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Supporting Information for

Implementation of WRF-Urban Asymmetric Convective Model (UACM) for Simulating Urban Fog over Delhi, India

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Introduction

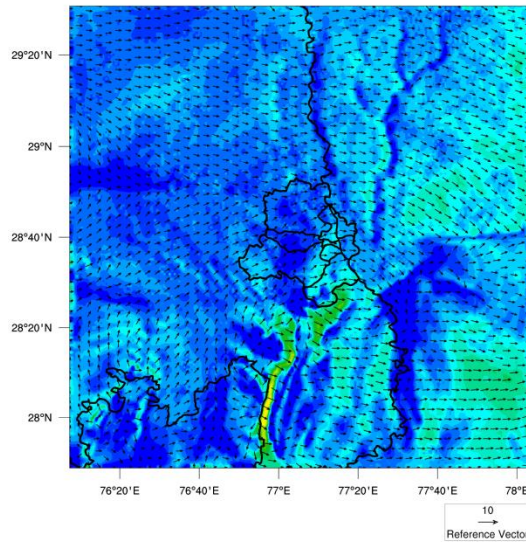
This supporting information includes Figures comprised of spatial contour plots of 10-m wind speed, 2-m temperature, as well as the time-series plots of 10-m wind speed, 2-m temperature, 2-m relative humidity on both the fog event case (29-30 January 2017) and the clear sky case (20-21 December 2016). Time series of shortwave and longwave radiation, soil heat flux, and soil temperature have also been included.

Figures:

10-m Wind Speed Contour Plots on 29-30 Jan 2017 [Fog Event Case]

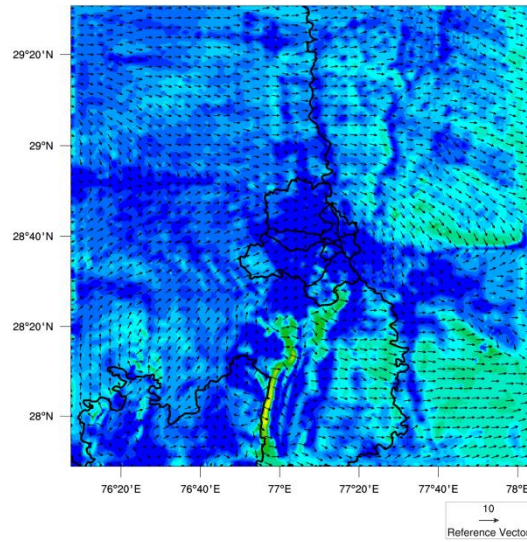
10m-WSPD. BACM 29-JAN-2017 [21:00 IST] 10m-WSPD. UACM 29-JAN-2017 [21:00 IST]

10m-Windspeed (m/s) [BACM] [21:00 IST]
U at 10 M (m s⁻¹)



(a)

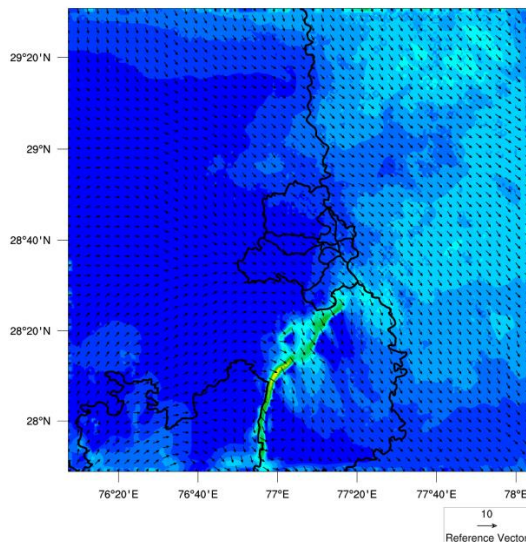
10m-Windspeed (m/s) [UACM] [21:00 IST]
U at 10 M (m s⁻¹)



(b)

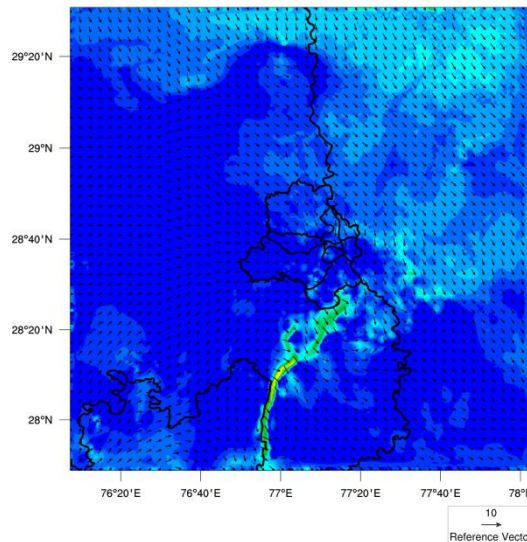
10m-WSPD. BACM 30-JAN-2017 [03:00 IST] 10m-WSPD. UACM 30-JAN-2017 [03:00 IST]

10m-Windspeed (m/s) [BACM] [03:00 IST]
U at 10 M (m s⁻¹)



(c)

10m-Windspeed (m/s) [UACM] [03:00 IST]
U at 10 M (m s⁻¹)

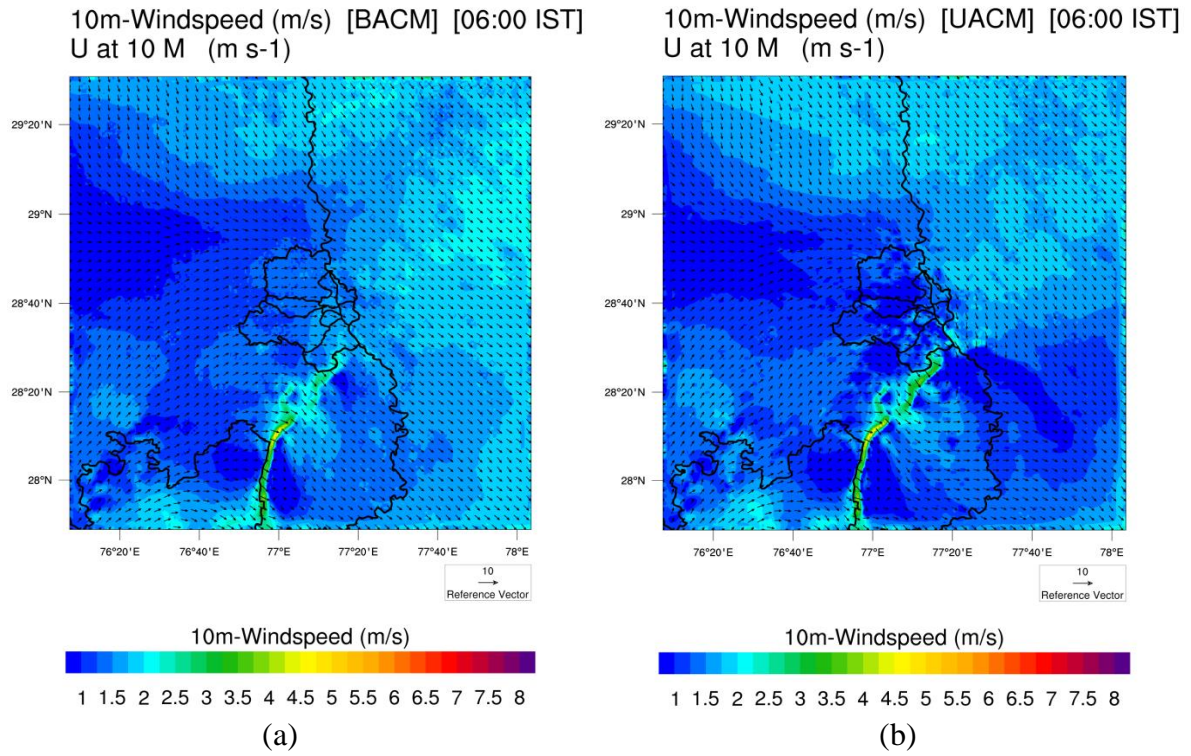


(d)

Figure S1: Contour plots of 10-m wind speed at 21:00 IST for (a) BACM, (b) UACM on 29-Jan-2017; and at 03:00 IST for (c) BACM, (d) UACM on 30-Jan-2017 [Fog Event Case].

