

Supplementary Information

Observation and Analysis of Particle Nucleation at a Forest Site in Southeastern US. *Atmosphere* 2013, 4, 72-93

Priya Pillai ^{1,*}, Andrey Khlystov ², John Walker ³ and Viney Aneja ¹

¹ Department of Marine, Earth, and Atmospheric Sciences, North Carolina State University, Raleigh, NC 27695, USA; E-Mail: vpaneja@ncsu.edu

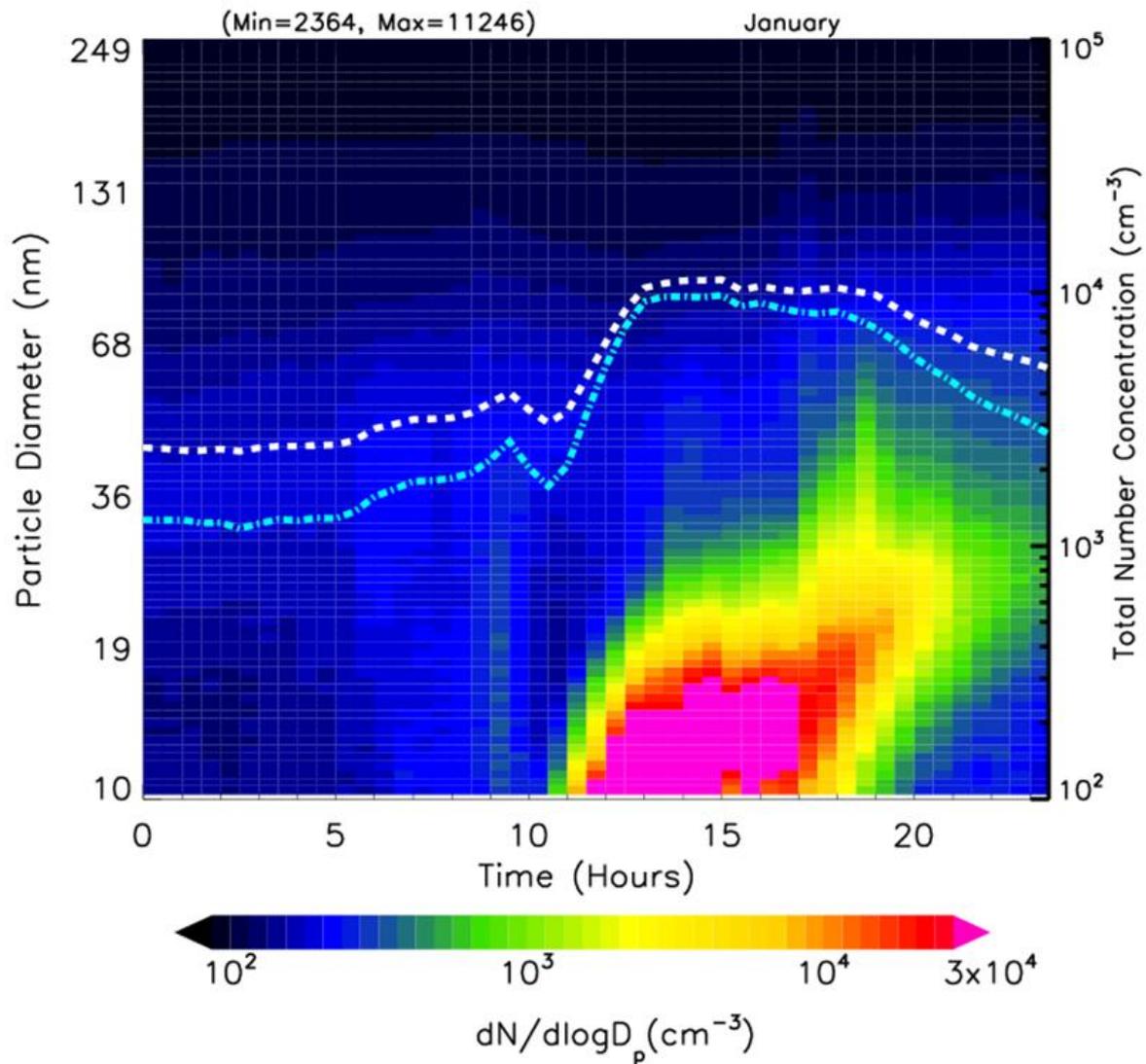
² RTI International, 3040 Cornwallis Rd., Durham, NC 27709, USA; E-Mail: akhlystov@rti.org

³ US Environmental Protection Agency, Research Triangle Park, NC 27711, USA;
E-Mail: walker.johnt@epamail.epa.gov

* Author to whom correspondence should be addressed; E-Mail: prpillai@ncsu.edu;
Tel.: +1-919-515-3690; Fax: +1-919-515-7802.

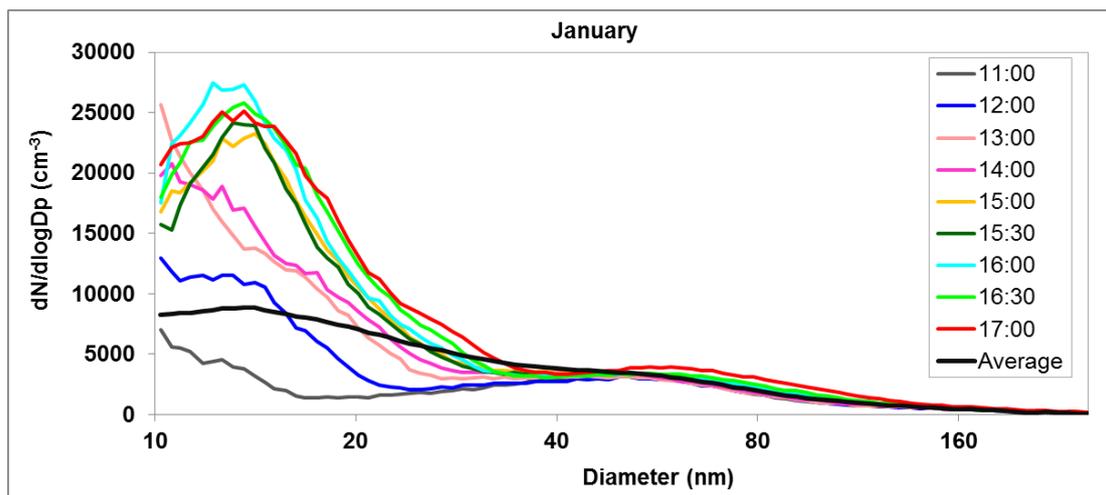
Monthly Mean Particle Size Distribution during Nucleation Events

Figure S1. (a) Monthly mean particle size distribution for January derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-h average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for January. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

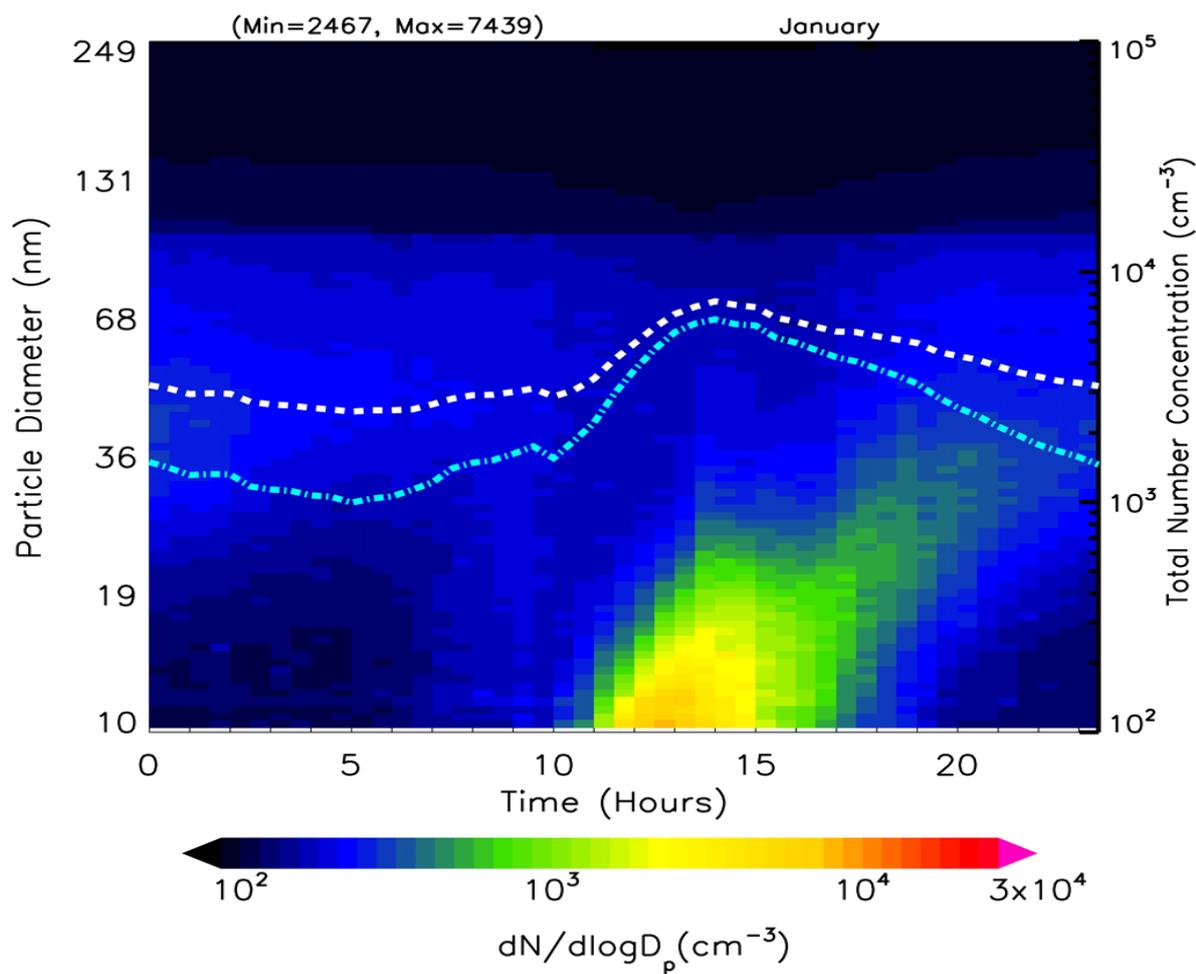


(a)

Figure S1. Cont.



