1   **Supplementary information for the manuscript** *Quantifying the emission changes and associated*
2   *air quality impacts during the COVID-19 pandemic in North China Plain: a response modeling study*
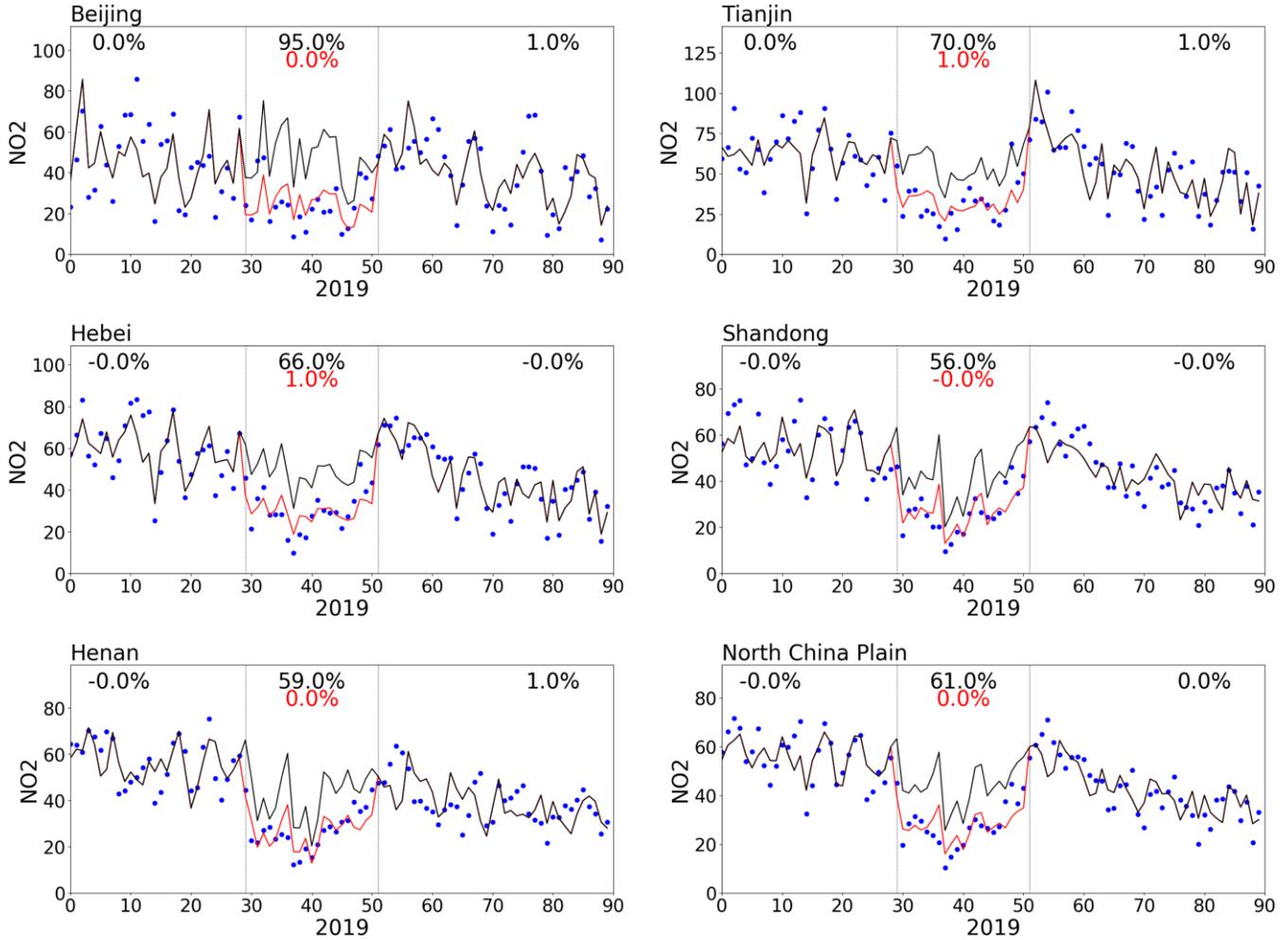
Figure S1 Comparison of the simulated average concentrations of NO_2 in NCP (the percentage numbers indicate the normalized mean