10-m Wind Speed Contour Plots on 29-30 Jan 2017 [Fog Event Case]

10m-WSPD. BACM 30-JAN-2017 [06:00 IST] 10m-WSPD. UACM 30-JAN-2017 [06:00 IST]



10m-WSPD. BACM 30-JAN-2017 [09:00 IST] 10m-WSPD. UACM 30-JAN-2017 [09:00 IST]

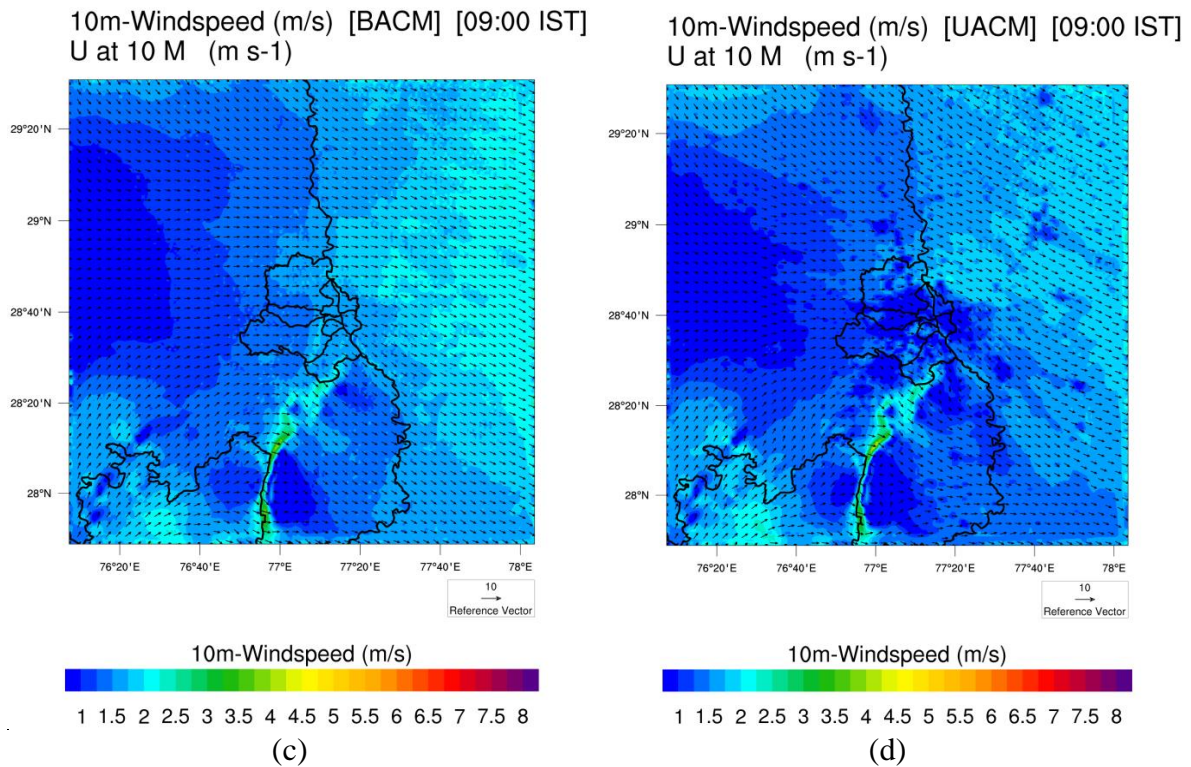
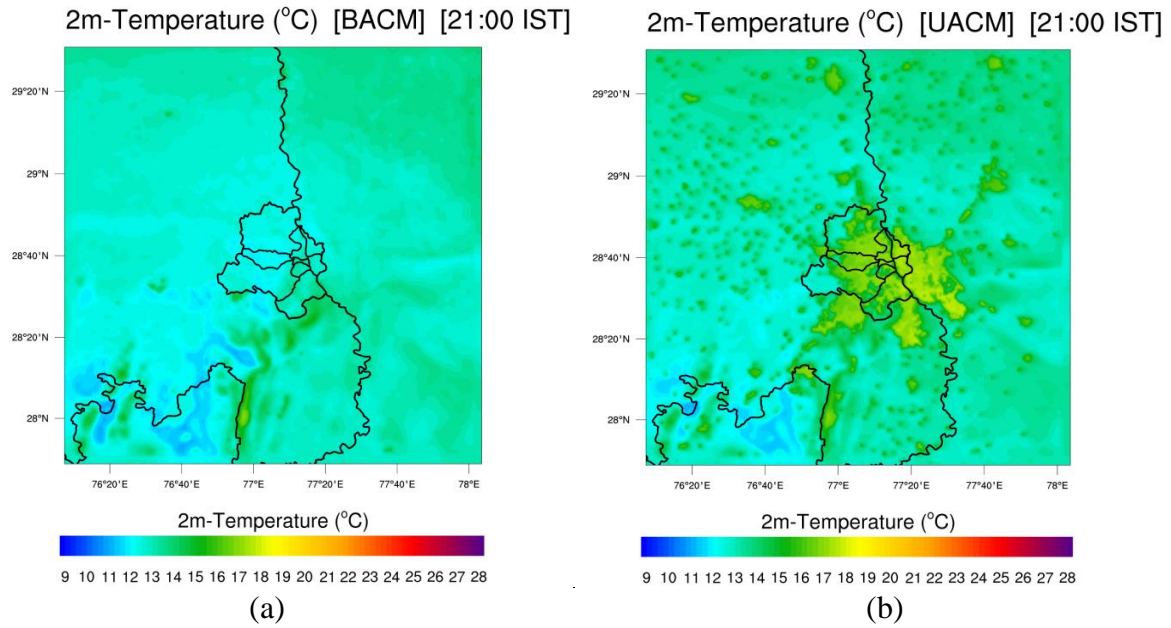


Figure S2: Contour plots of 10-m wind speed at 06:00 IST for (a) BACM, (b) UACM; and at 09:00 IST for (c) BACM, (d) UACM on 30-Jan-2017 [Fog Event Case].

2-m Temperature Contour Plots on 29-30 Jan 2017 [Fog Event Case]

2m-TEMP. BACM 29-JAN-2017 [21:00 IST] 2m-TEMP. UACM 29-JAN-2017 [21:00 IST]



2m-TEMP. BACM 30-JAN-2017 [03:00 IST] 2m-TEMP. UACM 30-JAN-2017 [03:00 IST]