(b)



(c)

Figure S2. (a) Monthly mean particle size distribution for February derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-h average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for February. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

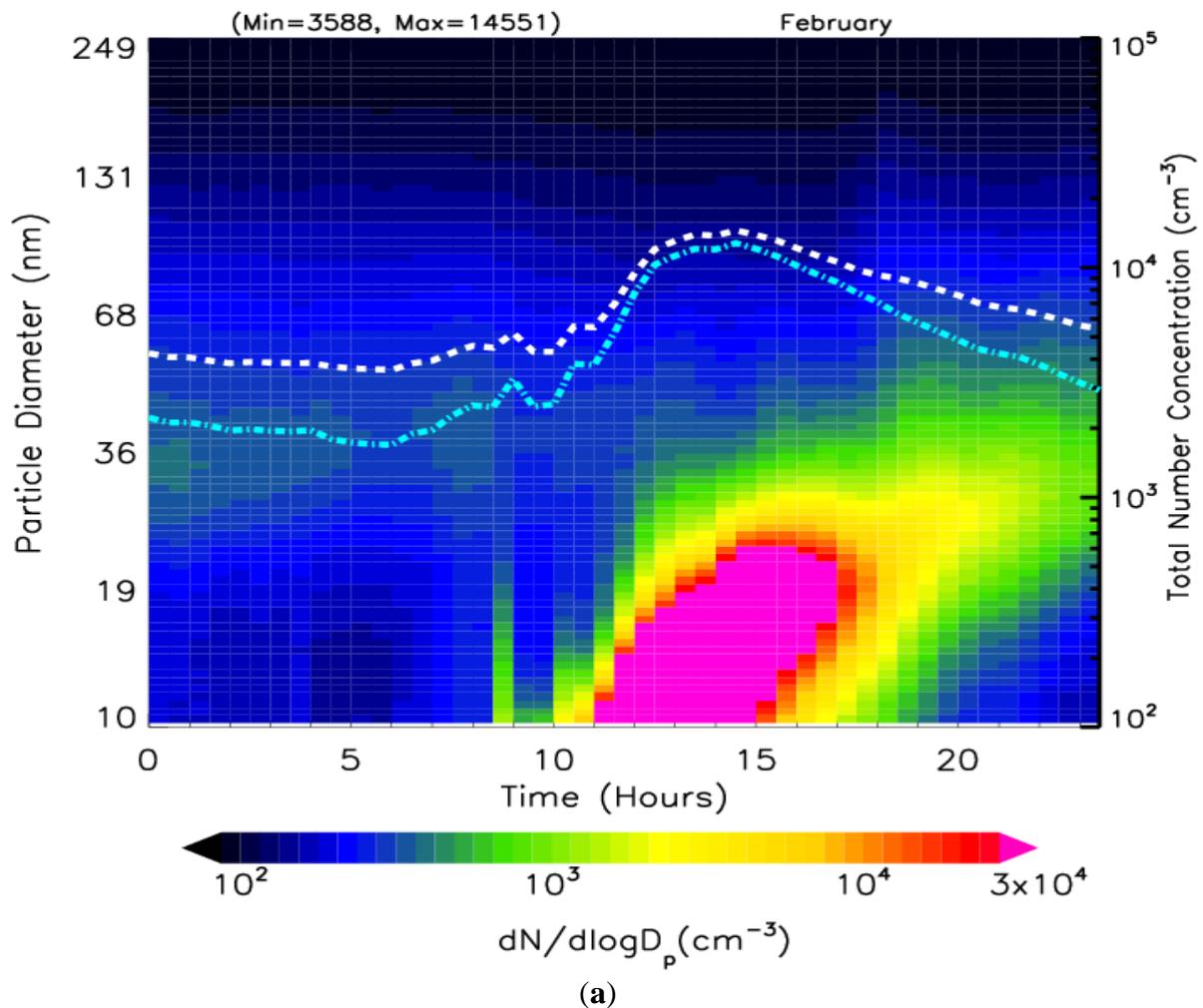
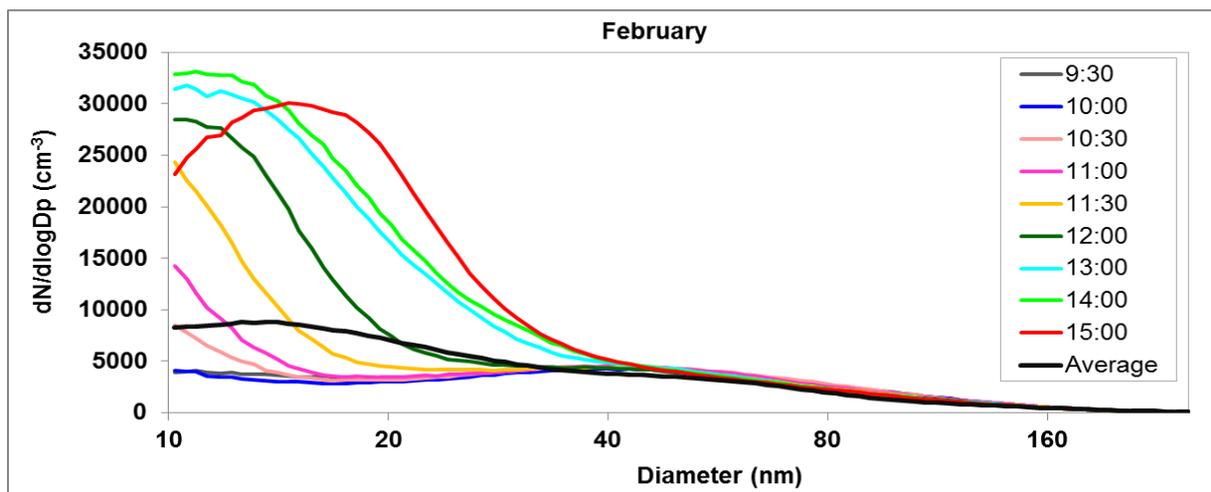
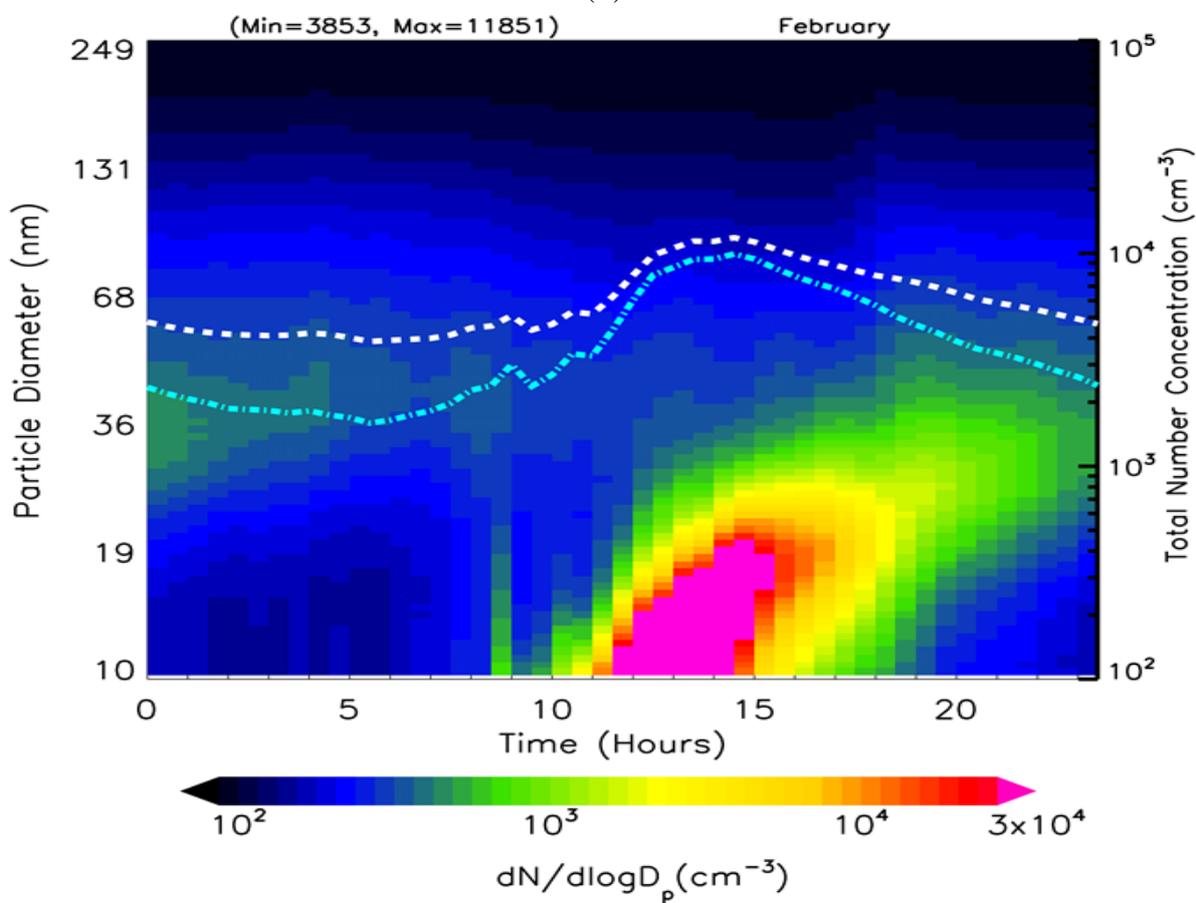


Figure S2. Cont.



(b)



(c)

Figure S3. (a) Particle size distribution for March derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-h average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for March. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

