# Contribution of marine biological emissions to gaseous methylamines in the atmosphere: an emission inventory based on satellite data

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Supplementary Information

Contains 12 pages, 3 tables, 8 figures

33  In this study, Bias, MAE (Mean Absolute Error), and R (Correlation coefficien) were used to evaluate

34  the deviation between observed value and simulated value.

35  The January and April observations are from the China Meteorological Data Network

36  (http://data.cma.cn), which includes 659 meteorological stations in 28 provincial-level administrative

37  regions in eastern China (excluding Beijing, Xinjiang and Tibet). The July and October observations

38  are from NCDC (National Climatic Data Center, ftp://ftp.ncdc.noaa.gov/pub/data/noaa/isd-lite/).

39  Contains 396 sites within the simulation range.

40  Table S1 Comparison of meteorological element model simulation results and observations

|  |  | Observation | Simulation | Bias | MAE | R |
|---|---|---|---|---|---|---|
| Wind Speed (m s$^{-1}$) | Jan. | 4.00 | 4.11 | 0.11 | 3.91 | 0.68 |
|  | Apr. | 4.21 | 4.56 | 0.35 | 3.41 | 0.68 |
|  | Jun. | 2.50 | 3.70 | 1.20 | 1.60 | 0.39 |
|  | Oct. | 2.40 | 3.70 | 1.30 | 1.60 | 0.57 |
| Temperature (℃) | Jan. | 2.50 | 1.63 | -0.86 | 1.48 | 0.89 |
|  | Apr. | 13.24 | 11.39 | -1.85 | 2.46 | 0.81 |
|  | Jun. | 24.50 | 23.40 | -1.10 | 2.20 | 0.89 |
|  | Oct. | 14.50 | 13.20 | -1.30 | 2.20 | 0.92 |
| Relative Humidity (%) | Jan. | 71.64 | 59.71 | -11.93 | 18.34 | 0.73 |
|  | Apr. | 63.19 | 61.18 | -2.01 | 12.07 | 0.84 |

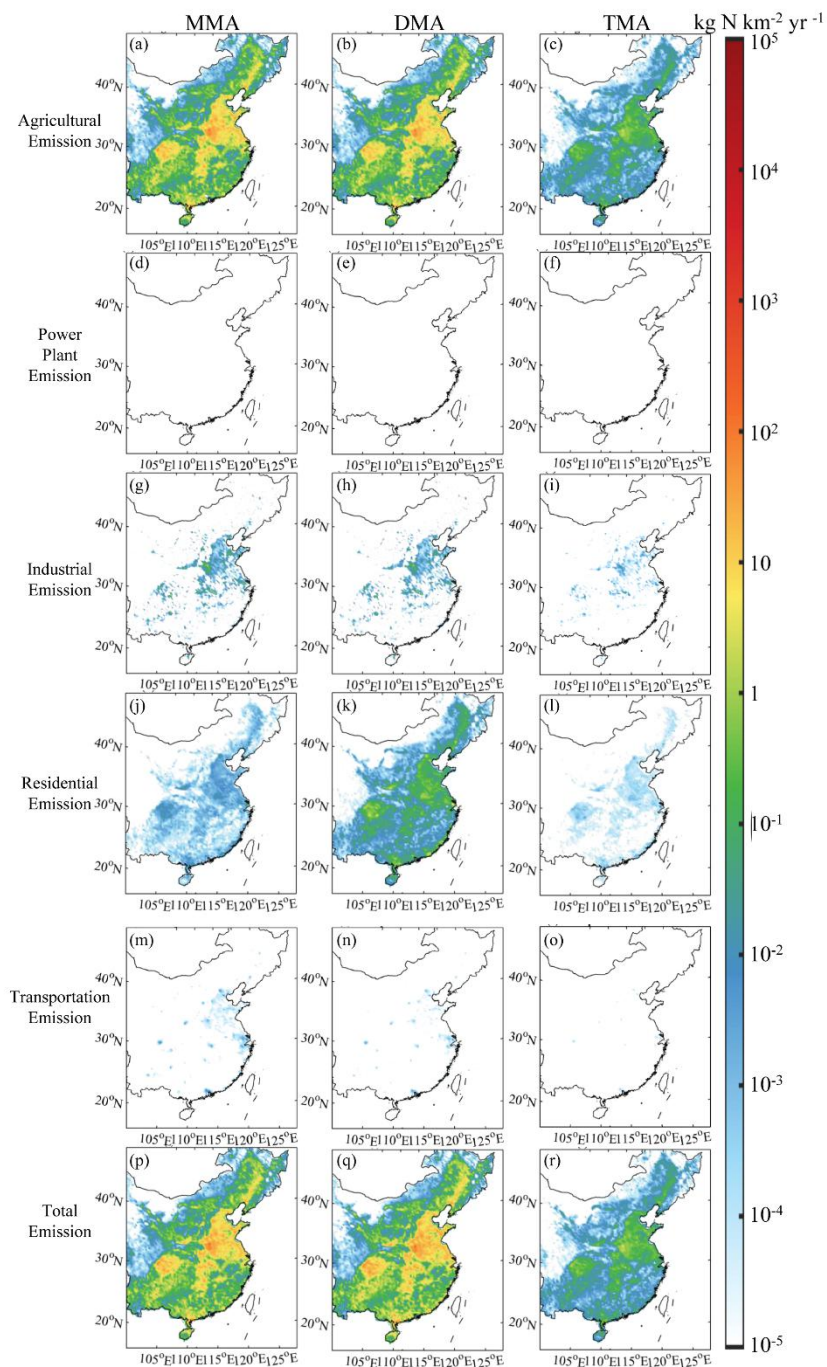
41 Table S2 Ratio of various types of emission sources in January, April, July and October.