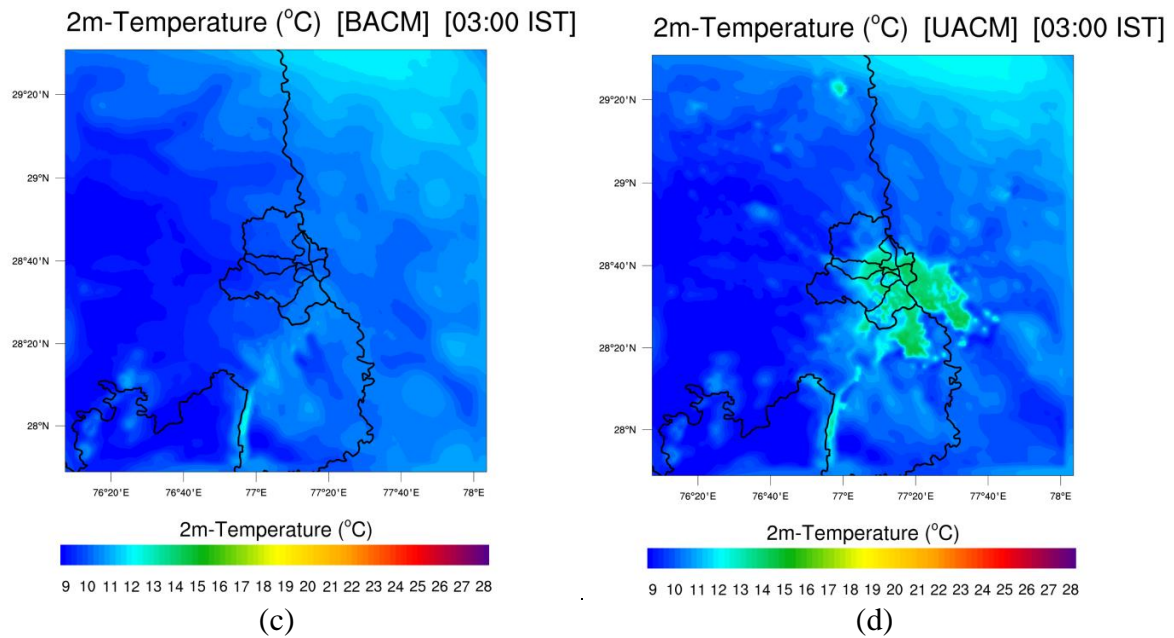
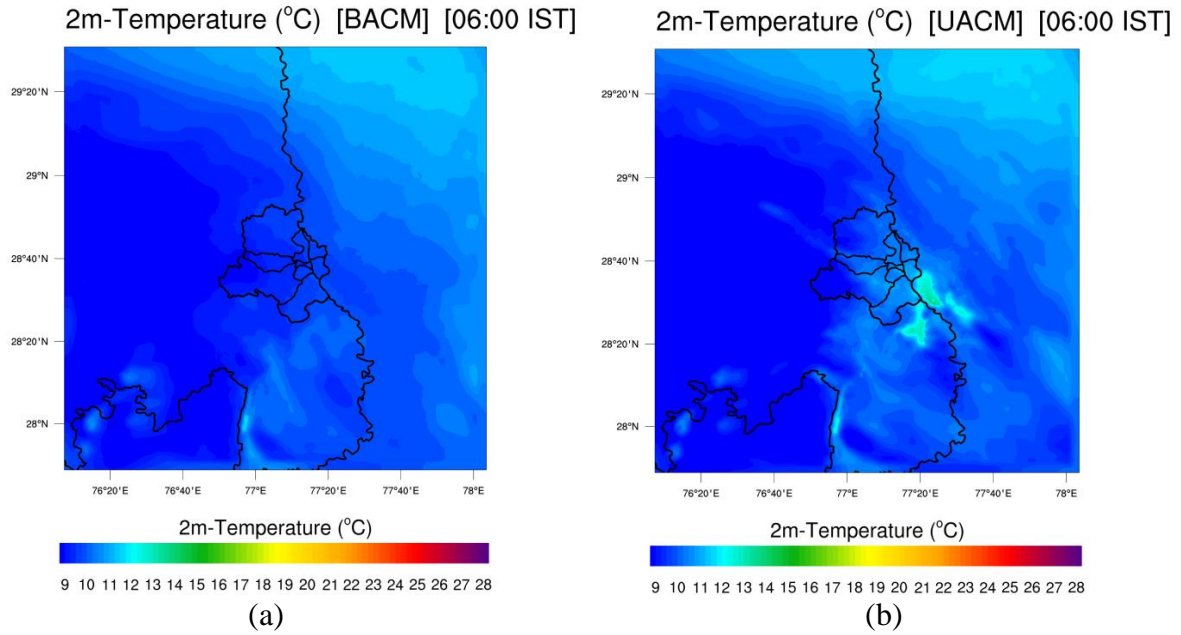


Figure S3: Contour plots of 2-m temperature at 21:00 IST for (a) BACM, (b) UACM on 29-Jan-2017; and at 03:00 IST for (c) BACM, (d) UACM on 30-Jan-2017 [Fog Event Case].

2-m Temperature Contour Plots on 29-30 Jan 2017 [Fog Event Case]

2m-TEMP. BACM 30-JAN-2017 [06:00 IST] 2m-TEMP. UACM 30-JAN-2017 [06:00 IST]



2m-TEMP. BACM 30-JAN-2017 [09:00 IST] 2m-TEMP. UACM 30-JAN-2017 [09:00 IST]

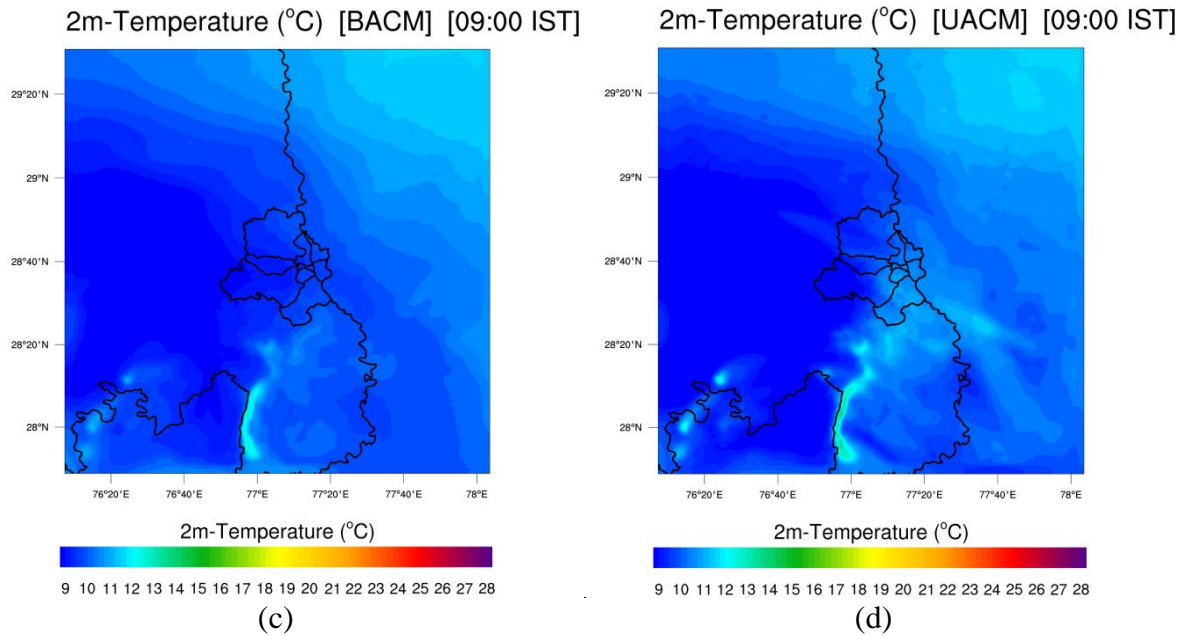
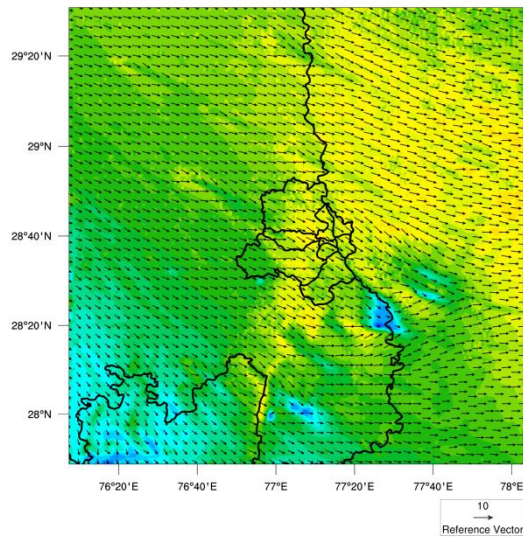


Figure S4: Contour plots of 2-m temperature at 06:00 IST for (a) BACM, (b) UACM; and at 09:00 IST for (c) BACM, (d) UACM on 30-Jan-2017 [Fog Event Case].