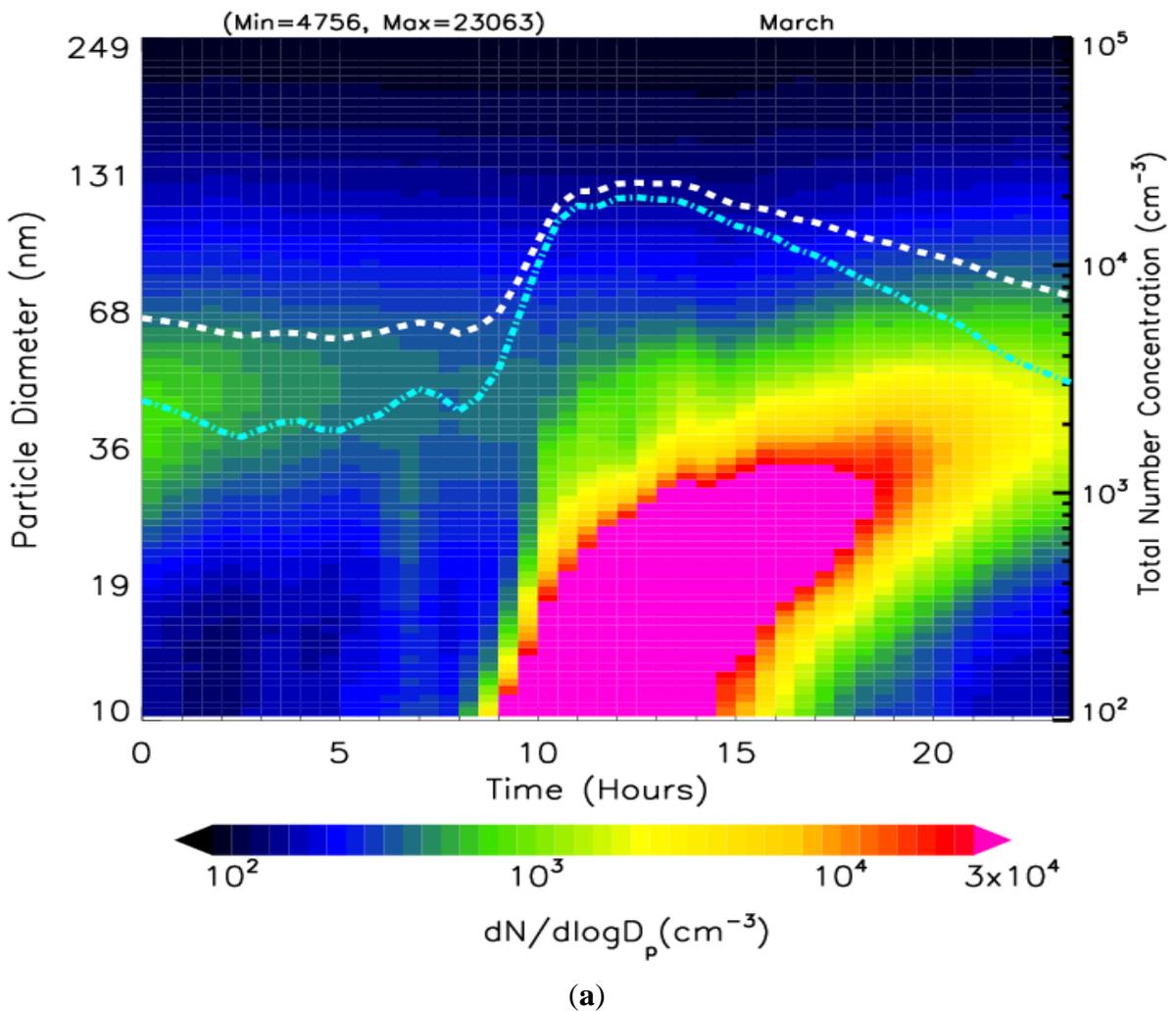
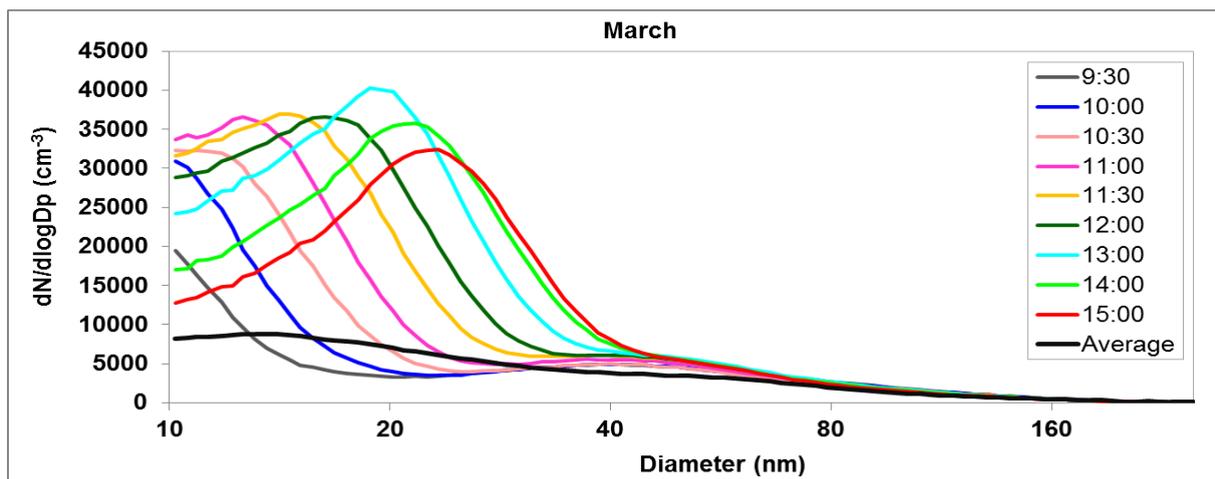
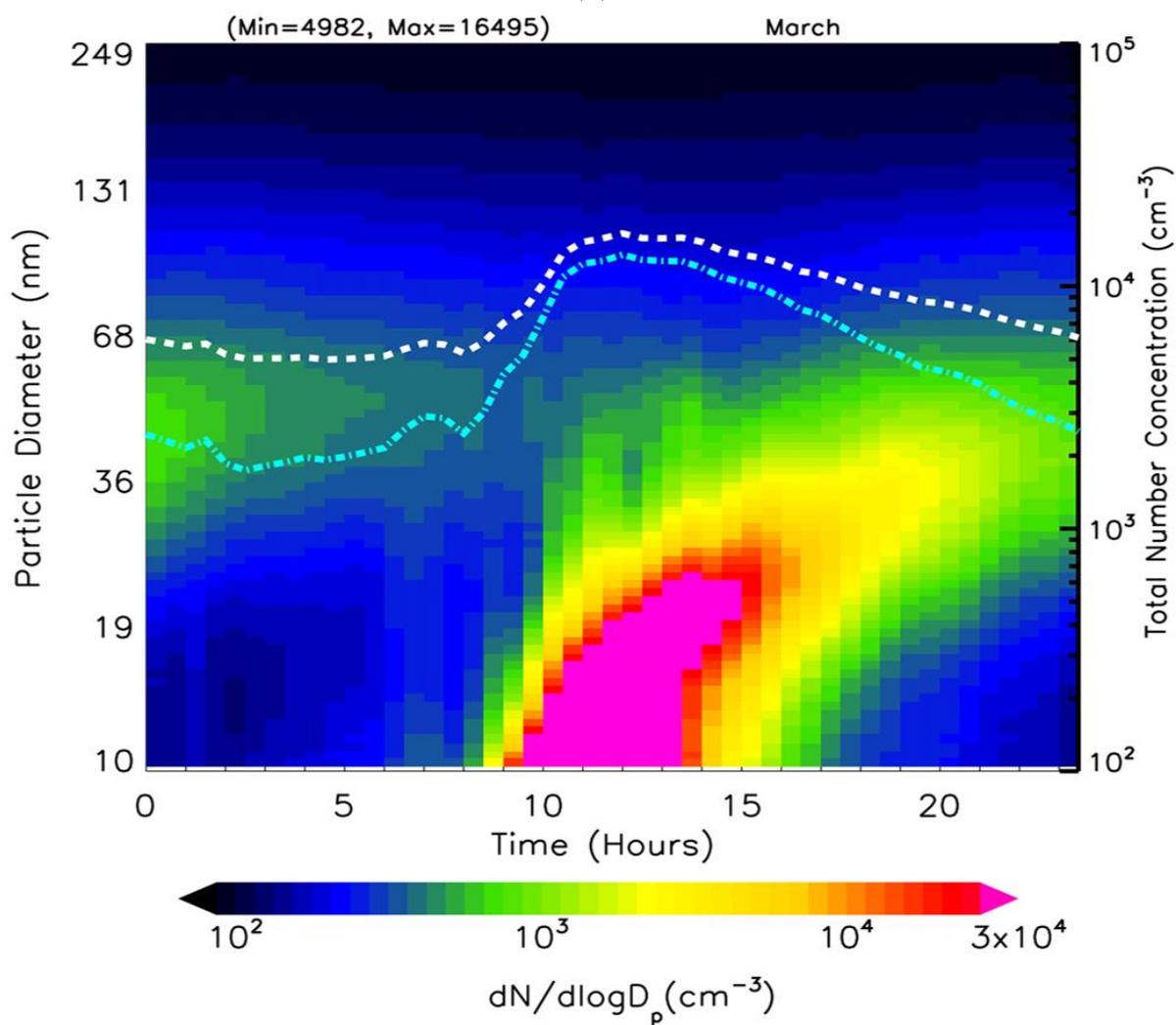


Figure S3. Cont.

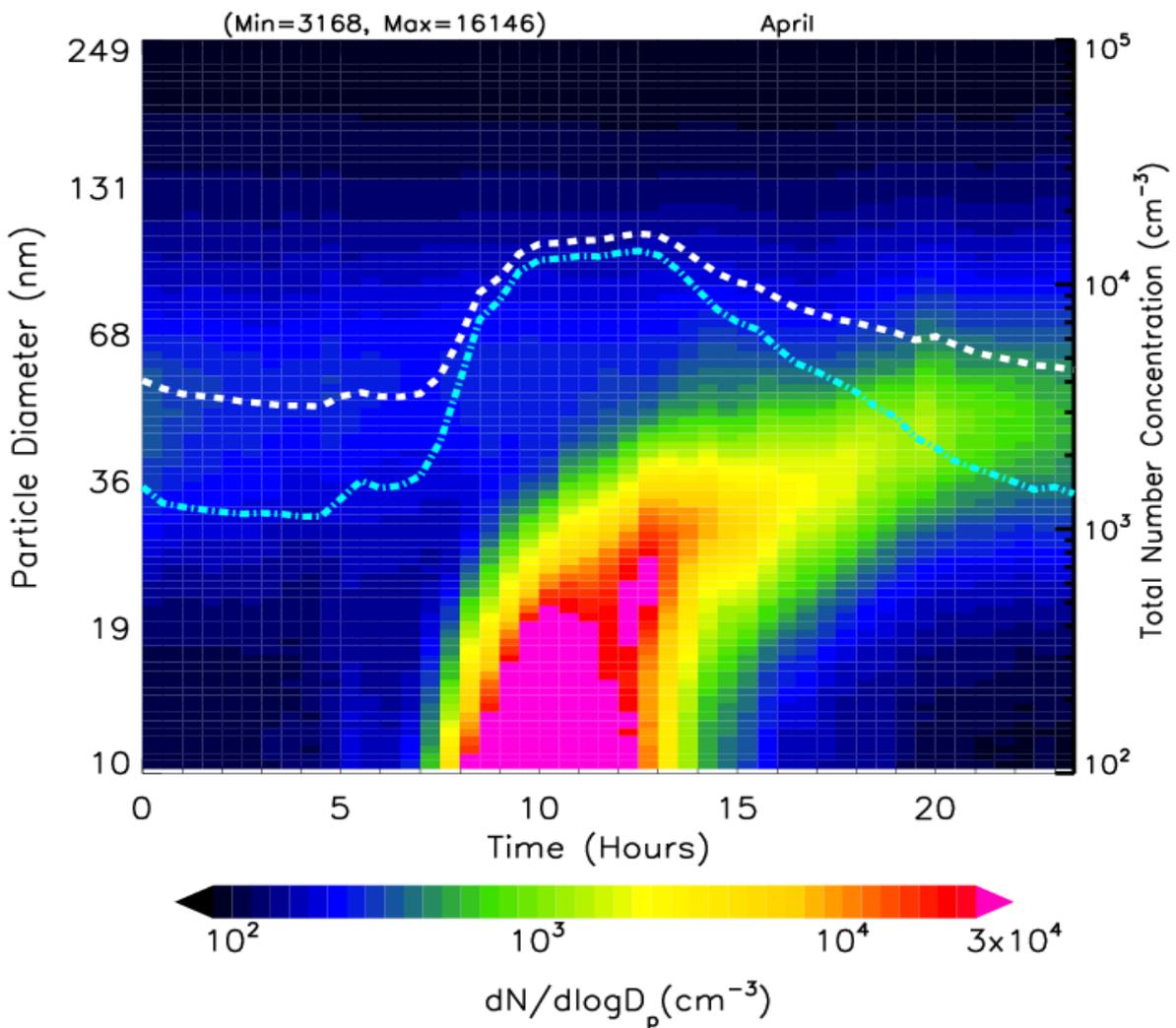


(b)