biases in hypothesis and actual simulations respectively for Period 2. Blue dots: observations; Black line: simualtions using adjusted emission with no consideration of shutdown influences; Red line: simualtions using adjusted emission with consideration of shutdown influences; unit: $\mu g\ m^{-3}$)
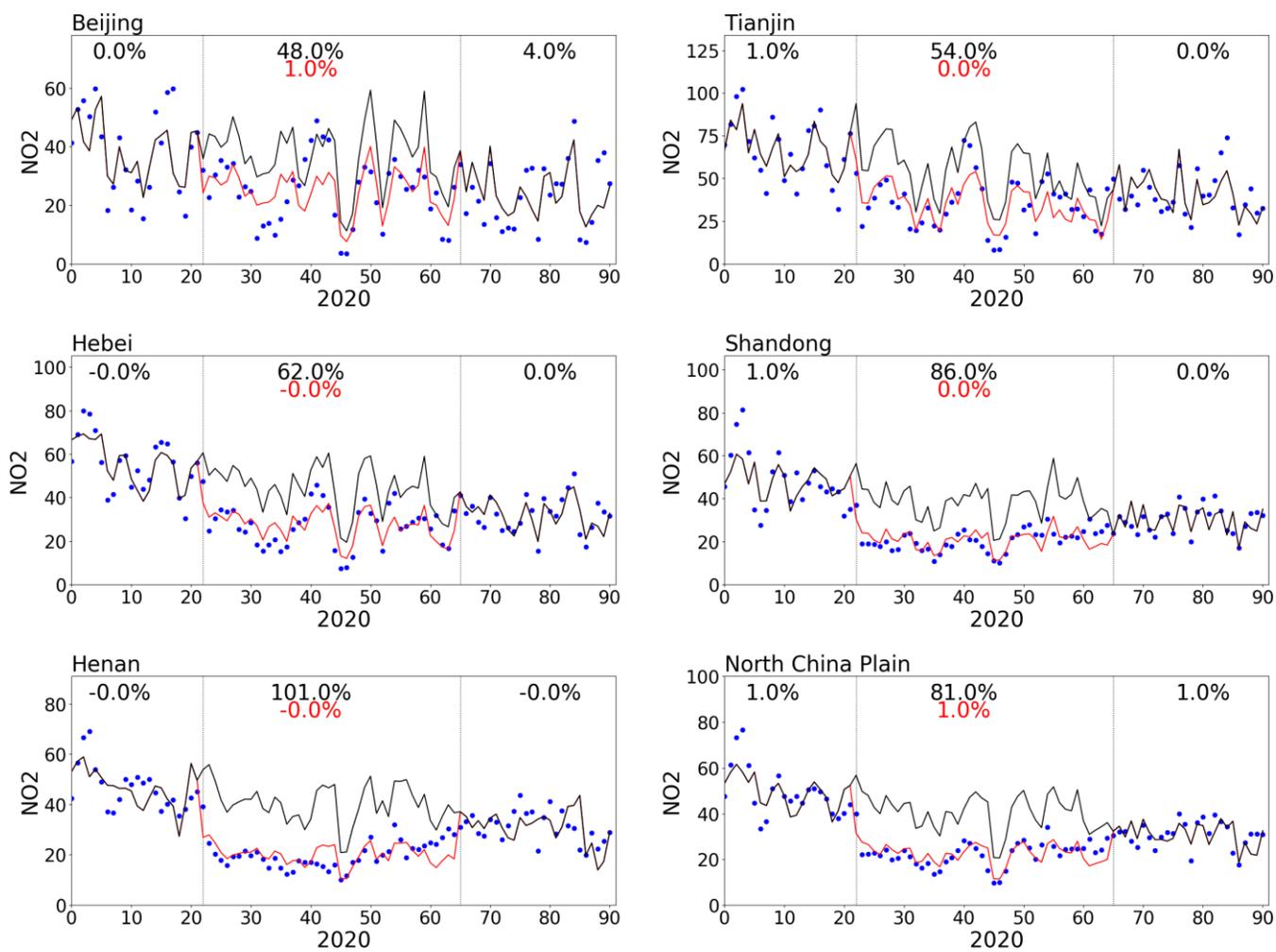
Figure S2 Same as Figure S1 but in 2020