10-m Wind Speed Contour Plots on 29-30 Jan 2017 [Fog Event Case]

10m-WSPD. BACM 29-JAN-2017 [14:00 IST] 10m-WSPD. UACM 29-JAN-2017 [14:00 IST]

10m-Windspeed (m/s) [BACM] [14:00 IST]
U at 10 M (m s⁻¹)

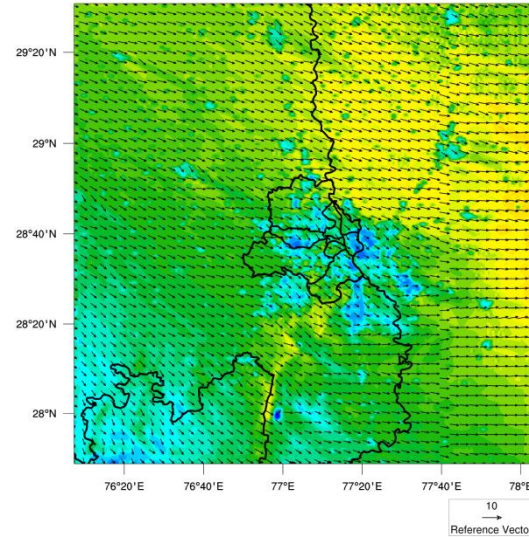


10m-Windspeed (m/s)

1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8

(a)

10m-Windspeed (m/s) [UACM] [14:00 IST]
U at 10 M (m s⁻¹)



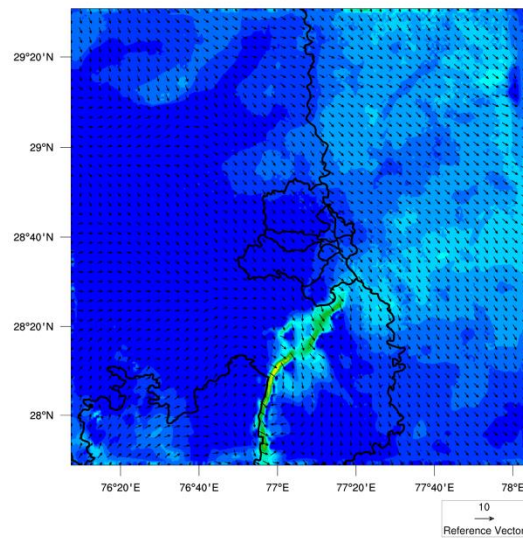
10m-Windspeed (m/s)

1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8

(b)

10m-WSPD. BACM 30-JAN-2017 [02:00 IST] 10m-WSPD. UACM 30-JAN-2017 [02:00 IST]

10m-Windspeed (m/s) [BACM] [02:00 IST]
U at 10 M (m s⁻¹)

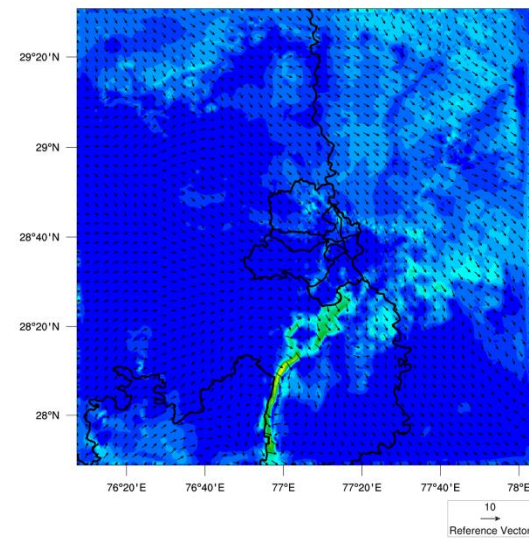


10m-Windspeed (m/s)

1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8

(c)

10m-Windspeed (m/s) [UACM] [02:00 IST]
U at 10 M (m s⁻¹)



10m-Windspeed (m/s)

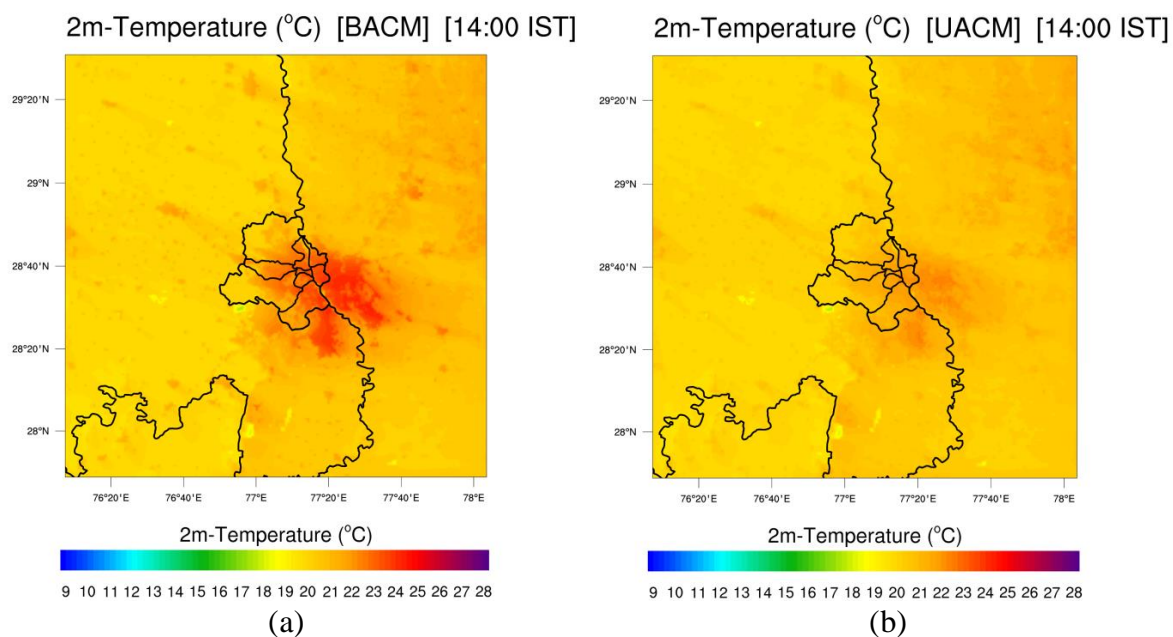
1 1.5 2 2.5 3 3.5 4 4.5 5 5.5 6 6.5 7 7.5 8

(d)

Figure S5: Contour plots of 10-m wind speed at 14:00 IST for (a) BACM, (b) UACM on 29-Jan-2017; and at 02:00 IST for (c) BACM, (d) UACM on 30-Jan-2017 [Fog Event Case].

2-m Temperature Contour Plots on 29-30 Jan 2017 [Fog Event Case]

2m-TEMP. BACM 29-JAN-2017 [14:00 IST] 2m-TEMP. UACM 29-JAN-2017 [14:00 IST]



2m-TEMP. BACM 30-JAN-2017 [02:00 IST] 2m-TEMP. UACM 30-JAN-2017 [02:00 IST]