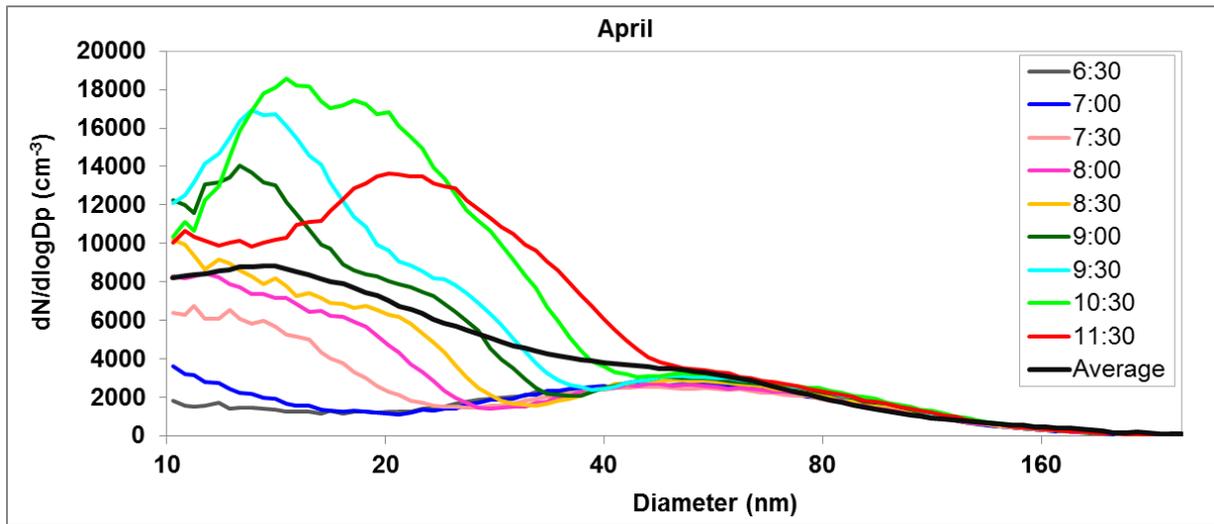
(c)

Figure S4. Monthly mean particle size distribution for April derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-h average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for April. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

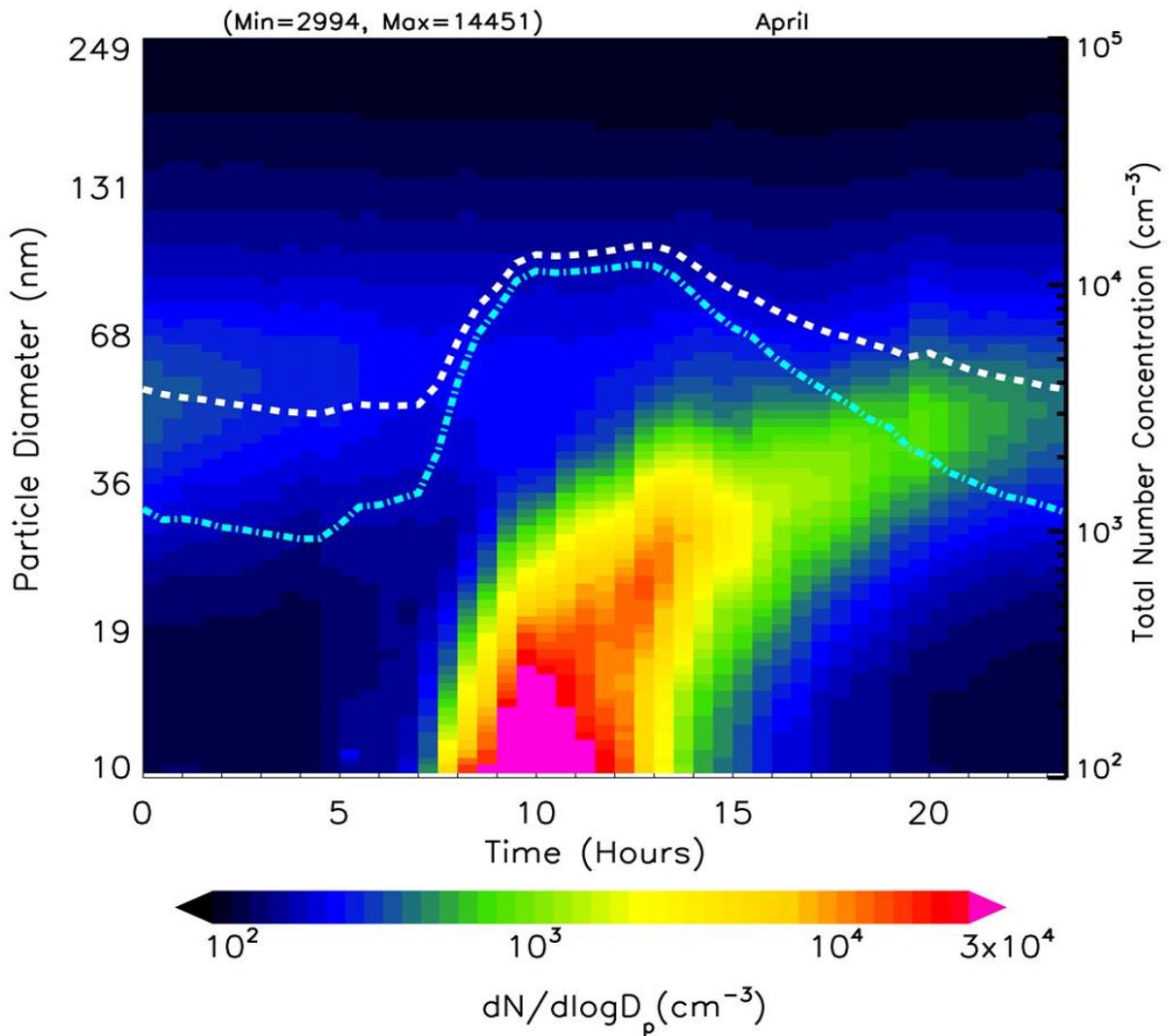


(a)

Figure S4. Cont.



(b)



(c)

Figure S5. (a) Monthly mean particle size distribution for May derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-h average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for March. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