|  | Jan. | | | Apr. | | | Jul. | | | Oct. | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | MMA | DMA | TMA | MMA | DMA | TMA | MMA | DMA | TMA | MMA | DMA | TMA |
| Agricultural | 86.8 | 60.2 | 84.8 | 93.2 | 82.6 | 92.9 | 94.6 | 86.2 | 94.4 | 91.5 | 78.9 | 91.1 |
| Industrial | 4.8 | 2.9 | 4.0 | 4.1 | 3.2 | 3.5 | 3.2 | 2.6 | 2.7 | 5.1 | 3.8 | 4.3 |
| Power Plant | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Residential | 7.9 | 36.5 | 10.8 | 2.4 | 14.0 | 3.3 | 1.8 | 11.0 | 2.5 | 3.0 | 17.0 | 4.1 |
| Transportation | 0.5 | 0.2 | 0.5 | 0.4 | 0.2 | 0.4 | 0.3 | 0.2 | 0.3 | 0.5 | 0.3 | 0.5 |

42

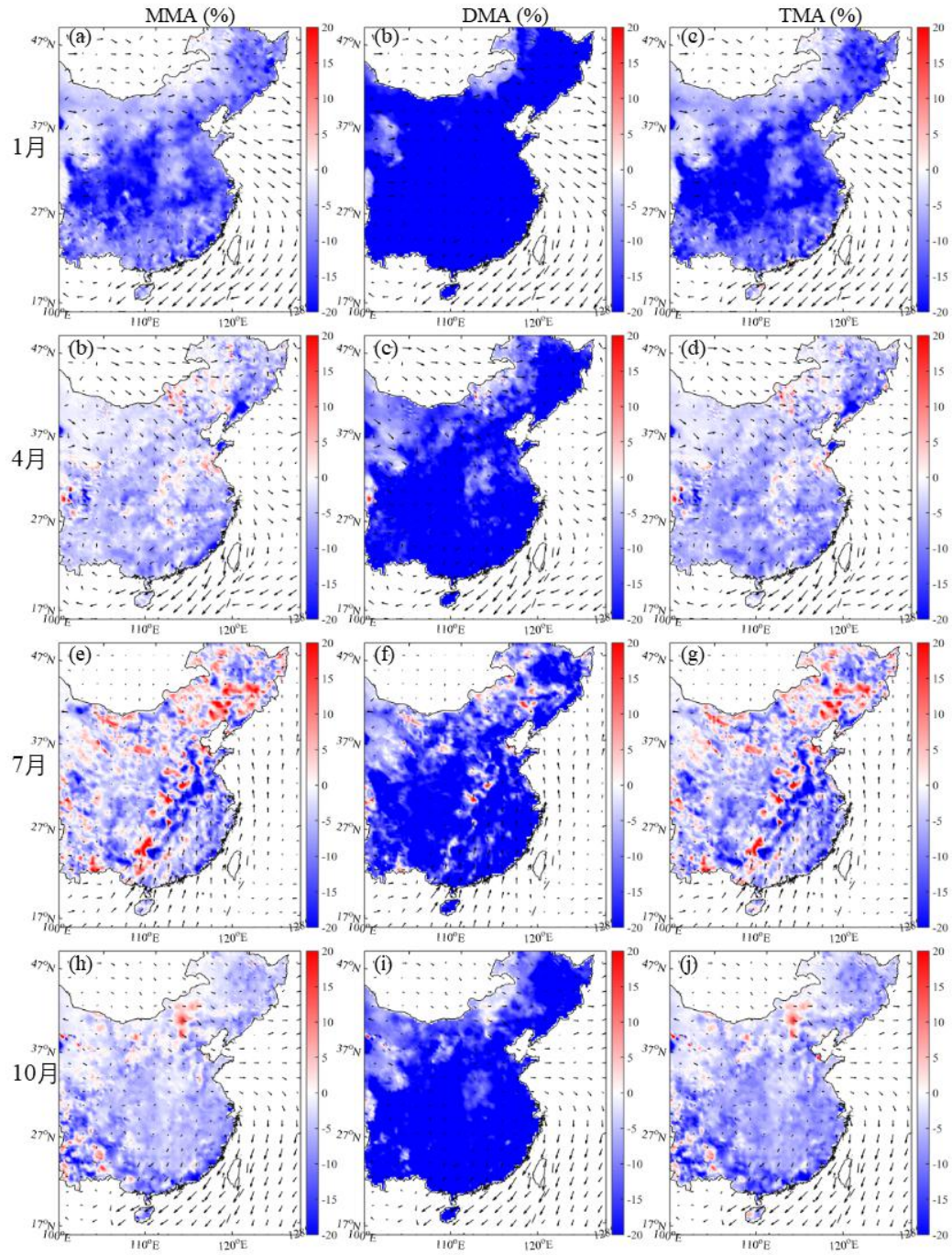
43      Table S3 Changes in amine emission fluxes (Unit: %).

|  |  | Jan. | Apr. | Jul. | Oct. |
|---|---|---|---|---|---|
| Reduce | MMA | 12.9 | 8.3 | 4.4 | 7.2 |
| 50% Chla. | TMA | 2.6 | 3.8 | 2.6 | 2.9 |
| Increase | MMA | -8.6 | -6.6 | -4.4 | -7.2 |
| 50% Chla. | TMA | -2.4 | -3.4 | -2.1 | -2.5 |

