
1	130319NVB	1.9E+04	1.1E+05	1.7E+05	1.6E+05	7.5E+04	5.3E+04	5.3E+04	2.9E+04
	130319VB	2.8E+05	4.4E+05	8.9E+05	4.2E+05	3.7E+05	2.0E+05	2.9E+05	4.5E+05
2	130320NVB	8.3E+03	3.7E+04	3.5E+04	4.9E+04	1.1E+05	2.2E+04	1.6E+03	0.0E+00
	130320VB	8.0E+04	1.3E+05	1.1E+05	7.5E+04	1.5E+05	6.2E+04	8.6E+04	1.7E+05
3	130321NVB	7.6E+03	9.2E+03	1.0E+04	2.0E+04	2.4E+04	1.8E+04	1.9E+04	9.6E+03
	130321VB	8.3E+04	9.7E+04	7.5E+04	1.3E+05	2.0E+05	8.3E+04	1.1E+05	2.0E+05
4	130414NVB	1.0E+05	1.7E+05	2.4E+05	2.6E+05	2.5E+05	1.3E+05	1.5E+05	1.1E+05
	130414VB	2.5E+05	3.7E+05	3.5E+05	2.6E+05	3.0E+05	7.0E+04	2.3E+05	4.2E+05
5	130415NVB	5.6E+04	8.3E+04	2.0E+05	1.8E+05	1.9E+05	9.8E+04	4.6E+04	2.6E+04
	130415VB	1.5E+05	1.9E+05	2.6E+05	2.5E+05	1.6E+05	1.6E+05	1.2E+05	1.7E+05
6	130427NVB	3.8E+04	1.9E+04	3.6E+04	3.7E+04	2.0E+04	1.3E+04	1.3E+04	1.1E+04
	130427VB	8.6E+04	5.3E+04	6.7E+04	8.5E+04	3.8E+04	4.5E+04	4.4E+04	1.4E+05
7	130428NVB	2.4E+04	1.8E+04	3.1E+04	2.9E+04	2.3E+04	1.2E+04	2.9E+04	2.1E+04
	130428VB	4.5E+04	5.0E+04	5.9E+04	6.4E+04	4.2E+04	4.2E+04	8.7E+04	1.5E+05
8	130429NVB	7.9E+03	2.3E+04	5.6E+04	5.1E+04	4.3E+04	2.0E+04	3.0E+04	2.8E+04
	130429VB	4.9E+04	5.4E+04	9.6E+04	8.8E+04	8.9E+04	5.4E+04	8.3E+04	1.4E+05
9	140319NVB	9.5E+03	2.1E+04	4.6E+04	3.2E+04	3.0E+04	5.8E+04	1.1E+05	3.2E+04
	140319VB	2.1E+04	0.0E+00	9.7E+03	6.4E+04	2.8E+03	6.1E+04	3.5E+05	4.5E+05
10	140320NVB	2.8E+04	6.0E+04	1.3E+05	2.5E+05	1.4E+05	5.9E+04	5.2E+04	6.9E+04
	140320VB	3.8E+04	9.5E+04	6.0E+02	1.8E+05	1.8E+04	5.2E+03	7.9E+04	1.1E+05
11	140321NVB	1.0E+04	2.4E+04	3.3E+04	3.7E+03	5.2E+04	4.4E+04	6.0E+04	3.6E+04
	140321VB	3.1E+04	3.8E+04	2.8E+04	3.0E+04	4.5E+04	1.6E+04	1.2E+05	4.6E+05
12	140323NVB	2.1E+04	1.6E+04	6.3E+04	5.9E+03	3.0E+04	5.7E+04	3.1E+04	5.9E+03
	140323VB	4.3E+04	1.9E+04	4.5E+04	1.9E+04	2.5E+04	2.8E+04	3.1E+05	7.6E+05
13	140324NVB	4.1E+03	8.7E+04	2.0E+04	9.2E+04	5.3E+04	2.8E+04	1.1E+05	4.9E+04
	140324VB	2.7E+04	3.4E+04	0.0E+00	8.2E+04	6.3E+04	5.7E+04	3.9E+05	7.2E+05
14	140325NVB	1.6E+04	4.3E+04	7.1E+04	2.5E+04	3.0E+04	2.4E+04	0.0E+00	3.0E+03
	140325VB	0.0E+00	6.5E+04	7.7E+04	4.2E+04	6.1E+04	7.8E+04	0.0E+00	4.3E+05
15	140327NVB	3.3E+04	4.7E+04	1.1E+05	1.3E+05	1.6E+05	1.0E+05	1.4E+05	4.1E+04
	140327VB	6.6E+05	6.6E+04	3.8E+04	4.4E+04	6.6E+04	4.5E+04	1.1E+05	2.1E+05
16	150320NVB	9.2E+03	2.6E+04	2.1E+04	2.4E+04	2.6E+04	1.3E+04	1.3E+04	9.2E+02
	150320VB	1.3E+05	1.7E+05	2.0E+05	1.1E+05	8.4E+04	0.0E+00	2.5E+05	1.6E+05
