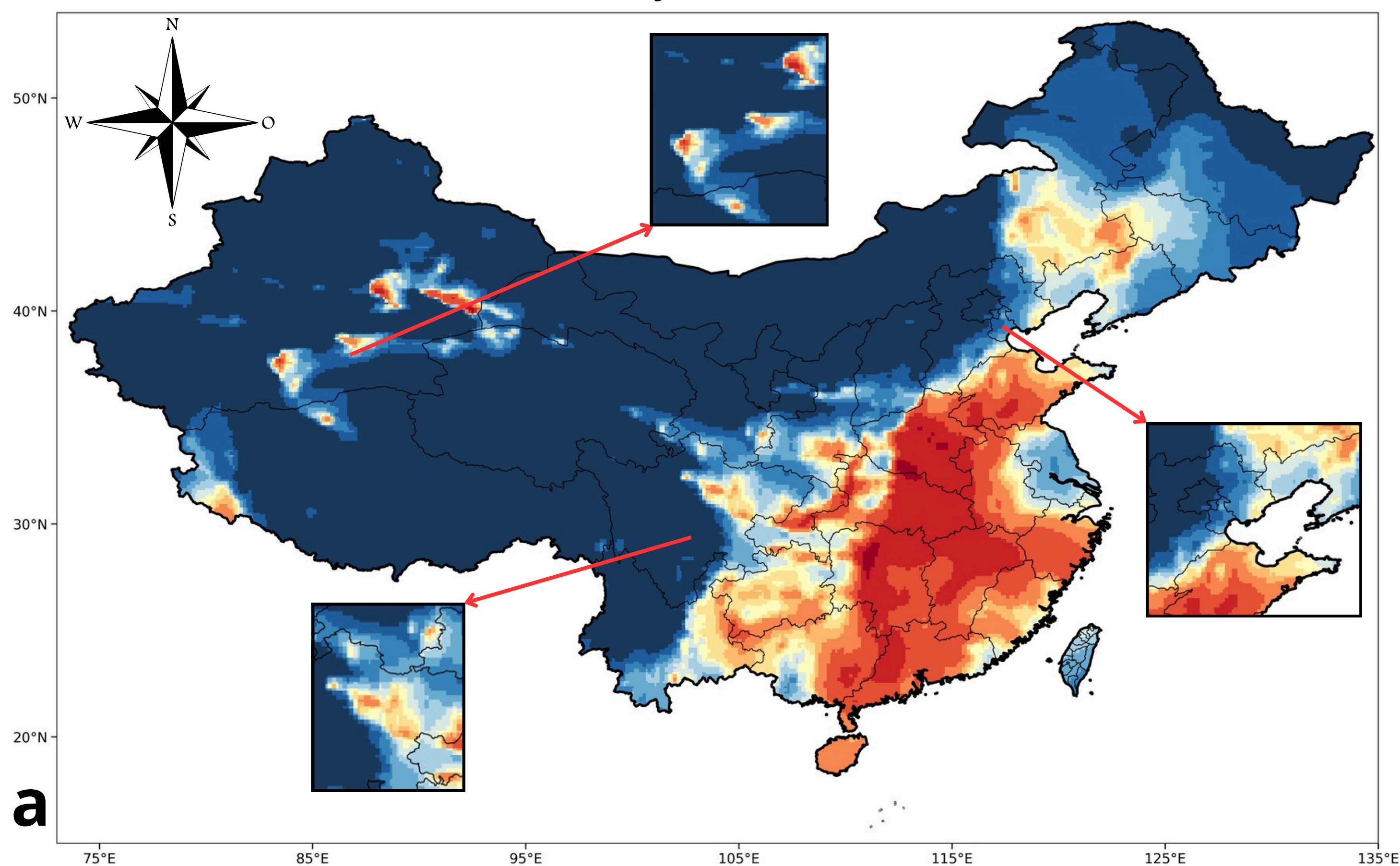**Ground truth (CAQRA reanalysis): Ground-based PM$_{2.5}$ observations**

TopoFlow PM$_{2.5}$ predictions

a

b

PM$_{2.5}$

0   16   32   48   64   100   250

Prediction Error Variance Distribution

- TopoFlow
- ClimaX
- AirCast

MAE (μg/m³)

20.0

17.5

15.0

12.5

10.0

7.5

5.0

2.5

3.6	4.6	5.1
3.7	4.8	5.3
4.1	5.2	5.7
4.6	5.9	6.5

12h   24h   48h   96h

Lead Time

c

Sichuan Region - TopoFlow Bias
Blue: Underestimate | Red: Overestimate

Chengdu

500 m

4000 m

Latitude (°N)

34°N

32°N

30°N

28°N

26°N

96°E   98°E   100°E   102°E   104°E   106°E   108°E   110°E

Longitude (°E)

10.0

7.5

5.0

2.5

0.0

-2.5

-5.0

-7.5

-10.0

d