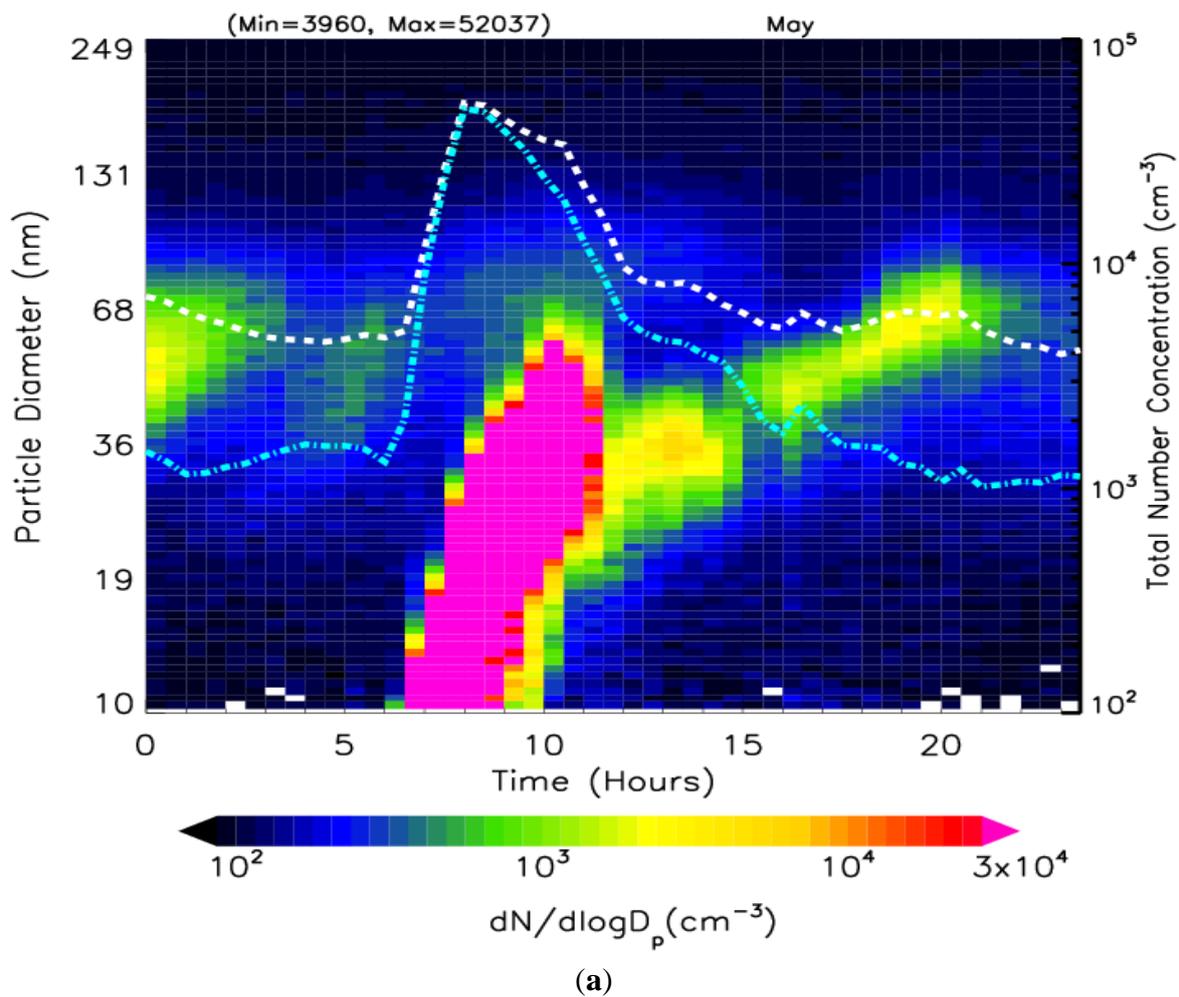
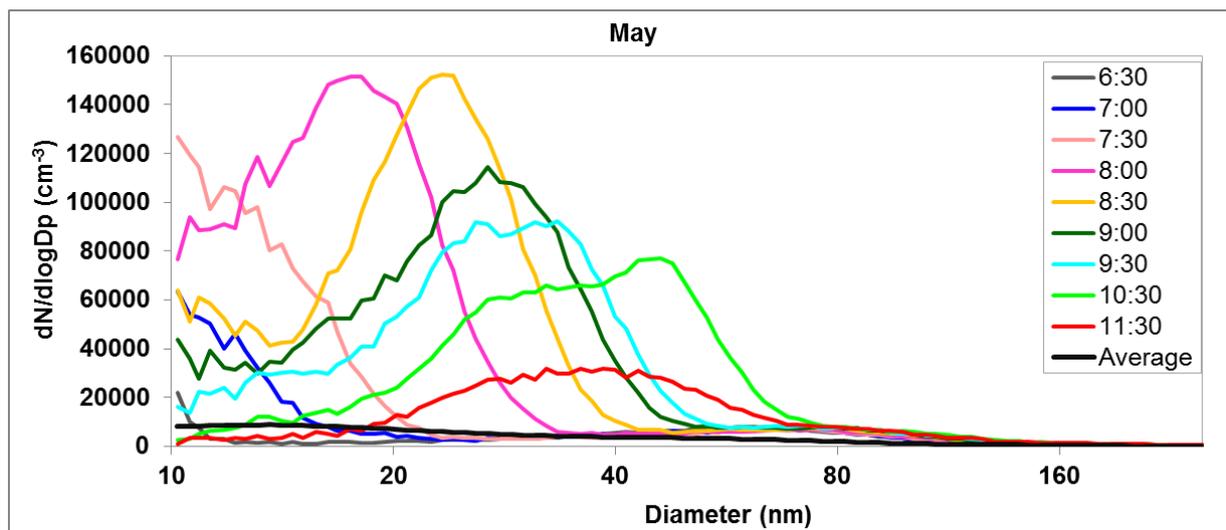
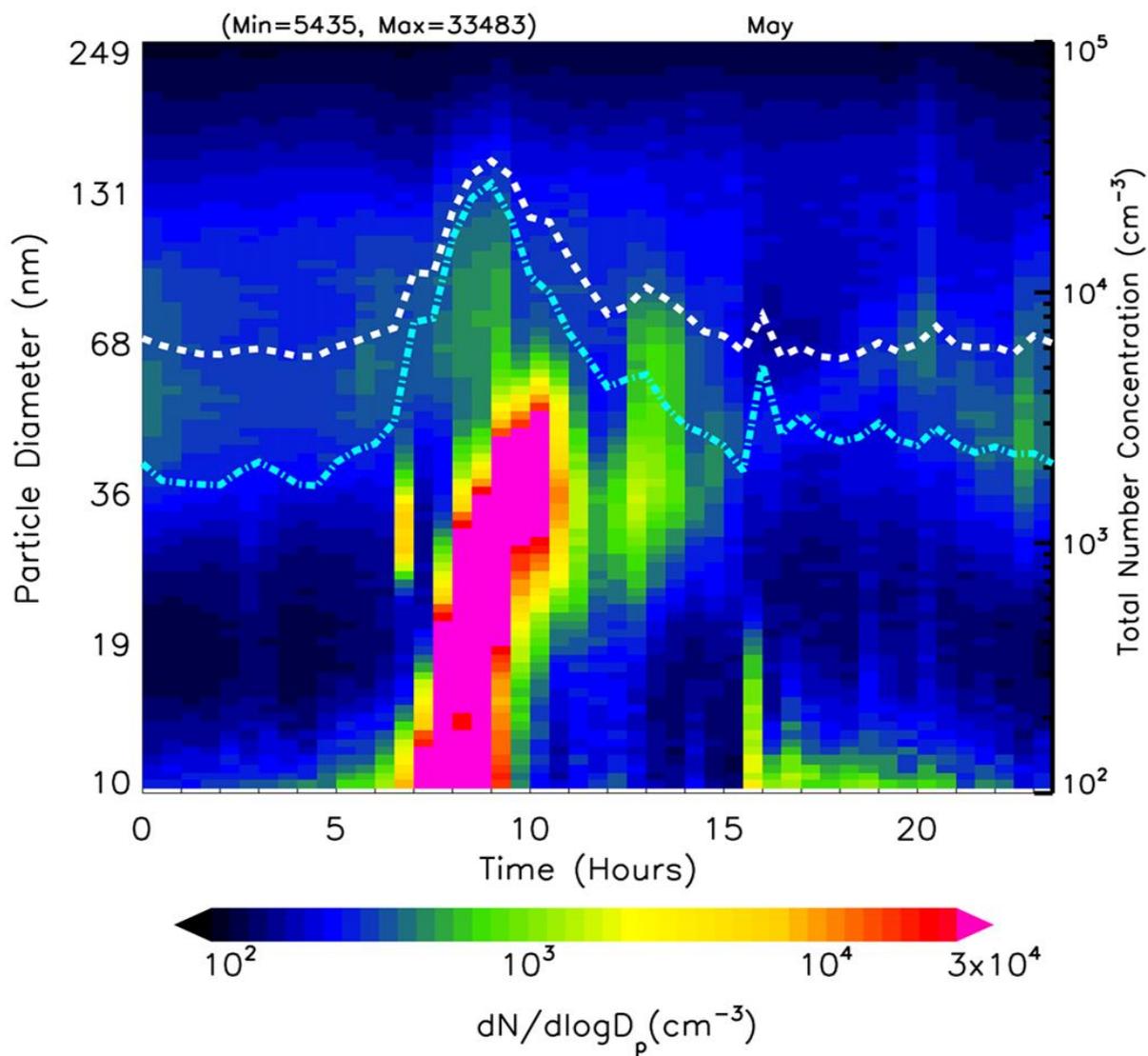


Figure S5. Cont.

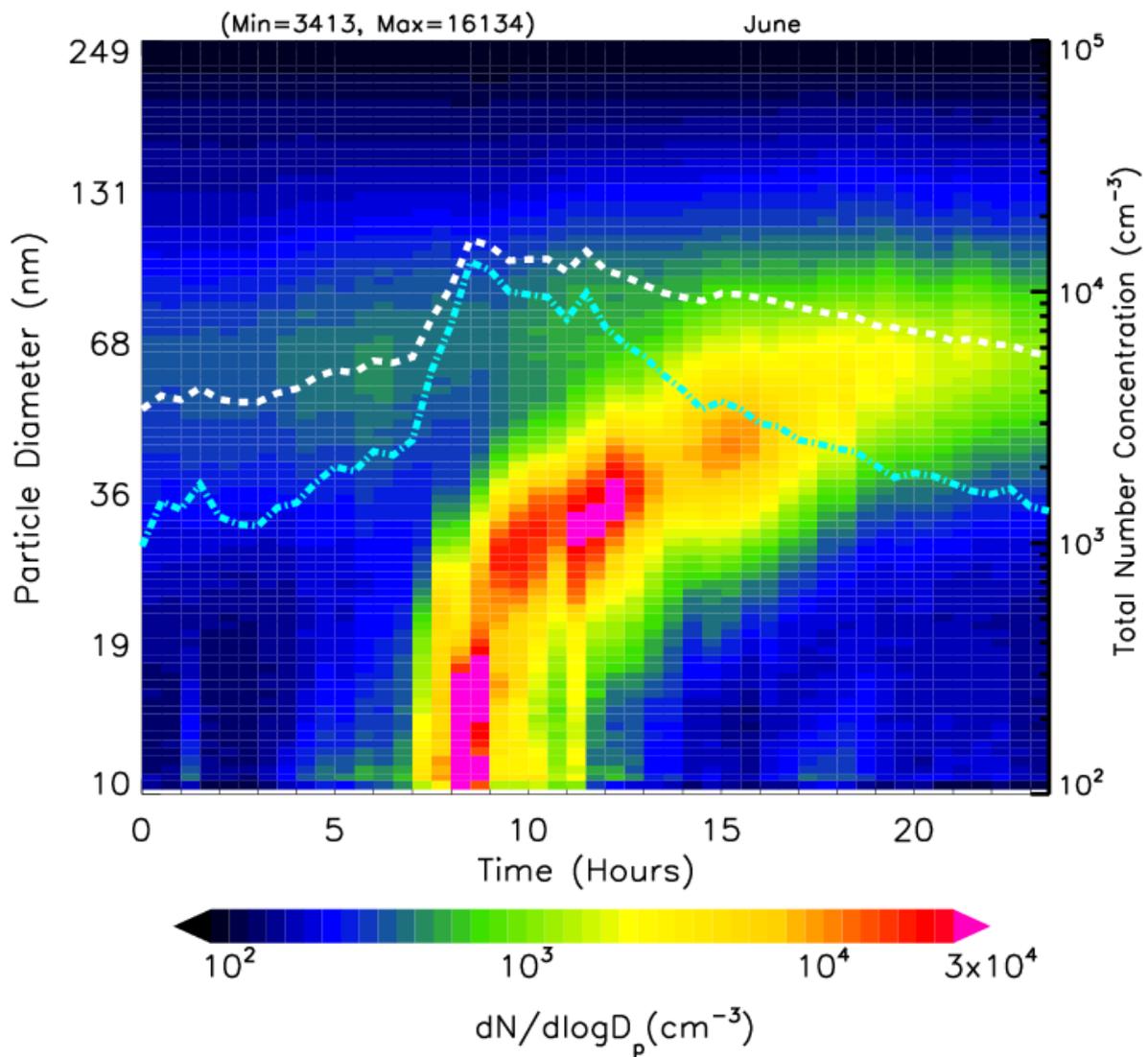


(b)



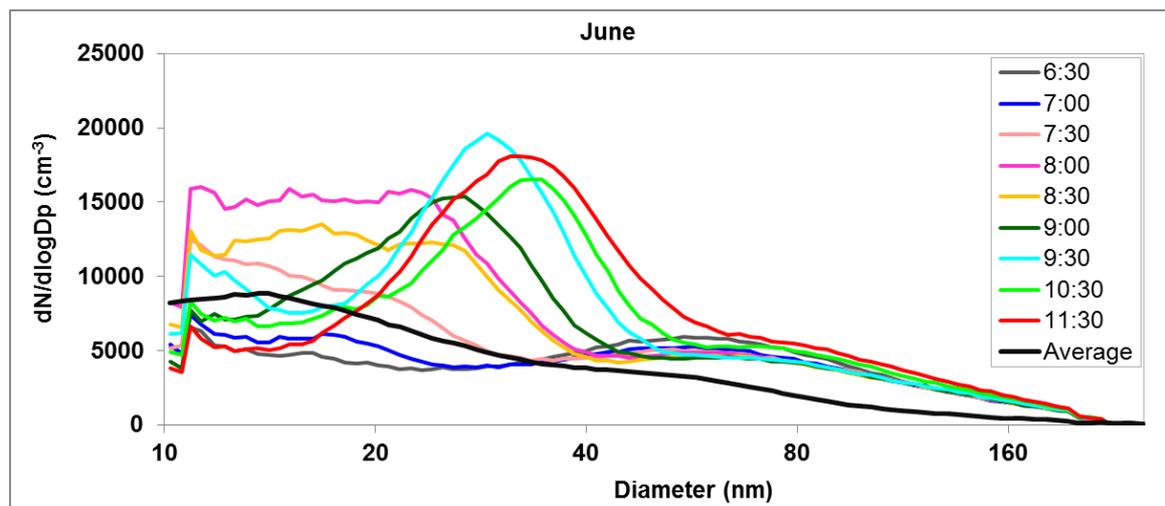
(c)

Figure S6. (a) Monthly mean particle size distribution for June derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-hour average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for June. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