17	150322Dust	7.3E+05	1.1E+06	2.9E+06	4.3E+06	2.8E+06	1.6E+06	5.7E+05	1.5E+05
	150322NVB	5.7E+04	6.1E+04	8.7E+04	9.4E+04	9.6E+04	6.8E+03	3.5E+03	0.0E+00
	150322VB	2.1E+04	5.2E+04	6.5E+04	1.6E+05	1.8E+05	7.9E+04	2.1E+05	3.0E+05
18	150323Dust	1.2E+05	2.1E+05	7.3E+05	1.2E+06	7.9E+05	3.2E+05	5.8E+04	1.8E+04
	150323NVB	5.7E+03	1.1E+04	6.2E+03	5.3E+03	2.5E+04	2.6E+04	2.6E+04	7.3E+03
	150323VB	1.4E+05	1.6E+05	1.1E+05	3.7E+05	1.7E+05	1.4E+05	1.3E+05	8.4E+04
19	150324NVB	2.2E+04	2.0E+04	2.0E+04	3.2E+04	3.9E+04	9.9E+03	5.0E+03	9.2E+02
	150324VB	7.9E+03	0.0E+00	9.5E+03	7.7E+04	8.2E+04	3.1E+04	8.6E+04	8.8E+04
20	150325NVB	7.3E+03	5.4E+03	2.3E+04	2.8E+04	1.9E+04	5.3E+03	2.1E+04	7.8E+03
	150325VB	4.7E+03	3.0E+04	4.9E+04	8.9E+04	5.1E+04	1.1E+04	6.9E+04	1.0E+05
21	150326NVB	1.2E+04	3.7E+04	8.5E+04	4.4E+04	3.2E+04	4.5E+04	3.6E+04	1.7E+04
	150326VB	1.8E+04	0.0E+00	0.0E+00	4.2E+04	0.0E+00	0.0E+00	1.5E+04	5.0E+05
22	160322Dust	1.5E+04	2.4E+04	7.2E+04	1.4E+05	1.6E+05	1.1E+05	9.3E+04	3.3E+04
	160322NVB	3.5E+03	2.5E+03	3.9E+04	7.5E+04	8.3E+04	4.9E+04	7.4E+04	3.5E+04
	160322VB	0.0E+00	3.1E+04	3.3E+04	2.6E+04	1.1E+04	4.1E+03	6.3E+04	8.3E+04
23	160323Dust	1.8E+04	8.1E+04	3.5E+04	1.6E+05	2.8E+05	2.1E+05	6.1E+04	3.2E+03
	160323NVB	6.0E+03	1.3E+04	0.0E+00	3.2E+04	7.2E+04	5.1E+04	1.9E+04	9.2E+03
	160323VB	4.1E+03	2.2E+04	2.8E+03	5.3E+03	1.8E+04	2.7E+04	9.7E+04	1.3E+05
24	160324Dust	5.6E+04	9.2E+03	2.0E+05	2.6E+05	1.6E+05	1.0E+05	6.2E+04	6.9E+03
	160324NVB	6.6E+03	3.3E+03	5.1E+04	7.4E+04	1.9E+04	2.0E+04	2.3E+04	4.6E+03
	160324VB	3.4E+04	6.5E+04	7.8E+04	2.9E+04	8.4E+02	4.5E+04	1.3E+05	8.5E+04
25	160325Dust	2.4E+04	4.9E+04	1.5E+05	1.9E+05	1.9E+05	1.3E+05	5.8E+04	4.5E+04
	160325NVB	5.9E+03	4.6E+03	1.7E+04	1.2E+04	3.1E+04	2.4E+04	1.1E+04	3.5E+03
	160325VB	4.5E+04	1.4E+05	3.9E+04	3.1E+04	3.7E+04	4.5E+04	1.2E+05	1.7E+05
26	160530Dust	1.2E+05	1.6E+05	1.8E+05	3.4E+05	3.2E+05	3.8E+05	1.6E+05	6.6E+04
	160530NVB	1.8E+04	3.7E+04	4.2E+04	1.7E+04	2.0E+04	1.6E+04	2.9E+04	3.7E+03
	160530VB	1.8E+05	8.3E+05	3.6E+05	3.2E+05	6.1E+05	3.6E+05	4.9E+05	7.1E+05
27	160531Dust	7.8E+04	1.7E+05	4.3E+05	2.2E+05	5.3E+05	3.7E+05	1.2E+05	1.8E+04
	160531NVB	5.1E+03	2.7E+04	1.9E+04	1.3E+04	1.3E+04	2.6E+04	5.8E+03	1.1E+04
	160531VB	5.1E+04	2.6E+05	0.0E+00	0.0E+00	0.0E+00	4.9E+04	2.3E+05	1.8E+05

Table S4. Data for Figure 2. Concentrations of viable (VB), nonviable (NVB), and total (TB) bacteria (C_B, cells m^{-3}) and mineral dust-like particles (C_M, particles m^{-3}) in size-segregated airborne particles.