44

45

46 Figure S1: Spatial distribution of amines emission fluxes: (a, b, c) Agricultural emissions; (d, e, f)

47 Power plant emissions; (g, h, i) Industrial emissions; (j, k, l)Residential emissions; (m, n, o)

48 Transportation emissions; (p, q, r) Total.

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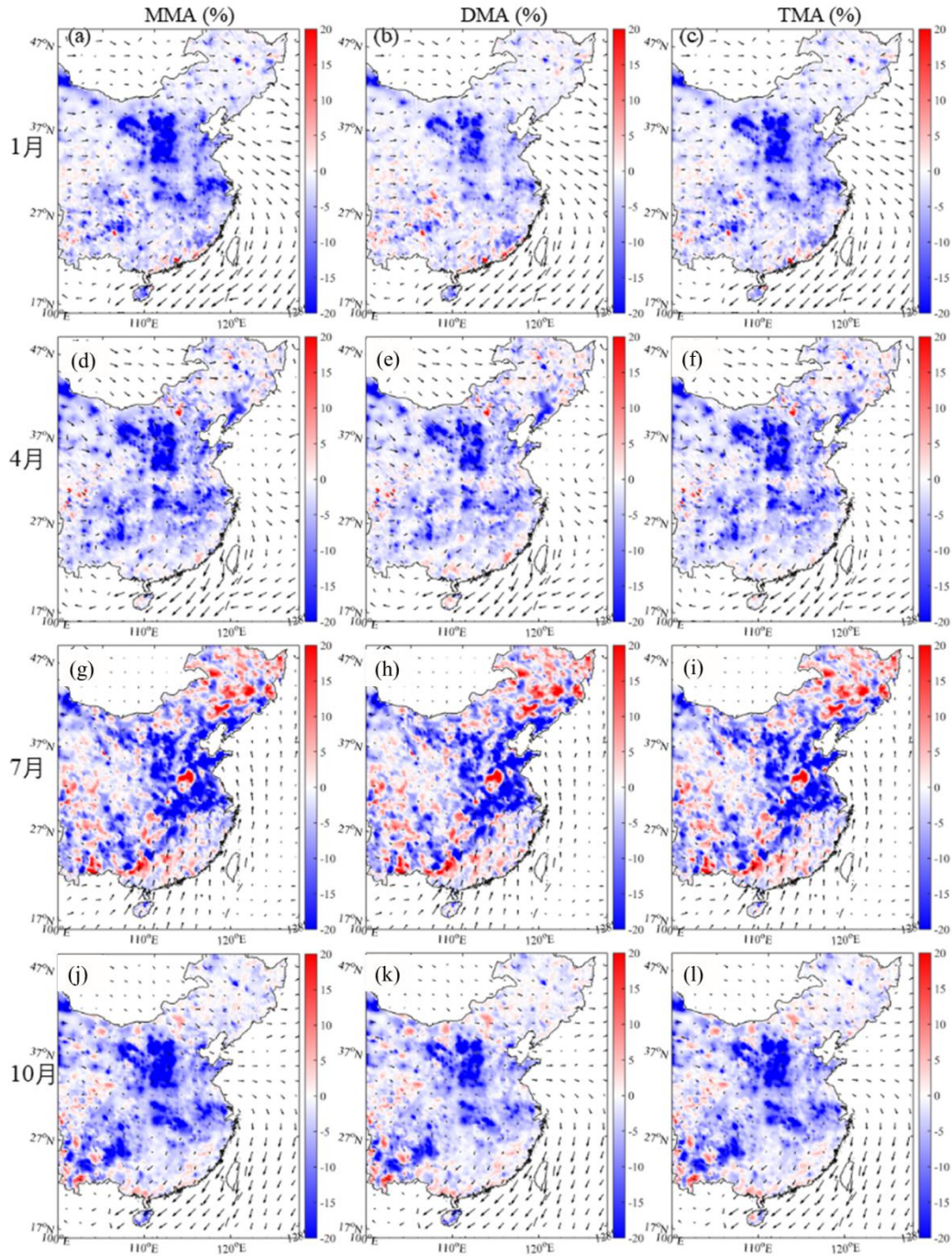
50    Figure S2: Changes in amine simulated concentration after reduction of residential emissions.

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52    Figure S3: Changes in amine simulated concentration after reduction of industrial emissions.