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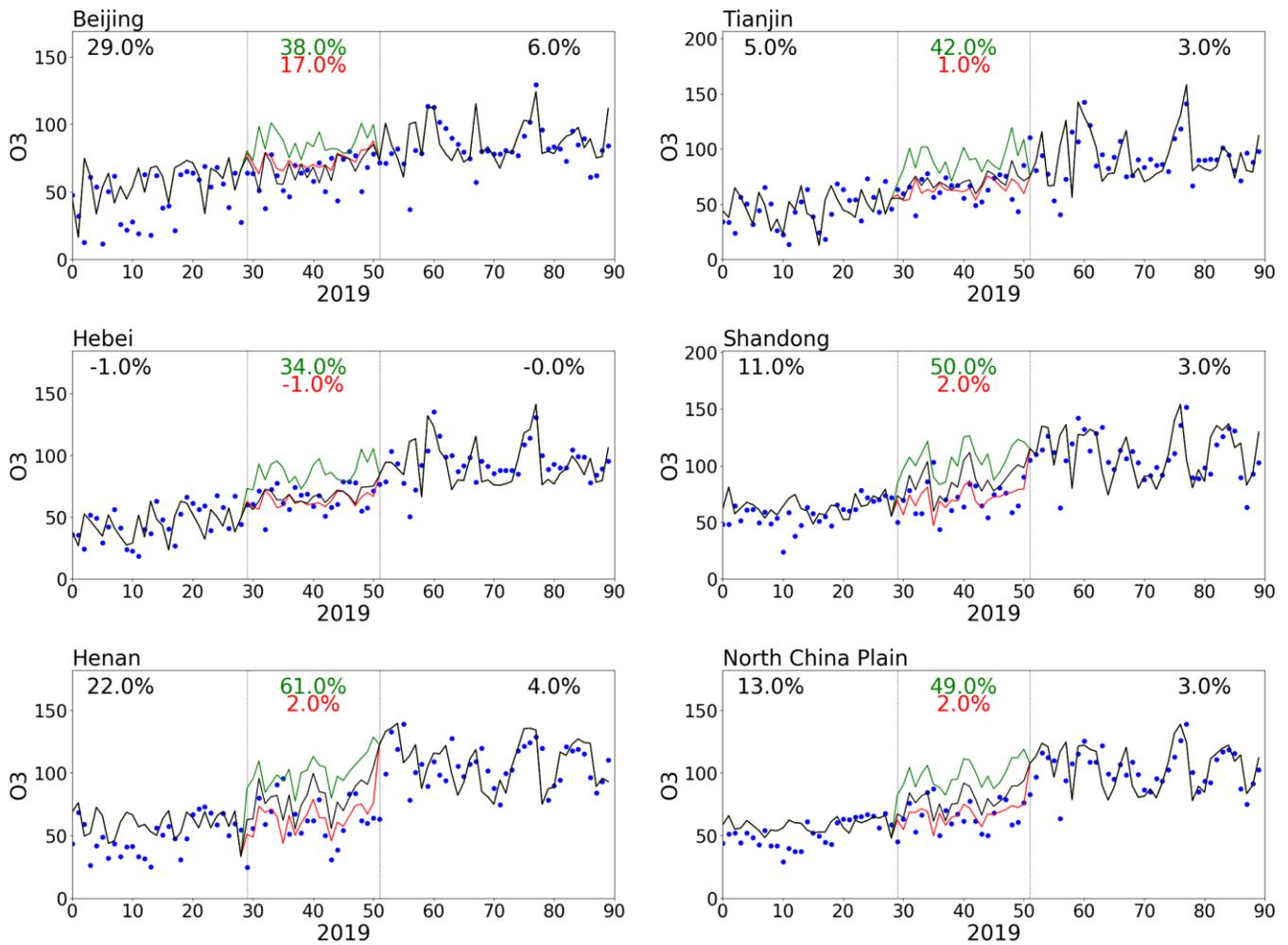
Figure S3 Comparison of the simulated average concentrations of O₃ in NCP (the percentage numbers indicate the normalized mean biases in hypothesis and actual simulations respectively for Period 2. Blue dots: observations; Black line: simualtions using adjusted emission