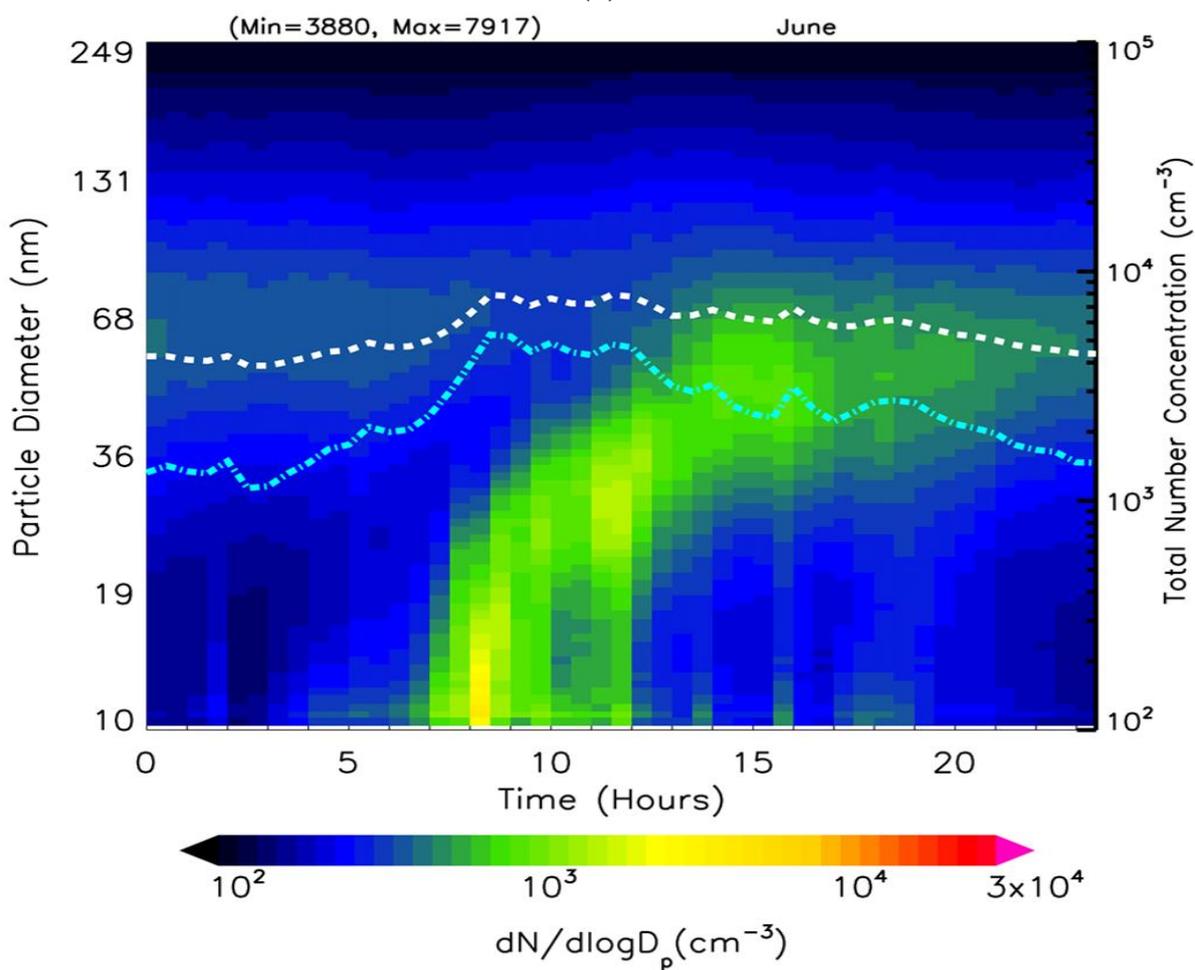


(a)

Figure S6. Cont.

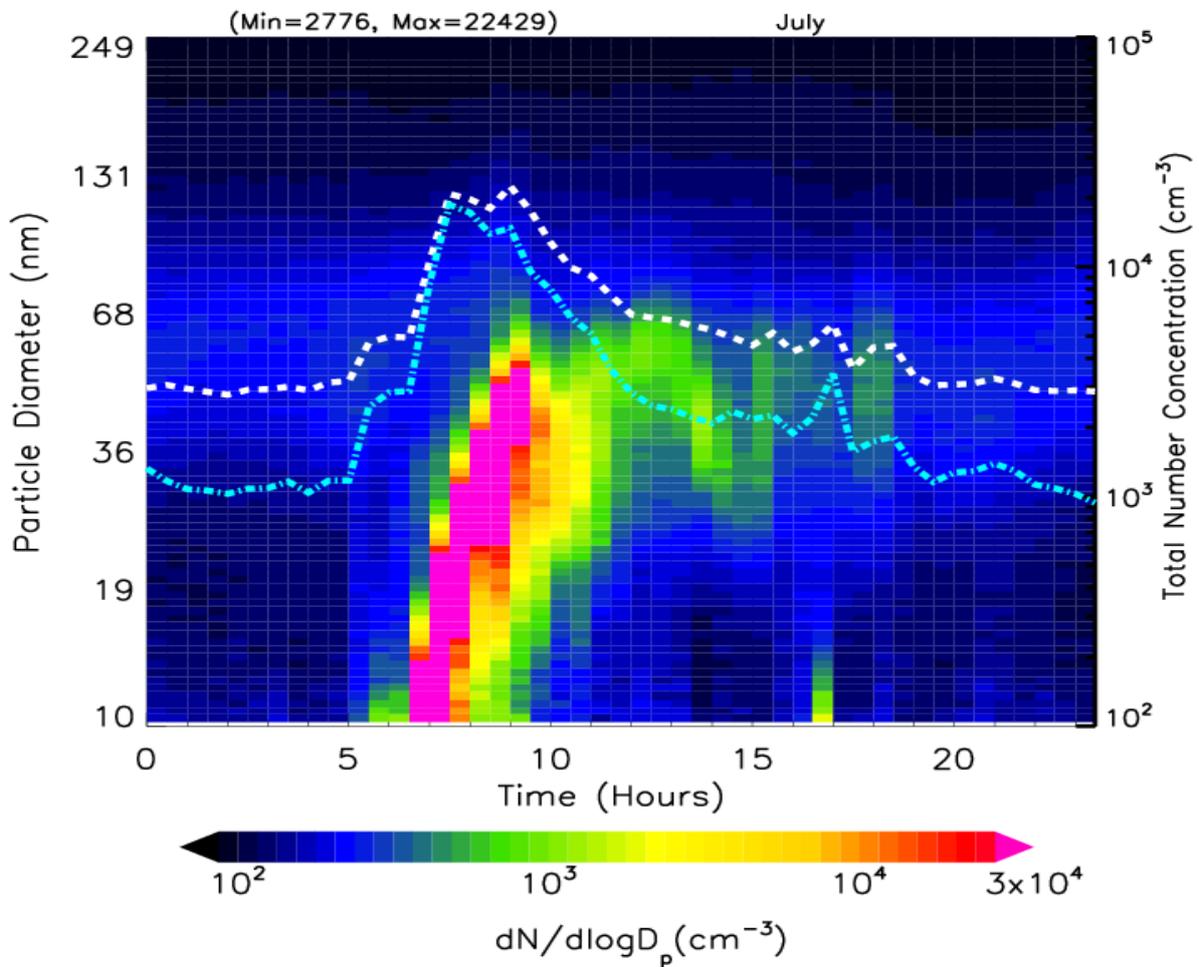


(b)



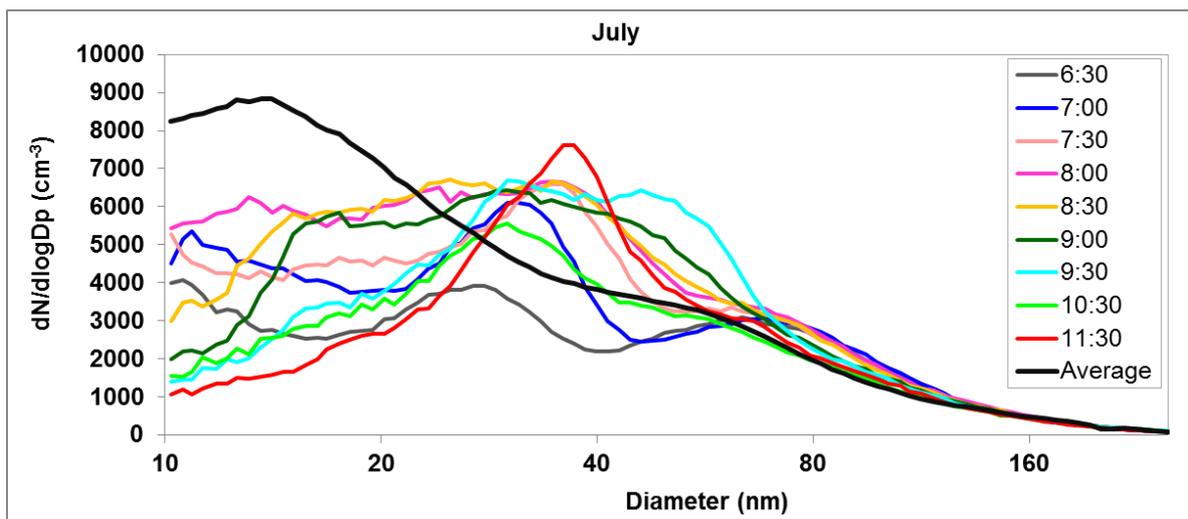
(c)

Figure S7. (a) Monthly mean particle size distribution for July derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-hour average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for July. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