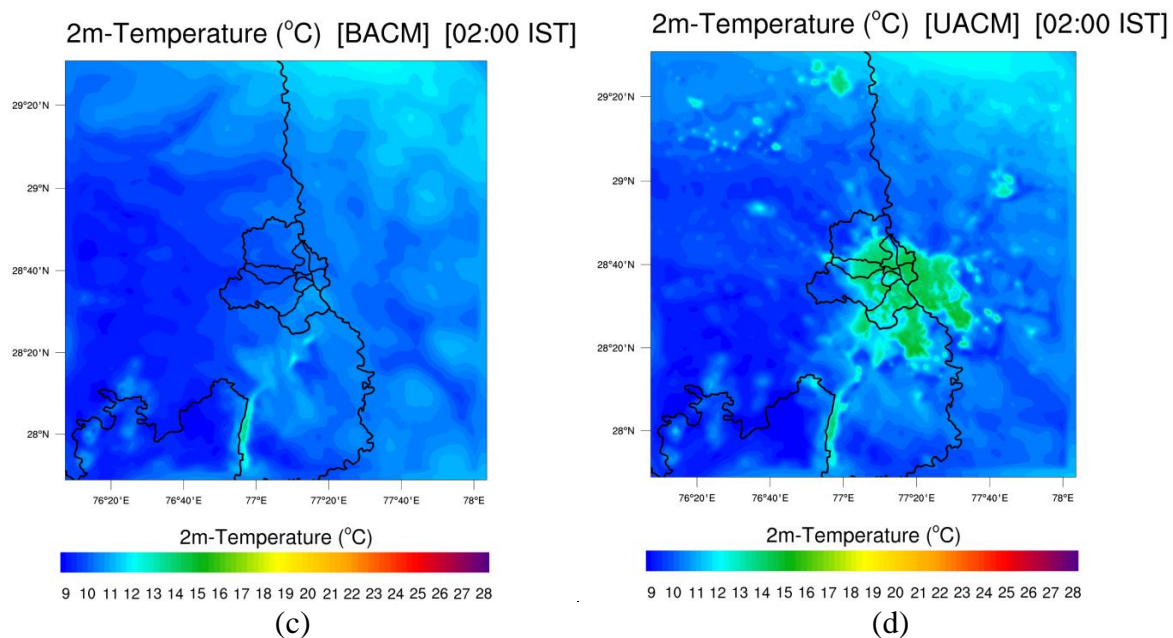
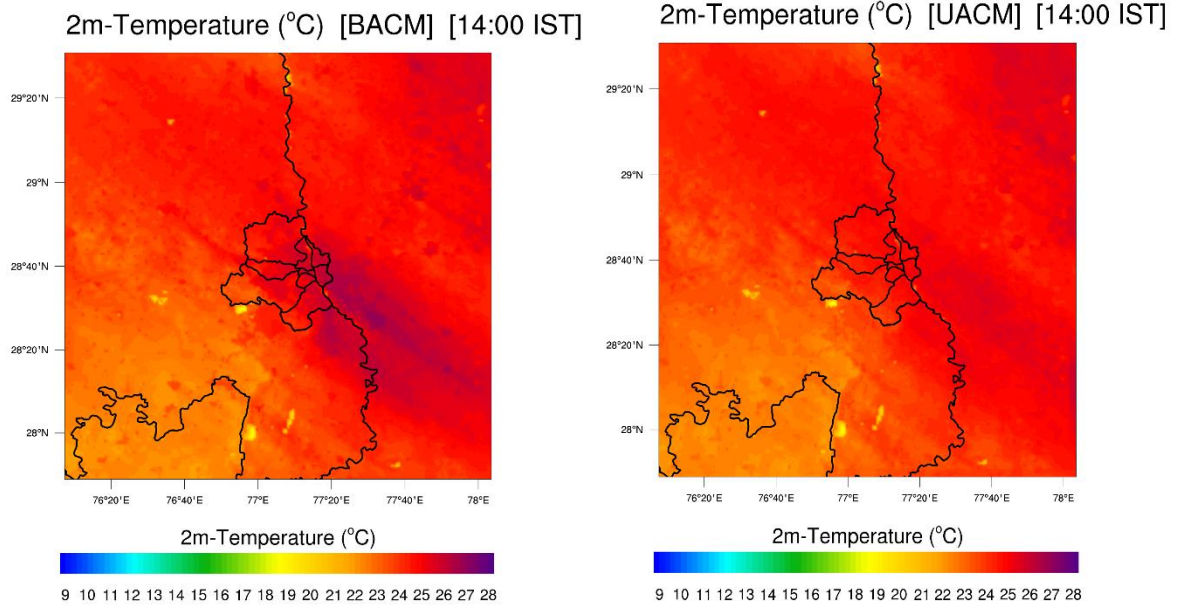


Figure S6: Contour plots of 2-m temperature at 14:00 IST for (a) BACM, (b) UACM on 29-Jan-2017; and at 02:00 IST for (c) BACM, (d) UACM on 30-Jan-2017 [Fog Event Case].

2-m Temperature Contour Plots on 20-21 Dec 2016 [Clear Sky Case]

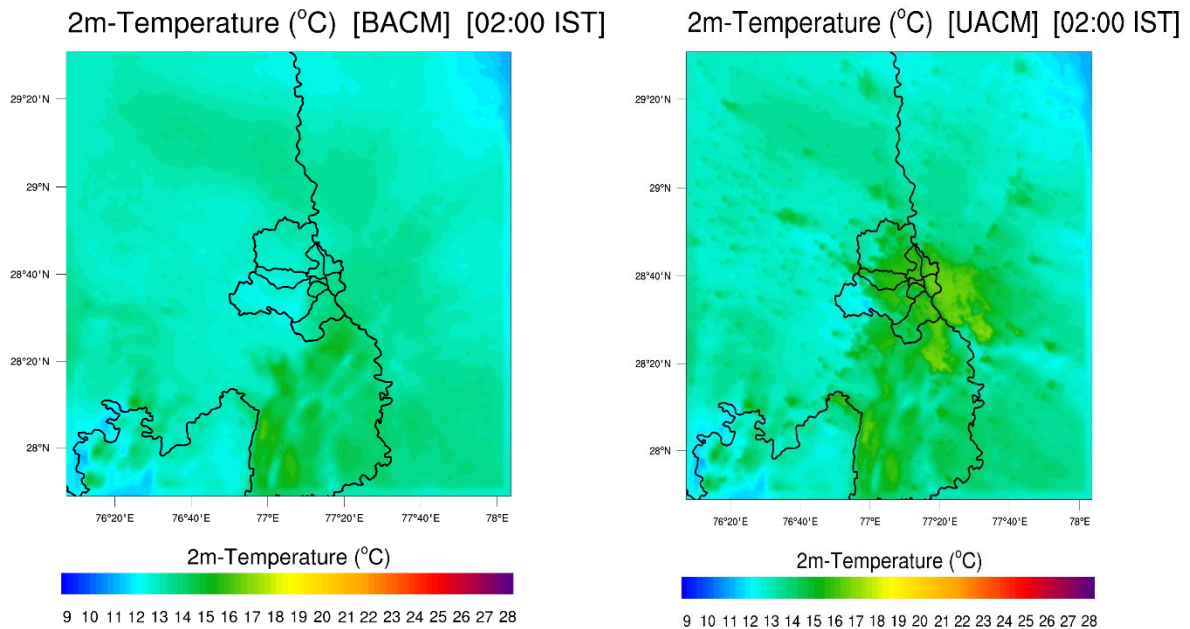
2m-TEMP. BACM 20-DEC-2016 [14:00 IST] 2m-TEMP. UACM 20-DEC-2016 [14:00 IST]



(a)

(b)

2m-TEMP. BACM 21-DEC-2016 [02:00 IST] 2m-TEMP. UACM 21-DEC-2016 [02:00 IST]



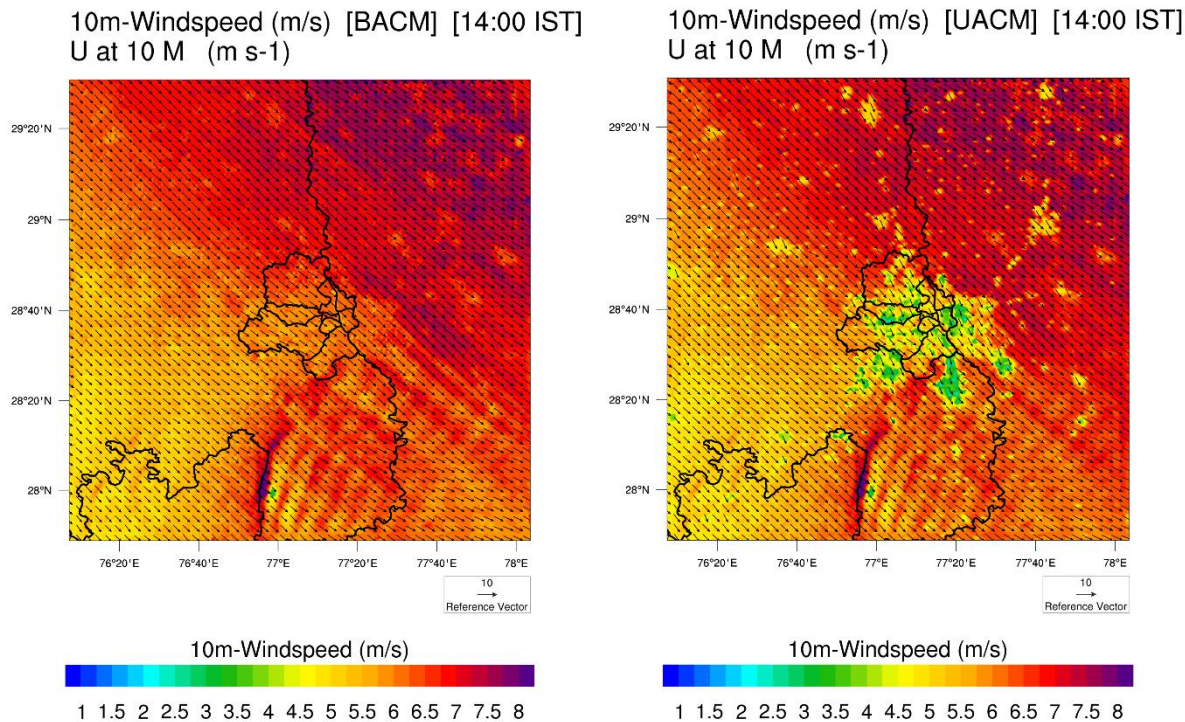
(c)