with no consideration of shutdown influences; Red line: simualtions using adjusted emission with consideration of shutdown influences; Green line: simualtions using adjusted emission with consideration of shut-down influences but without VOC; unit: μg m⁻³)

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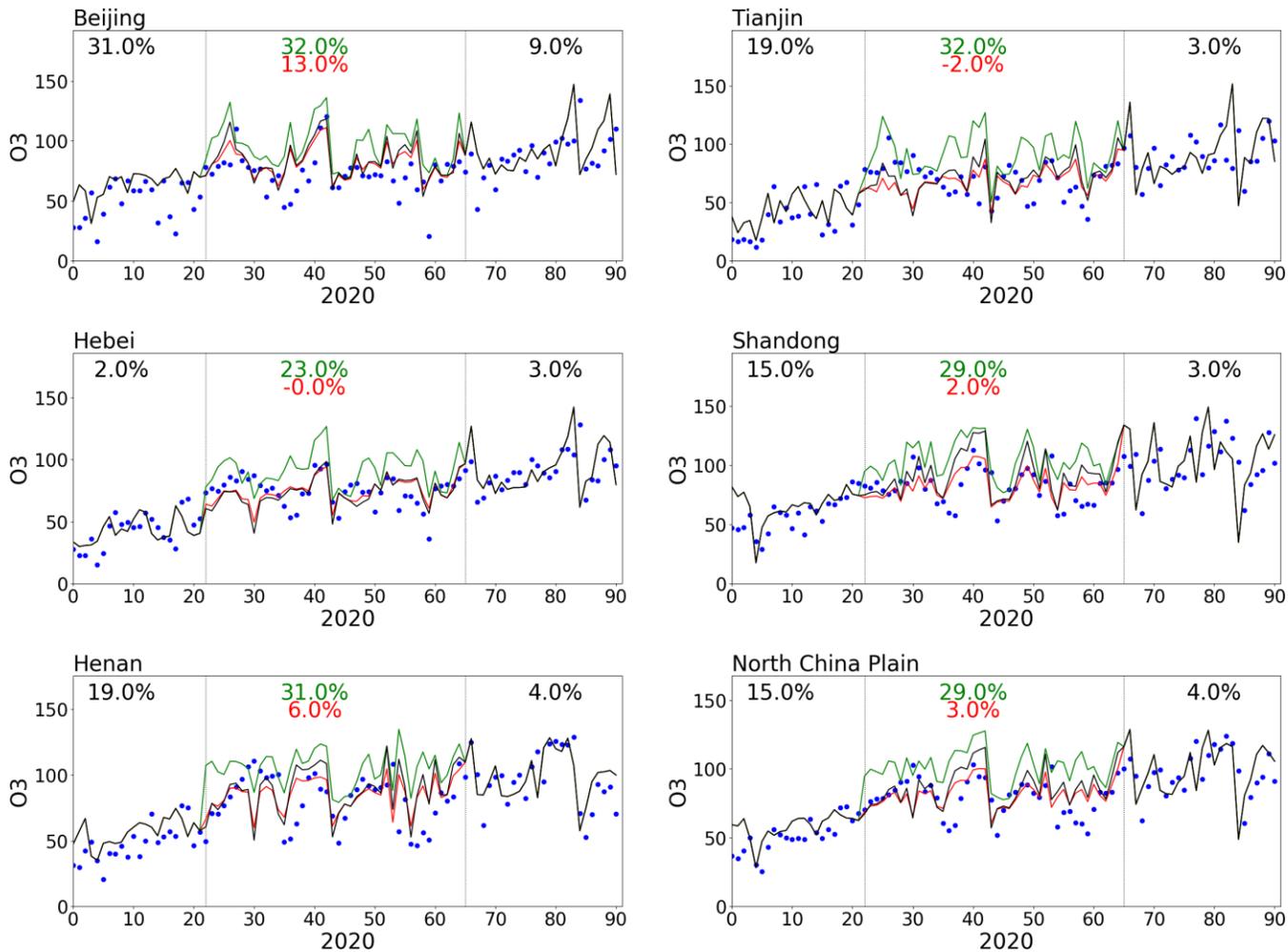
Figure S4 Same as Figure S3 but in 2020