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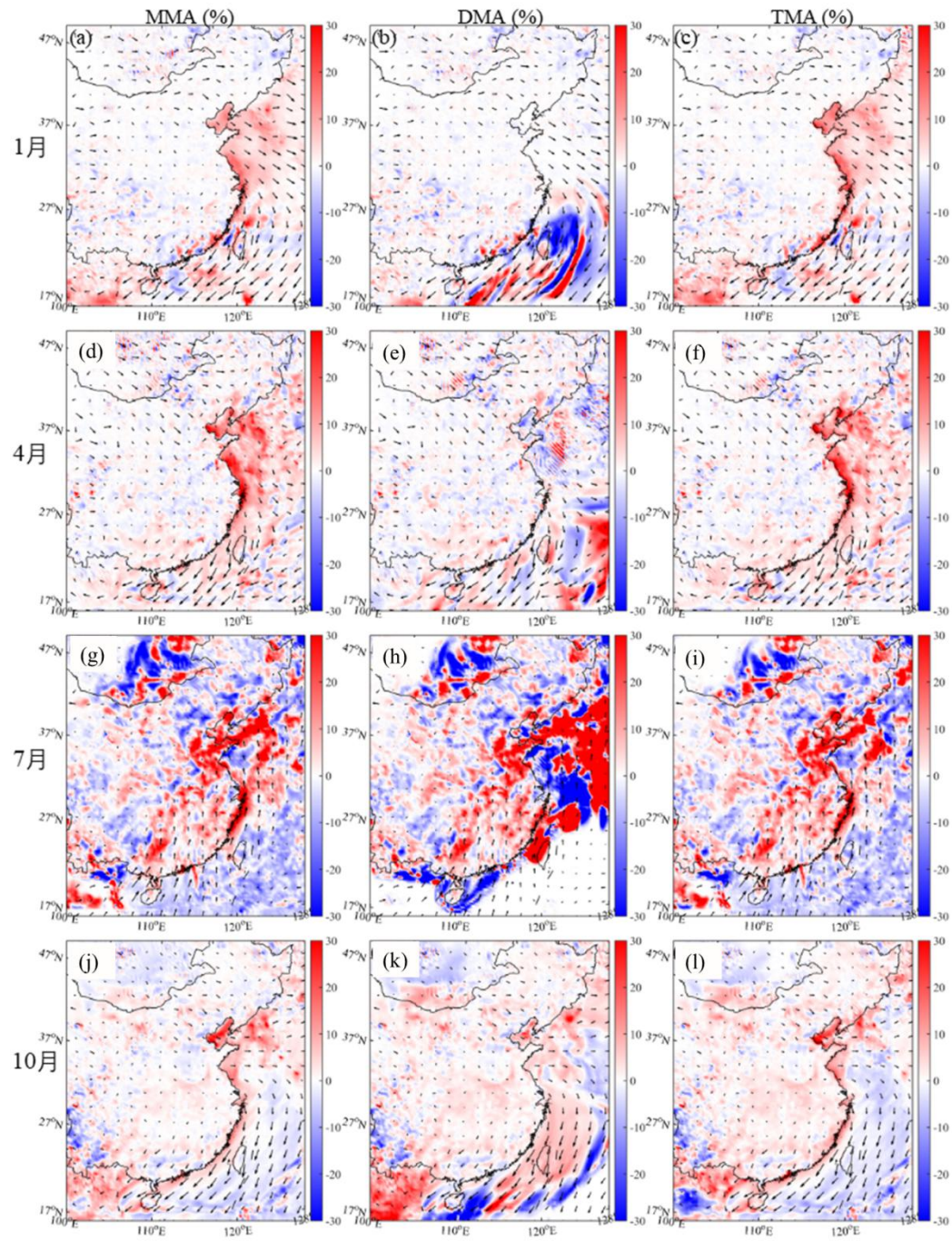
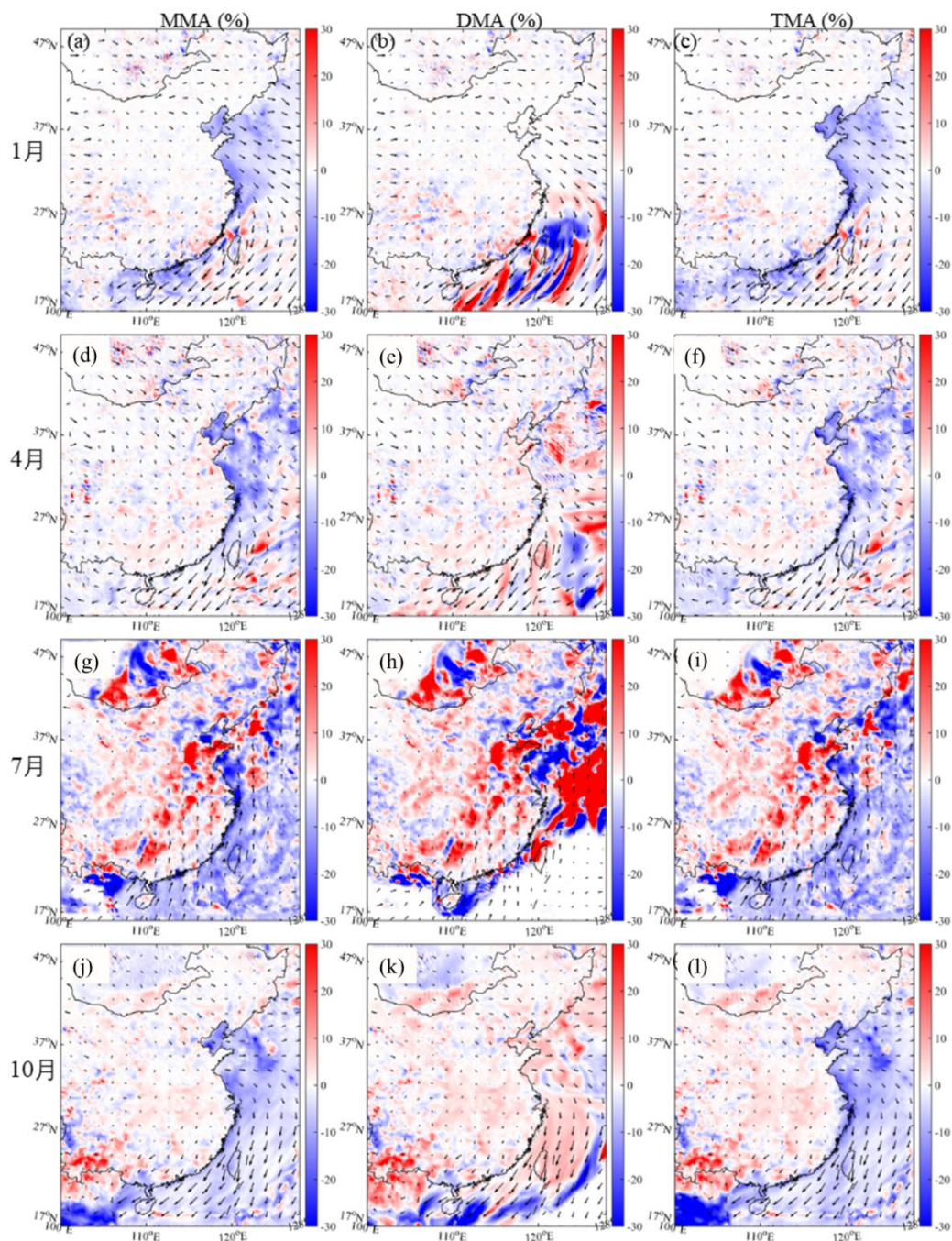