(d)

Figure S7: Contour plots of 2-m temperature at 14:00 IST for (a) BACM, (b) UACM on 20-Dec-2016; and at 02:00 IST for (c) BACM, (d) UACM on 21-Dec-2016 [Clear Sky Case].

10-m Wind Speed Contour Plots on 20-21 Dec 2016 [Clear Sky Case]

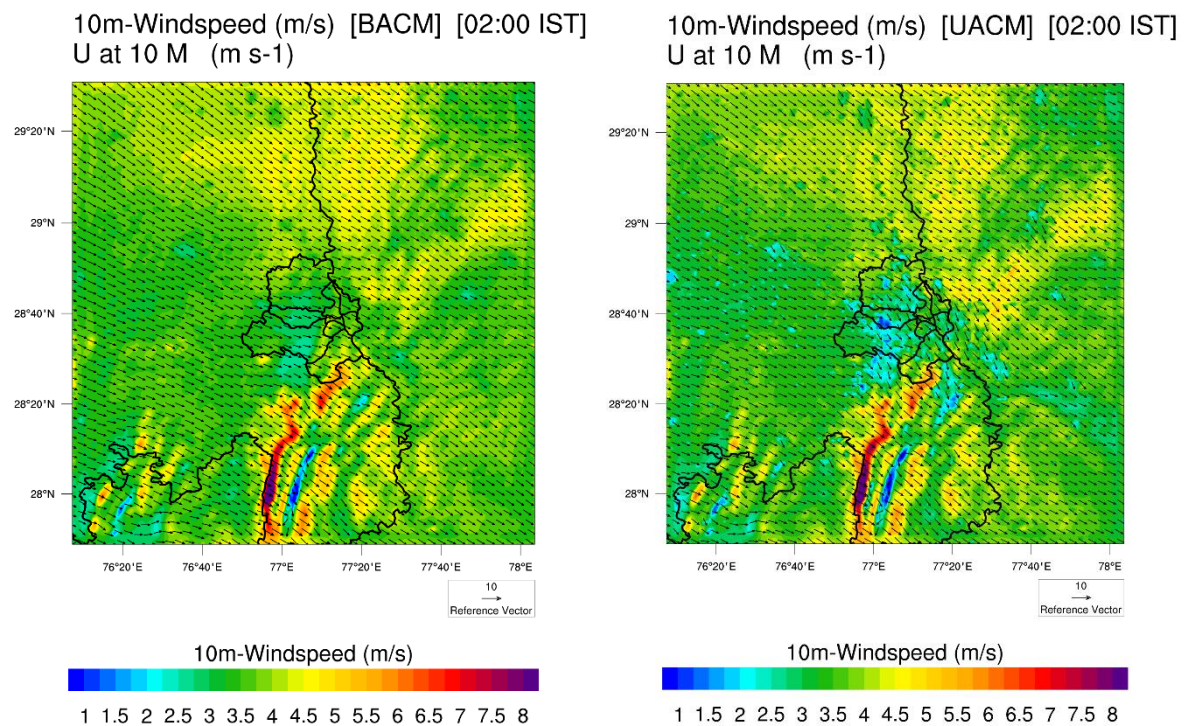
10m-WSPD. BACM 20-DEC-2016 [14:00 IST] 10m-WSPD. UACM 20-DEC-2016 [14:00 IST]



(a)

(b)

10m-WSPD. BACM 21-DEC-2016 [02:00 IST] 10m-WSPD. UACM 21-DEC-2016 [02:00 IST]

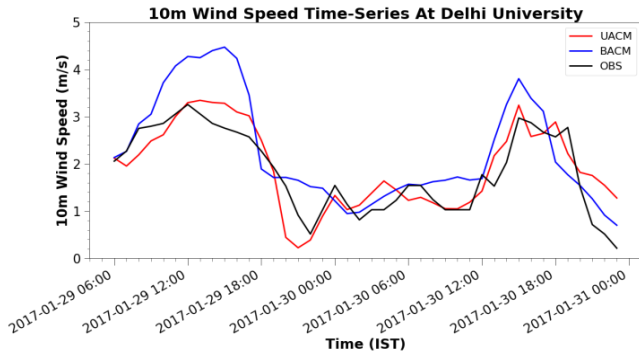


(c)

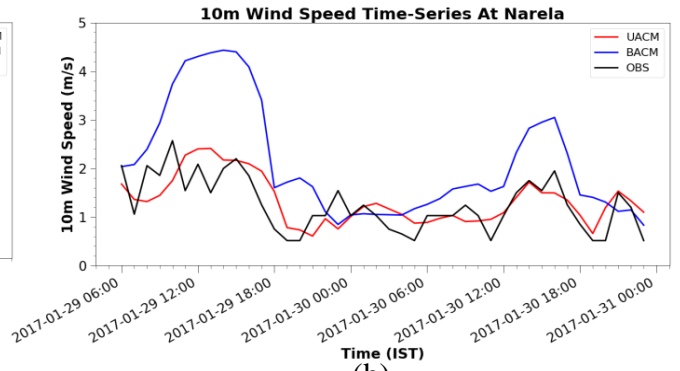
(d)

Figure S8: Contour plots of 10-m wind speed at 14:00 IST for (a) BACM, (b) UACM on 20-Dec-2016; and at 02:00 IST for (c) BACM, (d) UACM on 21-Dec-2016 [Clear Sky Case].

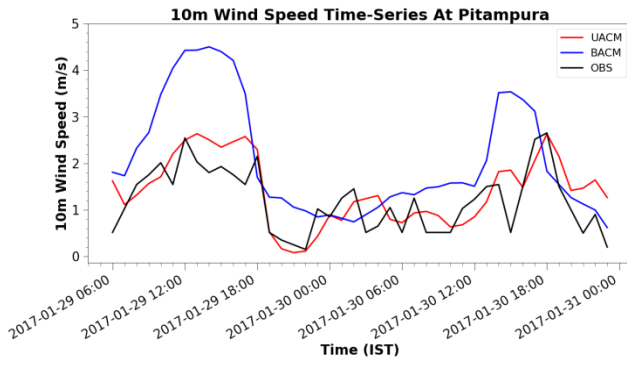
10-m Wind Speed Time-Series Plots



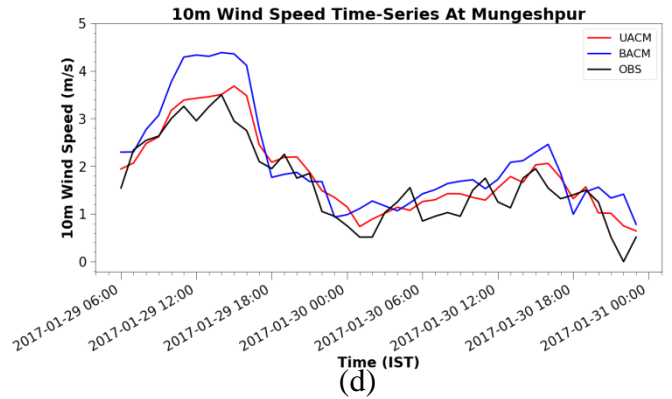
(a)