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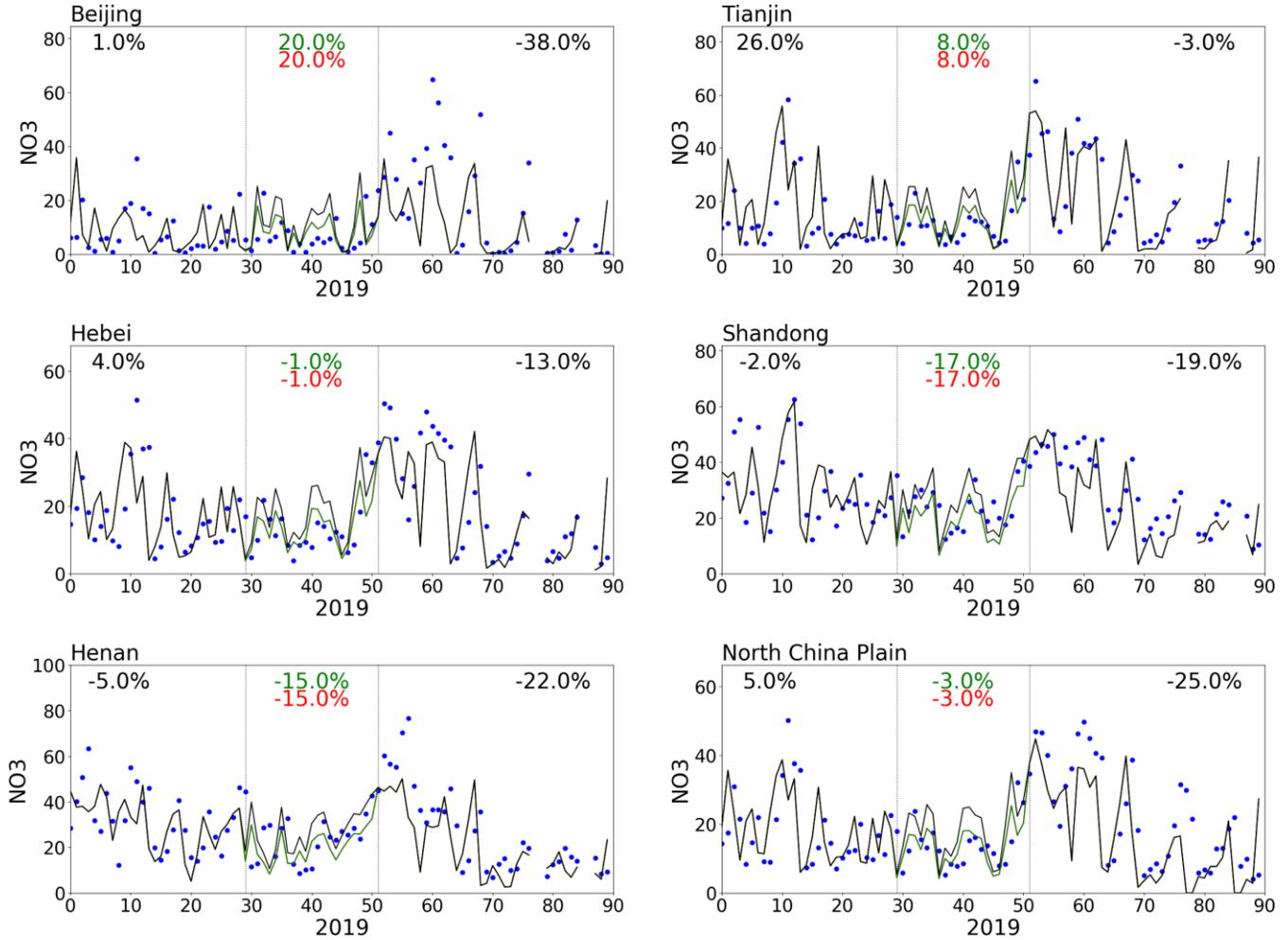
Figure S5 Comparison of the simulated average concentrations of NO_3^- in NCP (the percentage numbers indicate the normalized mean biases in hypothesis and actual simulations respectively for Period 2. Blue dots: observations; Black line: simualtions using adjusted