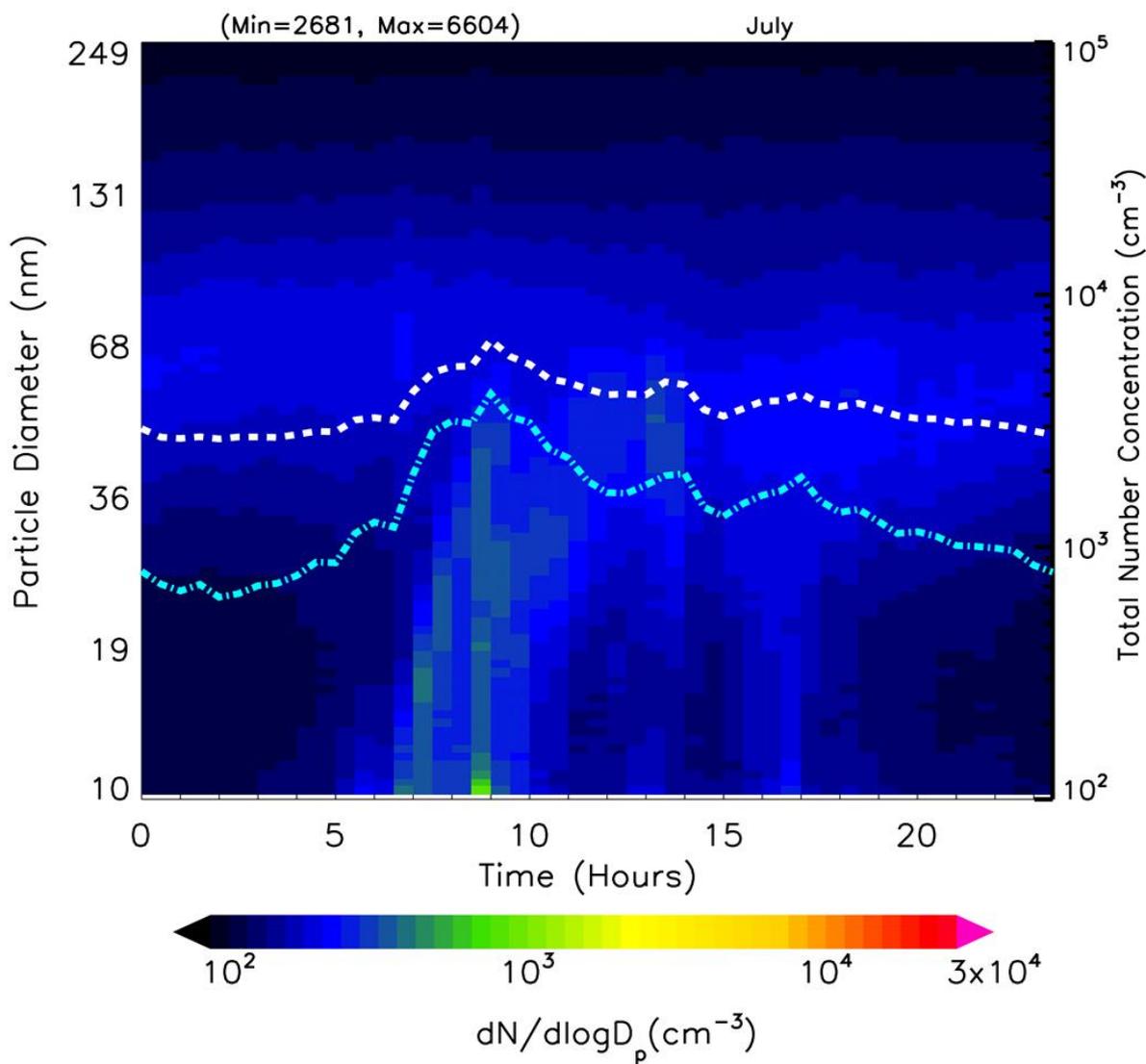


(a)

Figure S7. Cont.

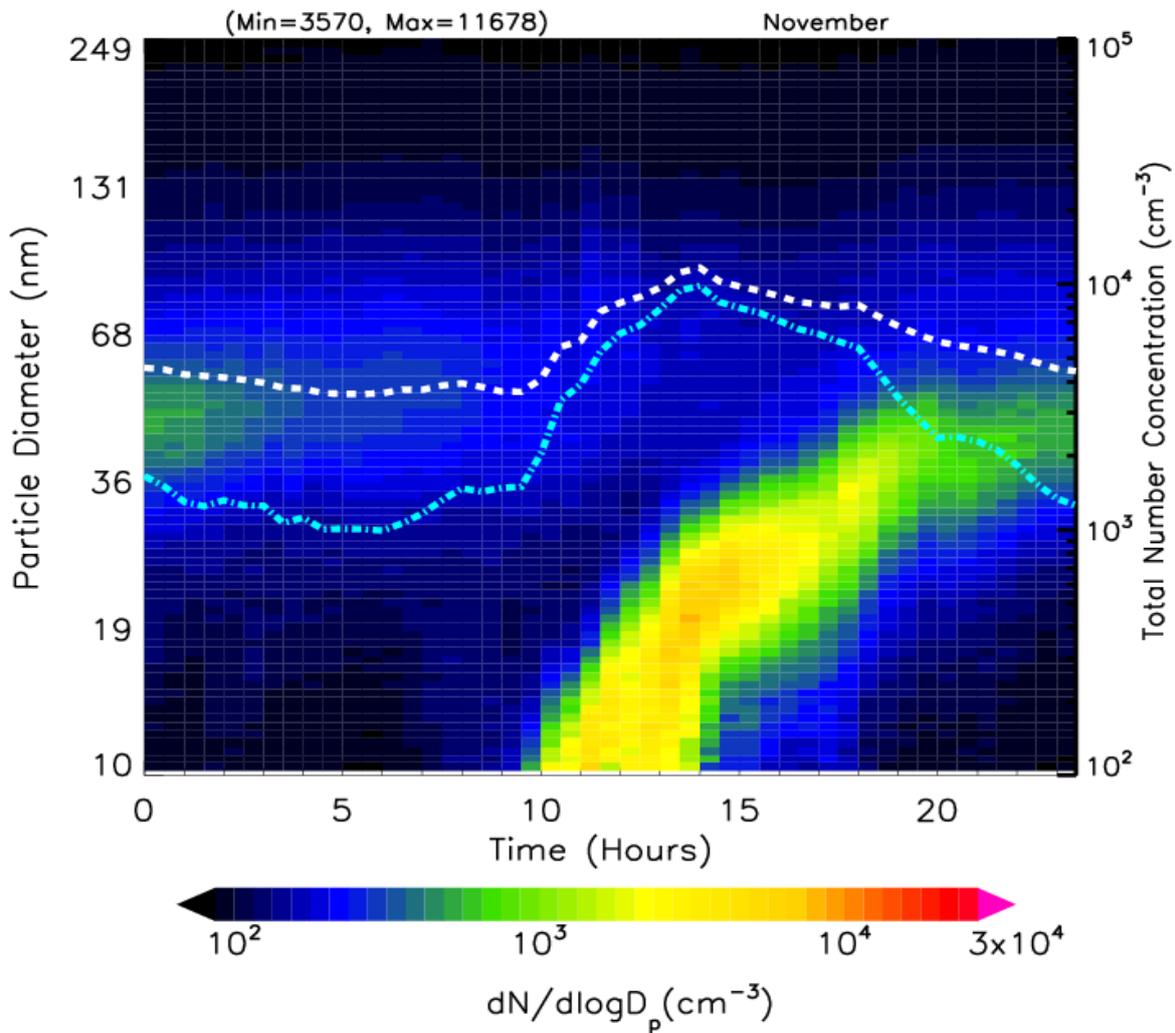


(b)



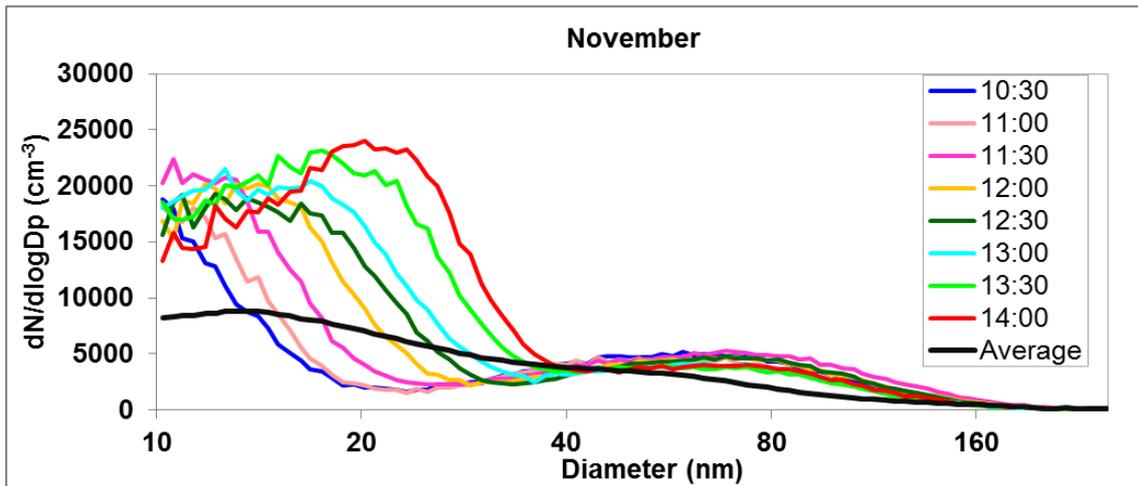
(c)

Figure S8. (a) Monthly mean particle size distribution for November derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-h average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for November. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

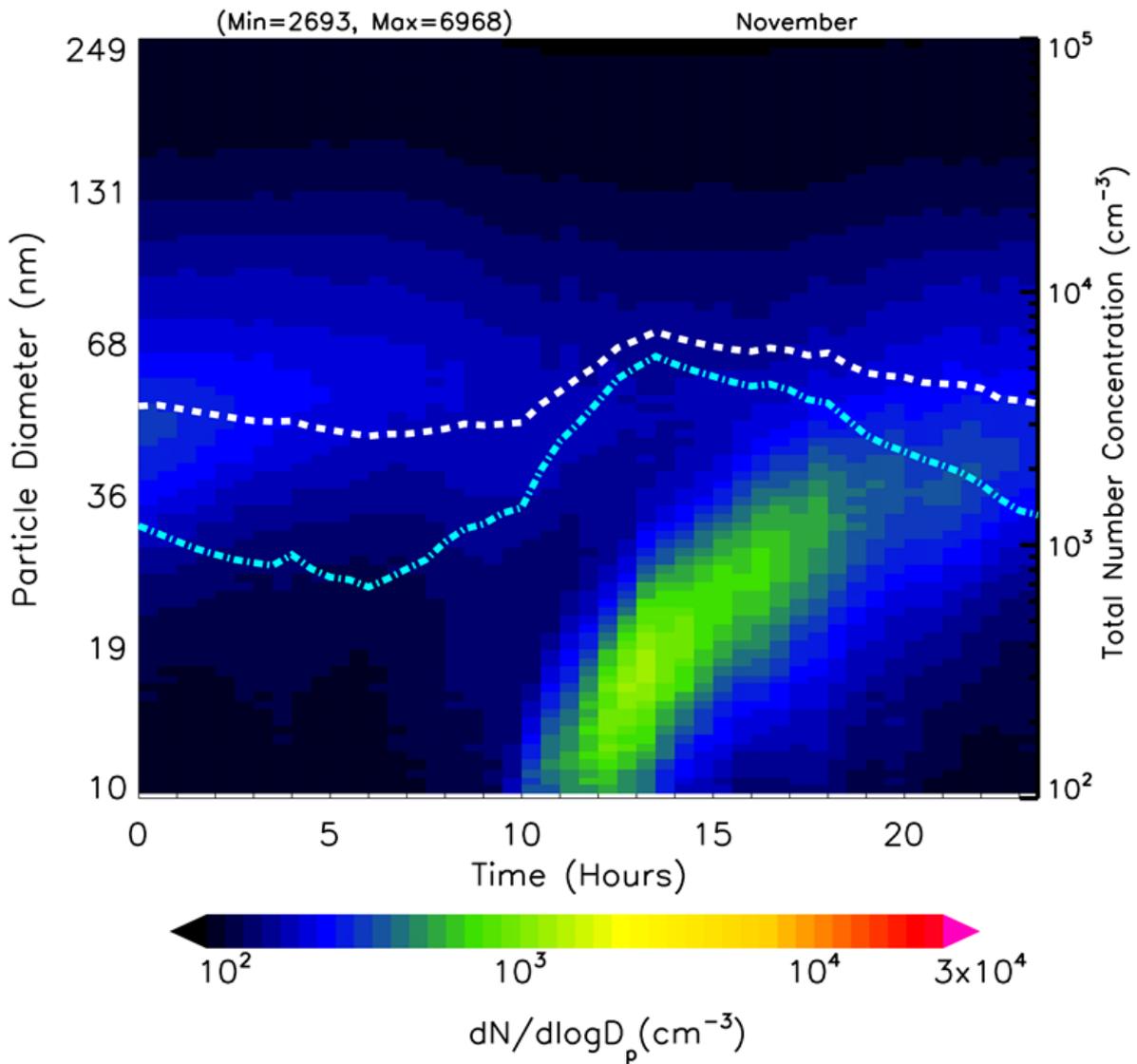


(a)

Figure S8. Cont.