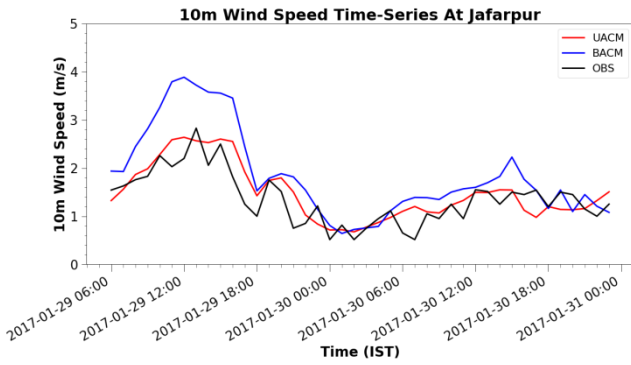
(b)



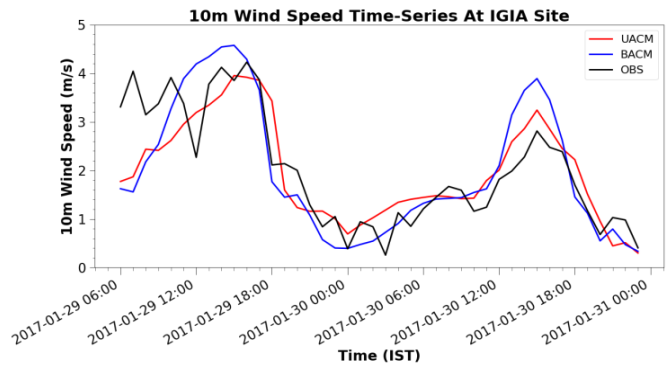
(c)



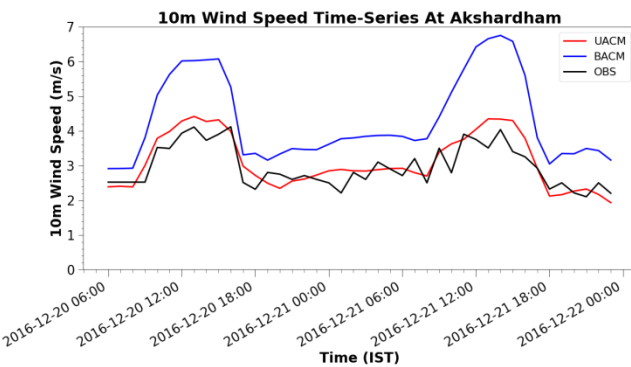
(d)



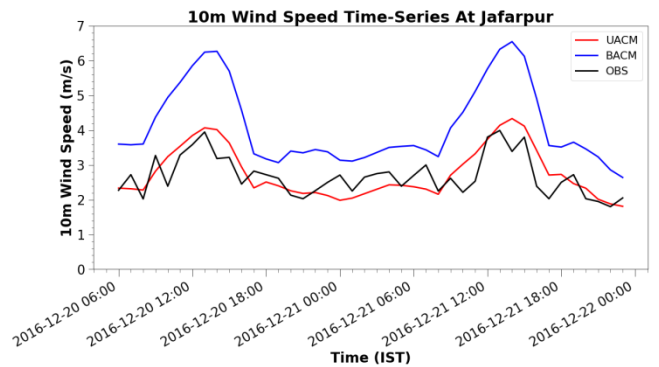
(e)



(f)



(g)



(h)

Figure S9: Time-series plots of 10-m wind speed at (a) Delhi University, (b) Narela, (c) Pitampura, (d) Mungeshpur, (e) Jafarpur, (f) IGIA Site station for the Fog Event Case; and at (g) Akshardham, (h) Jafarpur for the Clear Sky Case.

2-m Temperature Time-Series Plots

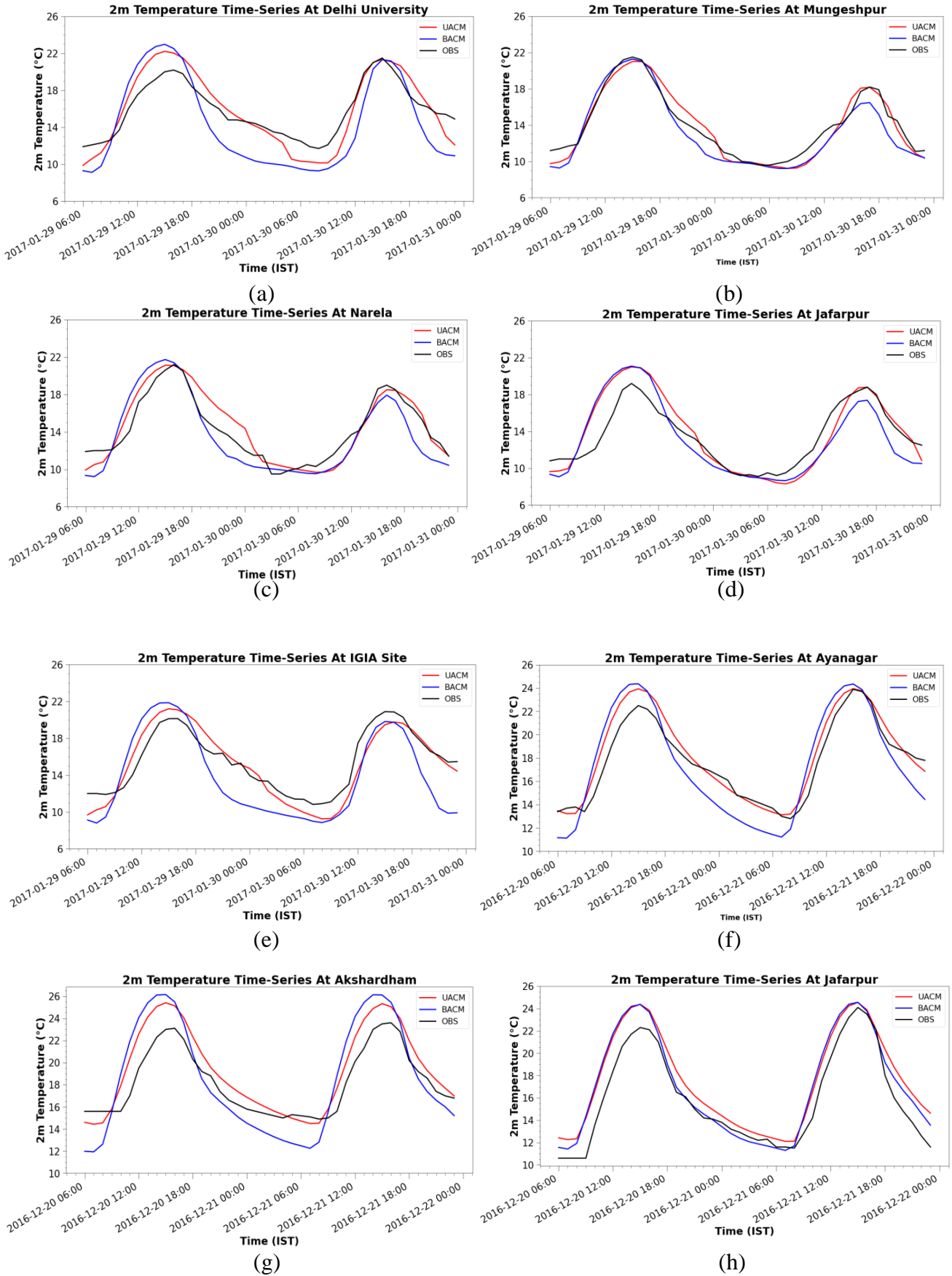


Figure S10: Time-series plots of 2-m temperature at (a) Delhi University, (b) Mungeshpur, (c) Narela, (d) Jafarpur station, (e) IGIA Site for the Fog Event Case, and at (f) Ayanagar, (g) Akshardham, (h) Jafarpur station for the Clear Sky Case.