Sample ID	Size range (μm) / Concentration	11-20	7-11	4.7-7	3.3-4.7	2.1-3.3	1.1-2.1	0.65-1.1	0.43-0.65
17	150322Dust	1.9E+05	2.1E+05	5.1E+05	6.6E+05	5.5E+05	4.6E+05	1.3E+05	2.7E+04
	150322VB	5.3E+03	1.0E+04	1.1E+04	2.5E+04	3.5E+04	2.2E+04	4.9E+04	5.4E+04
	150322NVB	1.5E+04	1.2E+04	1.5E+04	1.4E+04	1.9E+04	1.9E+03	8.0E+02	0.0E+00
	150322TB	2.0E+04	2.2E+04	2.6E+04	3.9E+04	5.4E+04	2.4E+04	5.0E+04	5.4E+04
18	150323Dust	3.1E+04	4.1E+04	1.3E+05	1.9E+05	1.5E+05	9.1E+04	1.3E+04	3.2E+03
	150323VB	3.6E+04	3.2E+04	2.0E+04	5.6E+04	3.4E+04	4.0E+04	3.0E+04	1.5E+04
	150323NVB	1.5E+03	2.2E+03	1.1E+03	8.2E+02	5.0E+03	7.2E+03	5.9E+03	1.3E+03
	150323TB	3.8E+04	3.4E+04	2.1E+04	5.7E+04	3.9E+04	4.7E+04	3.6E+04	1.6E+04
22	160322Dust	3.9E+03	4.7E+03	1.2E+04	2.2E+04	3.1E+04	3.1E+04	2.1E+04	6.0E+03
	160322VB	0.0E+00	6.2E+03	5.7E+03	3.9E+03	2.2E+03	1.2E+03	1.4E+04	1.5E+04
	160322NVB	9.0E+02	4.9E+02	6.7E+03	1.2E+04	1.6E+04	1.4E+04	1.7E+04	6.3E+03
	160322TB	9.0E+02	6.7E+03	1.2E+04	1.6E+04	1.9E+04	1.5E+04	3.1E+04	2.1E+04
23	160323Dust	4.8E+03	1.6E+04	6.1E+03	2.4E+04	5.4E+04	5.9E+04	1.4E+04	5.7E+02
	160323VB	1.1E+03	4.4E+03	4.9E+02	8.2E+02	3.6E+03	7.6E+03	2.2E+04	2.2E+04
	160323NVB	1.6E+03	2.5E+03	0.0E+00	4.8E+03	1.4E+04	1.4E+04	4.4E+03	1.6E+03
	160323TB	2.6E+03	6.9E+03	4.9E+02	5.7E+03	1.8E+04	2.2E+04	2.7E+04	2.4E+04
24	160324Dust	1.4E+04	1.8E+03	3.4E+04	4.0E+04	3.1E+04	2.9E+04	1.4E+04	1.2E+03
	160324VB	8.8E+03	1.3E+04	1.3E+04	4.5E+03	1.6E+02	1.3E+04	3.0E+04	1.5E+04
	160324NVB	1.7E+03	6.6E+02	8.8E+03	1.1E+04	3.7E+03	5.6E+03	5.2E+03	8.2E+02
	160324TB	1.1E+04	1.3E+04	2.2E+04	1.6E+04	3.9E+03	1.8E+04	3.6E+04	1.6E+04
25	160325Dust	6.4E+03	9.7E+03	2.7E+04	2.9E+04	3.8E+04	3.8E+04	1.3E+04	8.2E+03
	160325VB	1.2E+04	2.8E+04	6.8E+03	4.7E+03	7.3E+03	1.3E+04	2.7E+04	3.0E+04
	160325NVB	1.5E+03	9.0E+02	2.9E+03	1.9E+03	6.1E+03	6.6E+03	2.4E+03	6.3E+02
	160325TB	1.3E+04	2.8E+04	9.7E+03	6.6E+03	1.3E+04	1.9E+04	3.0E+04	3.1E+04
26	160530Dust	3.1E+04	3.1E+04	3.2E+04	5.2E+04	6.2E+04	1.1E+05	3.5E+04	1.2E+04
	160530VB	4.8E+04	1.6E+05	6.2E+04	4.9E+04	1.2E+05	1.0E+05	1.1E+05	1.3E+05
	160530NVB	4.6E+03	7.2E+03	7.2E+03	2.6E+03	3.9E+03	4.6E+03	6.6E+03	6.6E+02
	160530TB	5.3E+04	1.7E+05	7.0E+04	5.1E+04	1.2E+05	1.1E+05	1.2E+05	1.3E+05
27	160531Dust	2.0E+04	3.4E+04	7.4E+04	3.4E+04	1.0E+05	1.0E+05	2.8E+04	3.3E+03
	160531VB	1.3E+04	5.1E+04	0.0E+00	0.0E+00	0.0E+00	1.4E+04	5.2E+04	3.2E+04
	160531NVB	1.3E+03	5.3E+03	3.3E+03	2.0E+03	2.6E+03	7.2E+03	1.3E+03	2.0E+03
	160531TB	1.4E+04	5.6E+04	3.3E+03	2.0E+03	2.6E+03	2.1E+04	5.3E+04	3.4E+04

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