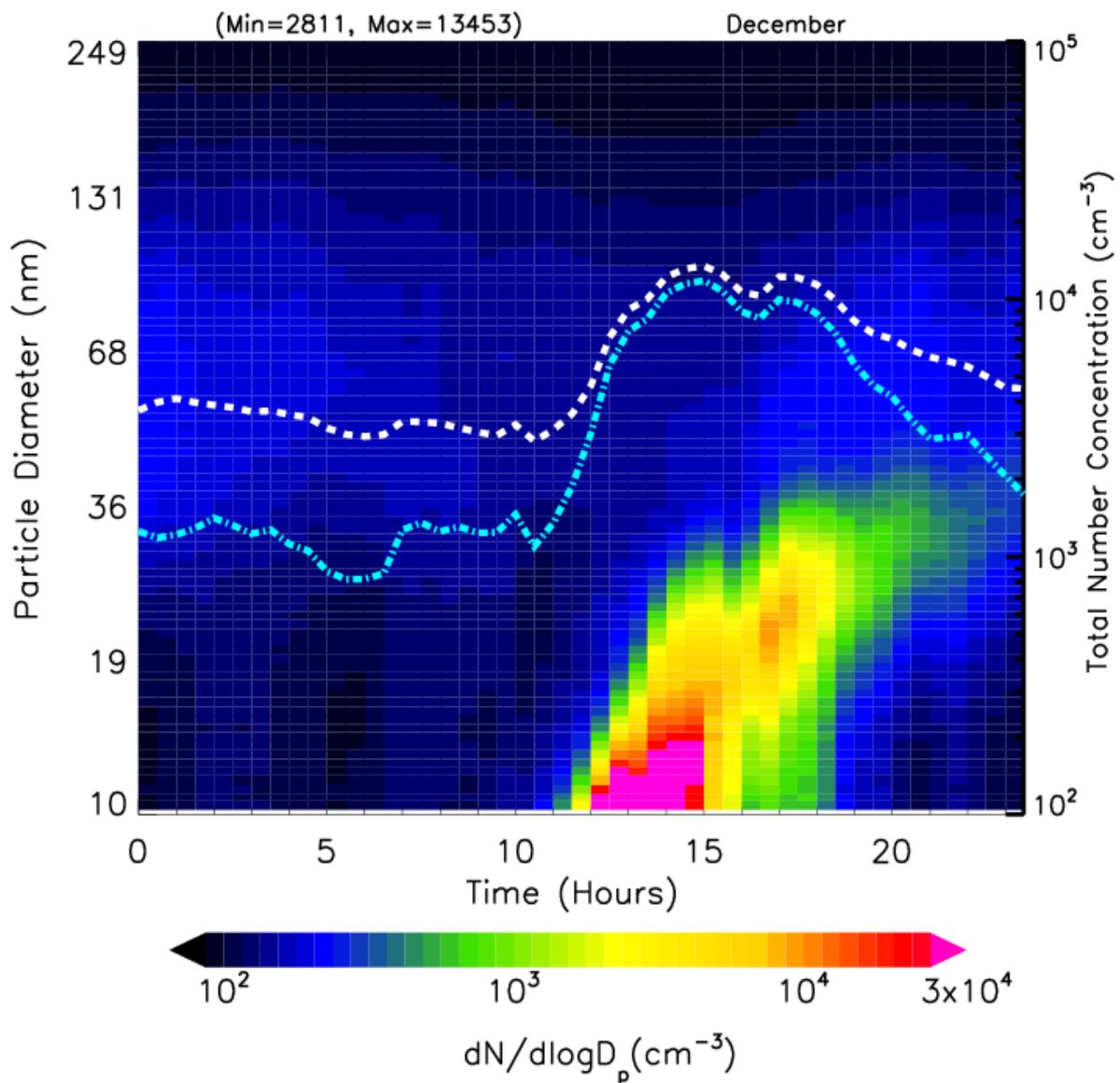


(b)



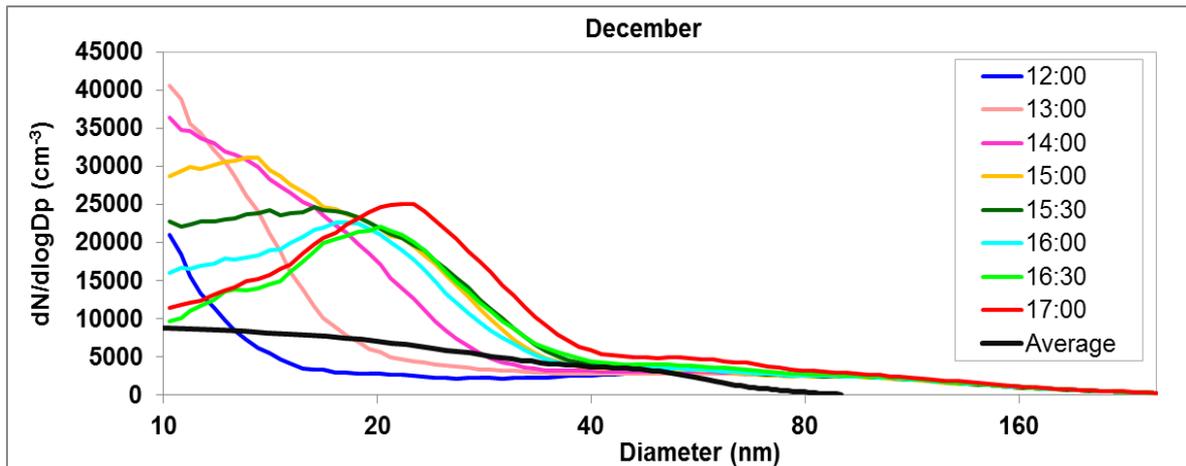
(c)

Figure S9. (a) Monthly mean particle size distribution for December derived only from continuous and uninterrupted nucleation events. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue). (b) Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) as a function of diameter midpoint of each size channel along with the 24-h average size distribution. (c) Monthly mean particle size distribution (nucleation + non-nucleation) for December. Evolution of particle size distribution $dN/d\log D_p$ (cm^{-3}) during the course of the day as a function of diameter midpoint of each size channel during nucleation events is shown with the dotted lines representing total particle number concentration (white) and nucleation mode particle number concentration (blue).

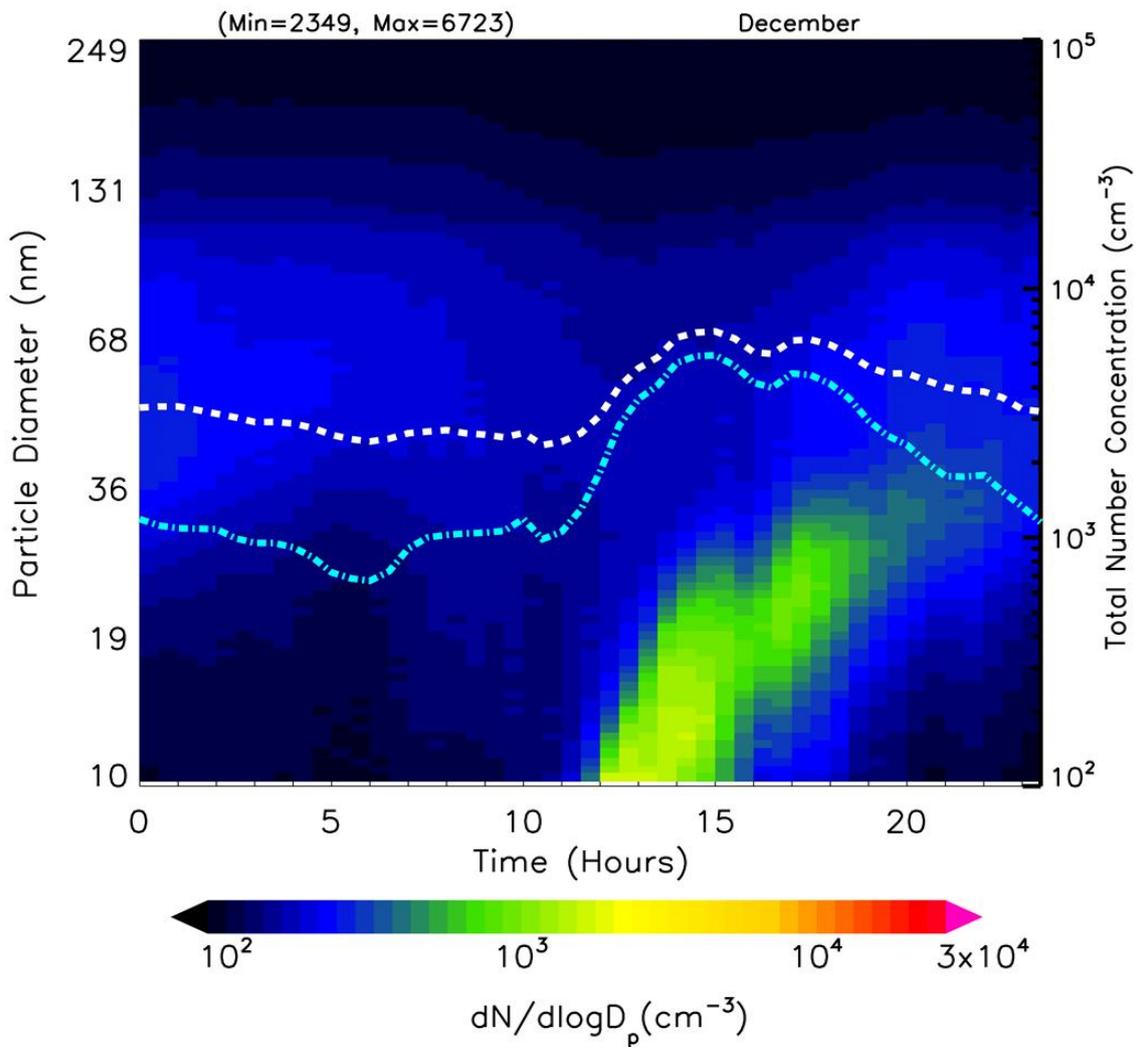


(a)

Figure S9. Cont.



(b)



(c)