emission with no consideration of shutdown influcences; Red line: simualtions using adjusted emission with consideration of shutdown influcences; Green line: simualtions using adjusted emission with consideration of shut-down influcences but without NH_3; unit: μg m^{-3})

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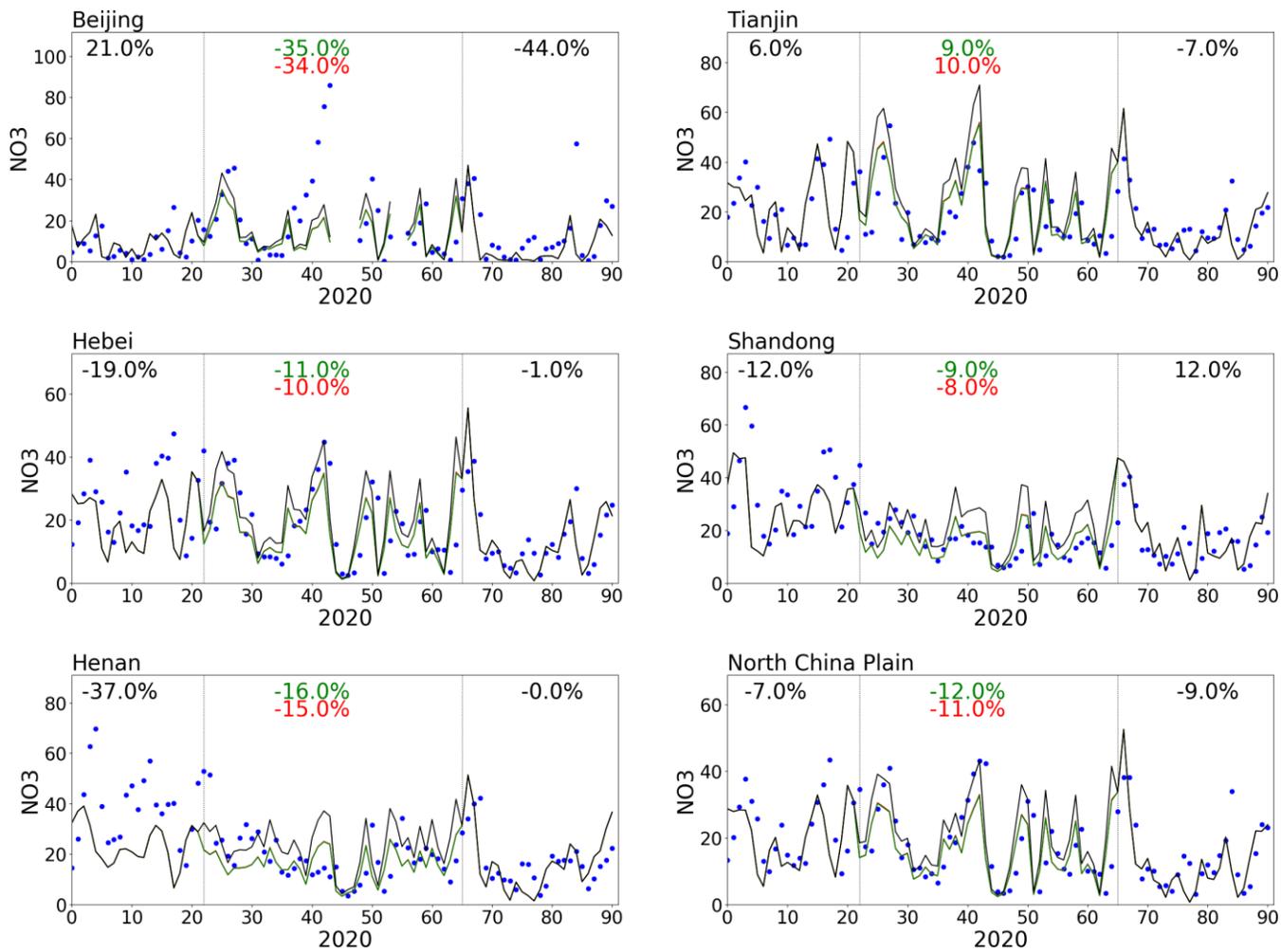