Figure S4: Changes in amine simulated concentrations after a 50% reduction in Chla.

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56 Figure S5: Changes in amine simulated concentrations after a 50% increase in Chla.

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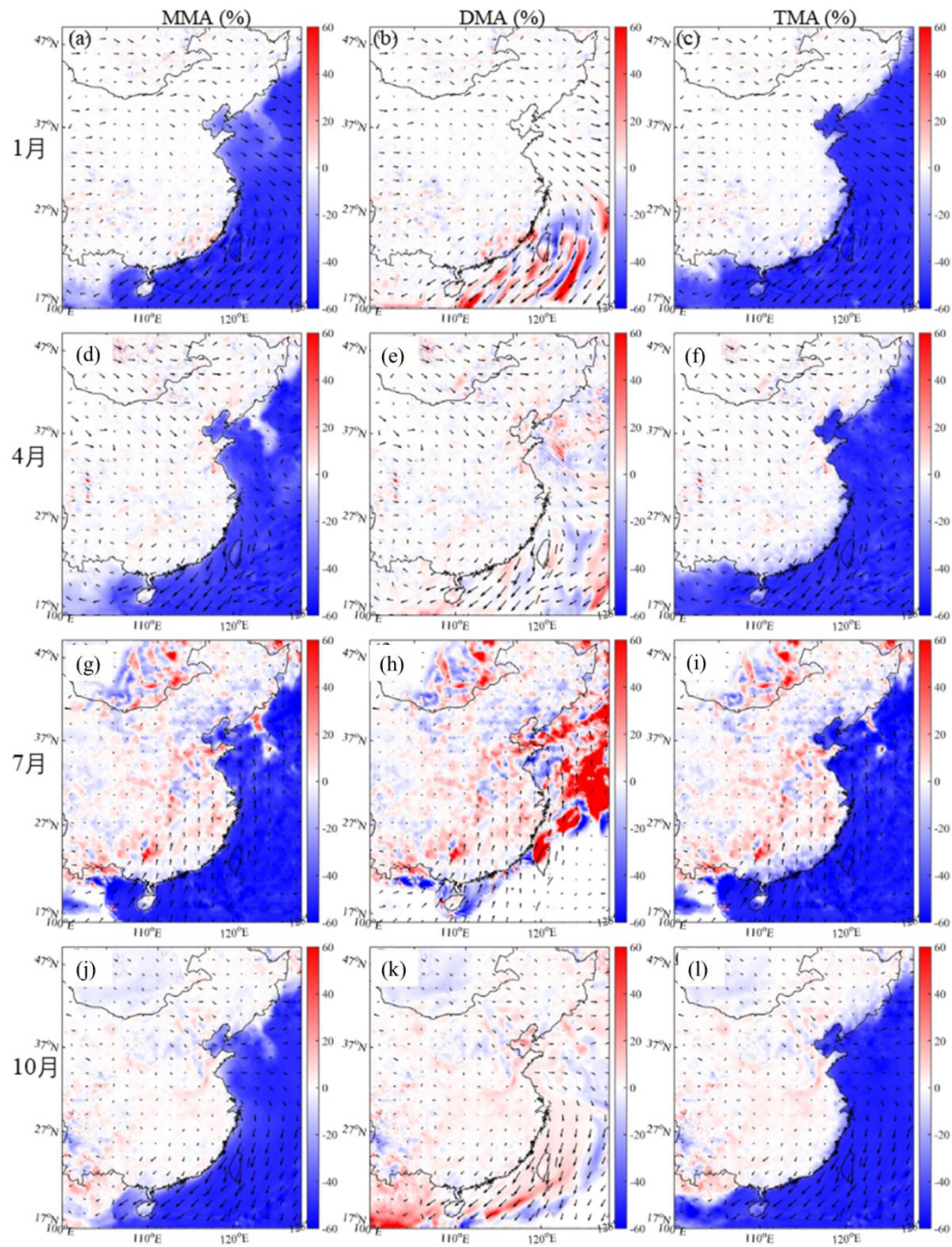
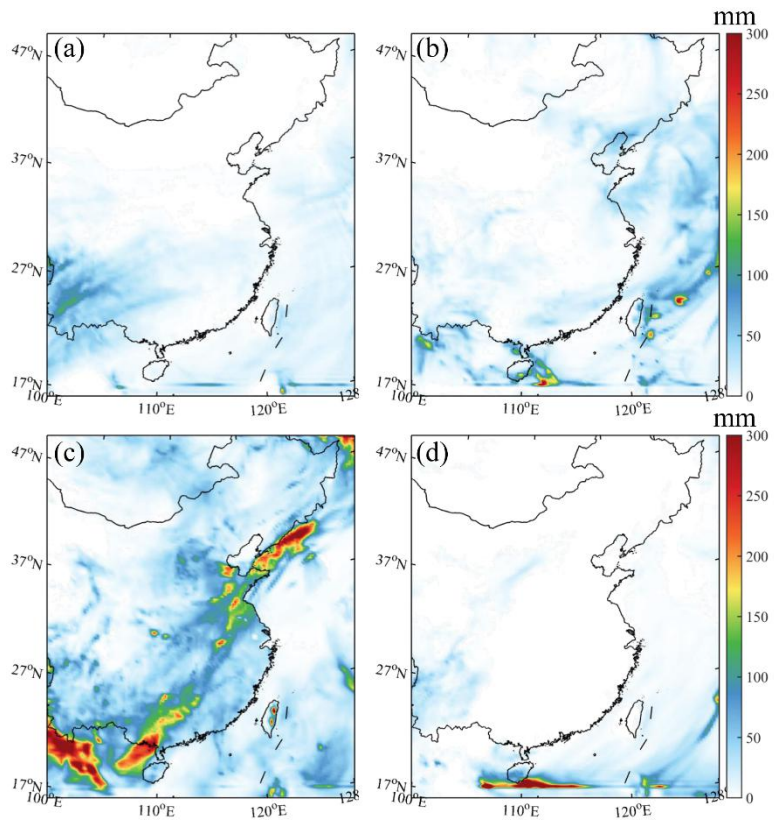


Figure S6: Changes in amine simulated concentrations after a 50% reduction in WS.