2-m Relative Humidity Time-Series Plots

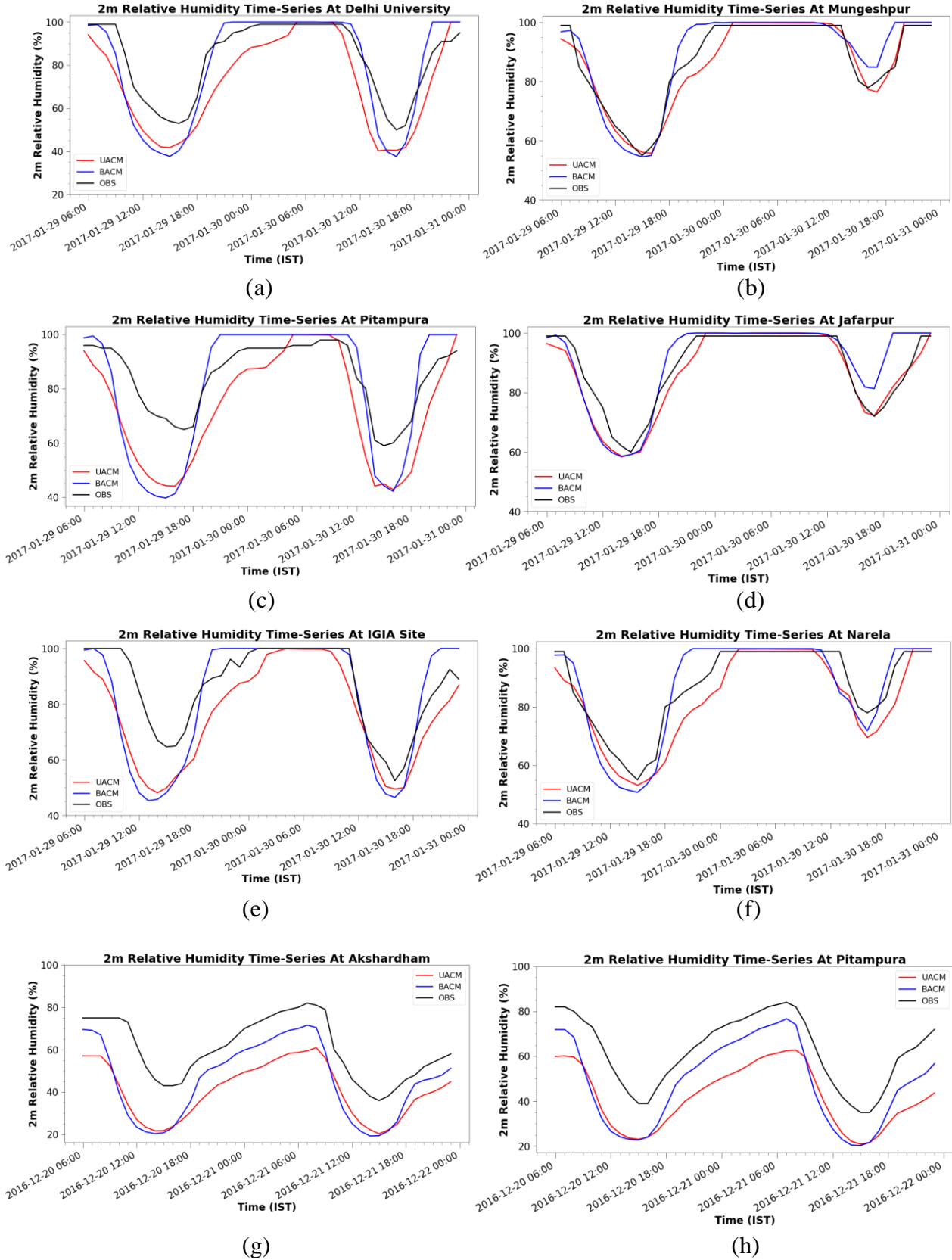


Figure S11: Time-series plots of 2-m relative humidity at (a) Delhi University, (b) Mungeshpur, (c) Pitampura, (d) Jafarpur, (e) IGIA Site, (f) Narela station for the Fog Event Case; and at (g) Akshardham, (h) Pitampura station for the Clear Sky Case.

SW, LW -Radiation, Soil- Heat Flux, Temperature Time-Series Plots

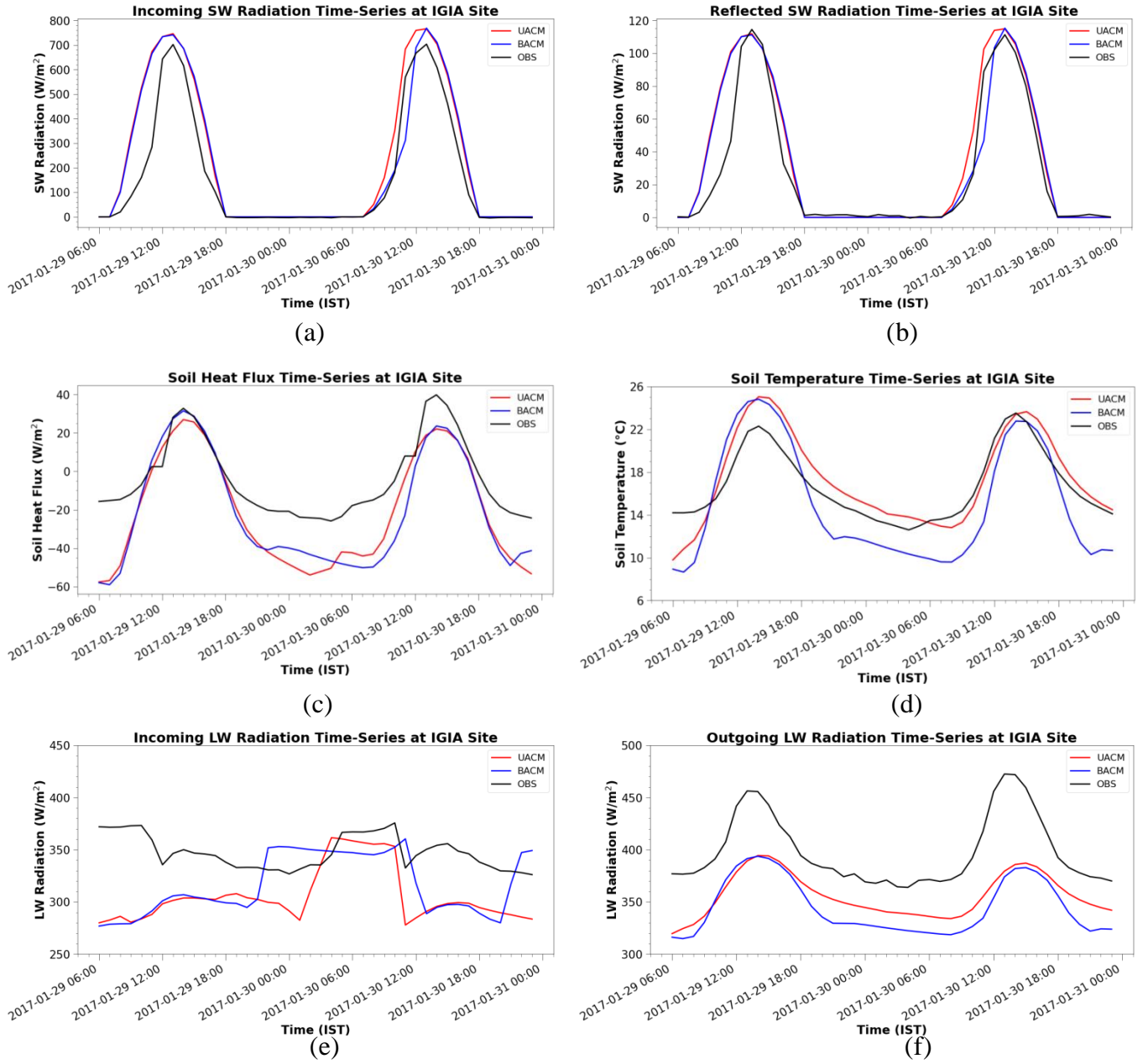


Figure S12: Time-series plots of (a) incoming shortwave radiation, (b) reflected shortwave radiation, (c) soil heat flux, (d) soil temperature, (e) incoming longwave radiation, (f) outgoing longwave radiation for the Fog Event Case.