Figure S6 Same as Figure S5 but in 2020

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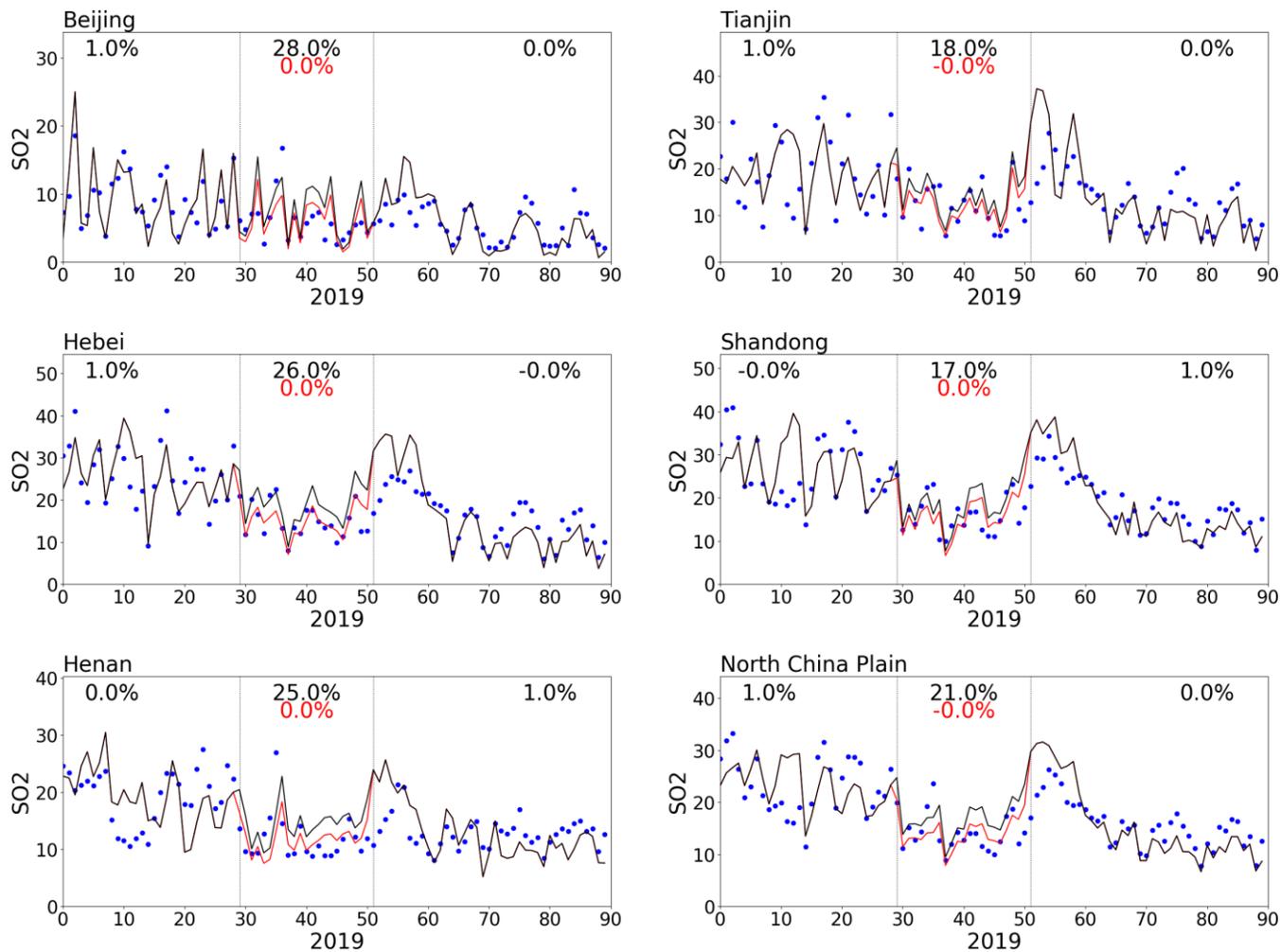
Figure S7 Comparison of the simulated average concentrations of SO_2 in NCP (the percentage numbers indicate the normalized mean biases in hypothesis and actual simulations respectively for Period 2. Blue dots: observations; Black line: simualtions