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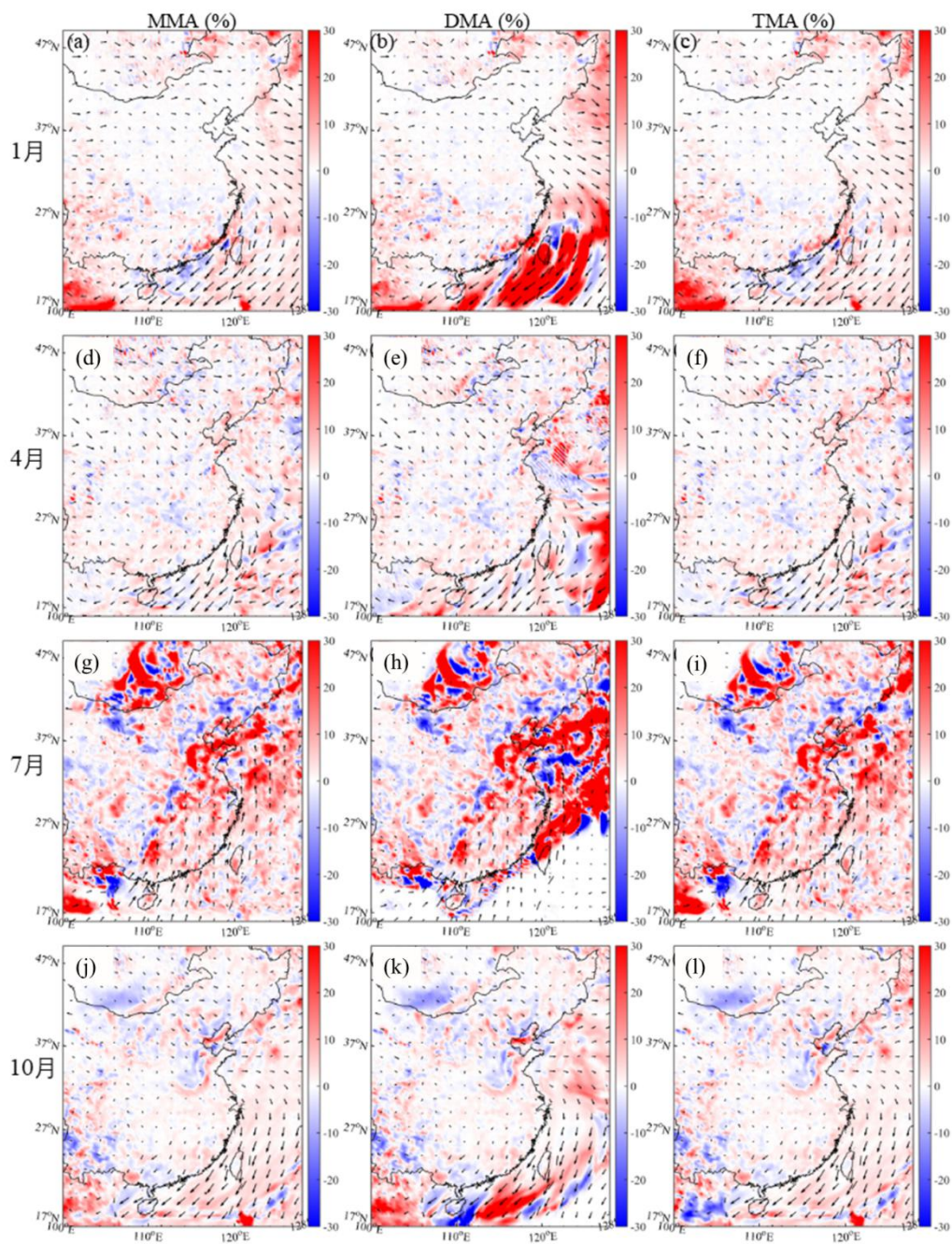
60    Figure S7: Simulated accumulated rainfall distribution in the simulated period: (a) January, (b) April,

61    (c) July and (d) October.

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63    Figure S8: Changes in amine simulated concentration after decreasing the apparent Henry coefficient.