using adjusted emission with no consideration of shutdown influences; Red line: simualtions using adjusted emission with consideration of shutdown influcences; unit: $\mu g\ m^{-3}$)

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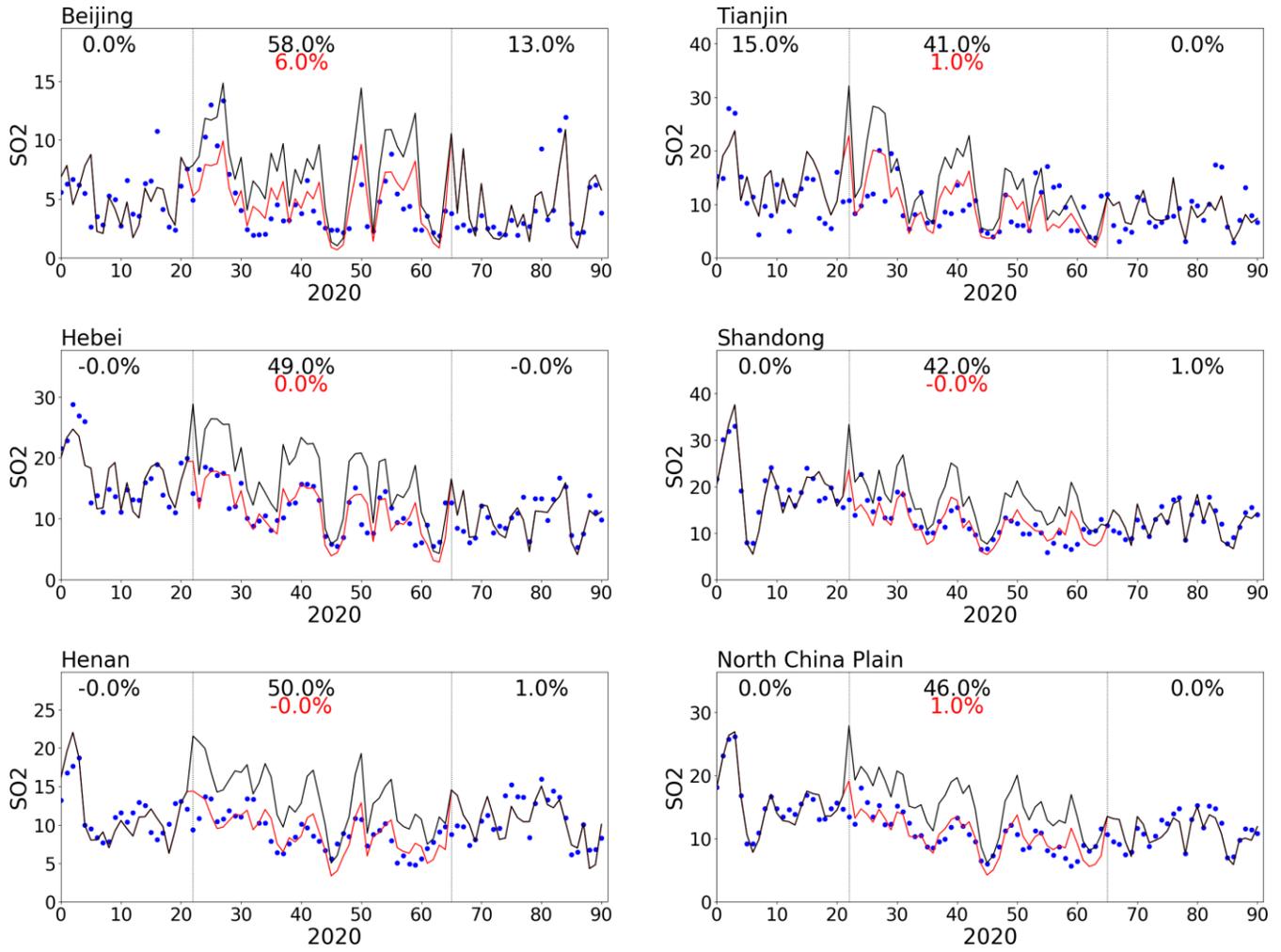
Figure S8 Same as Figure S7 but in 2020

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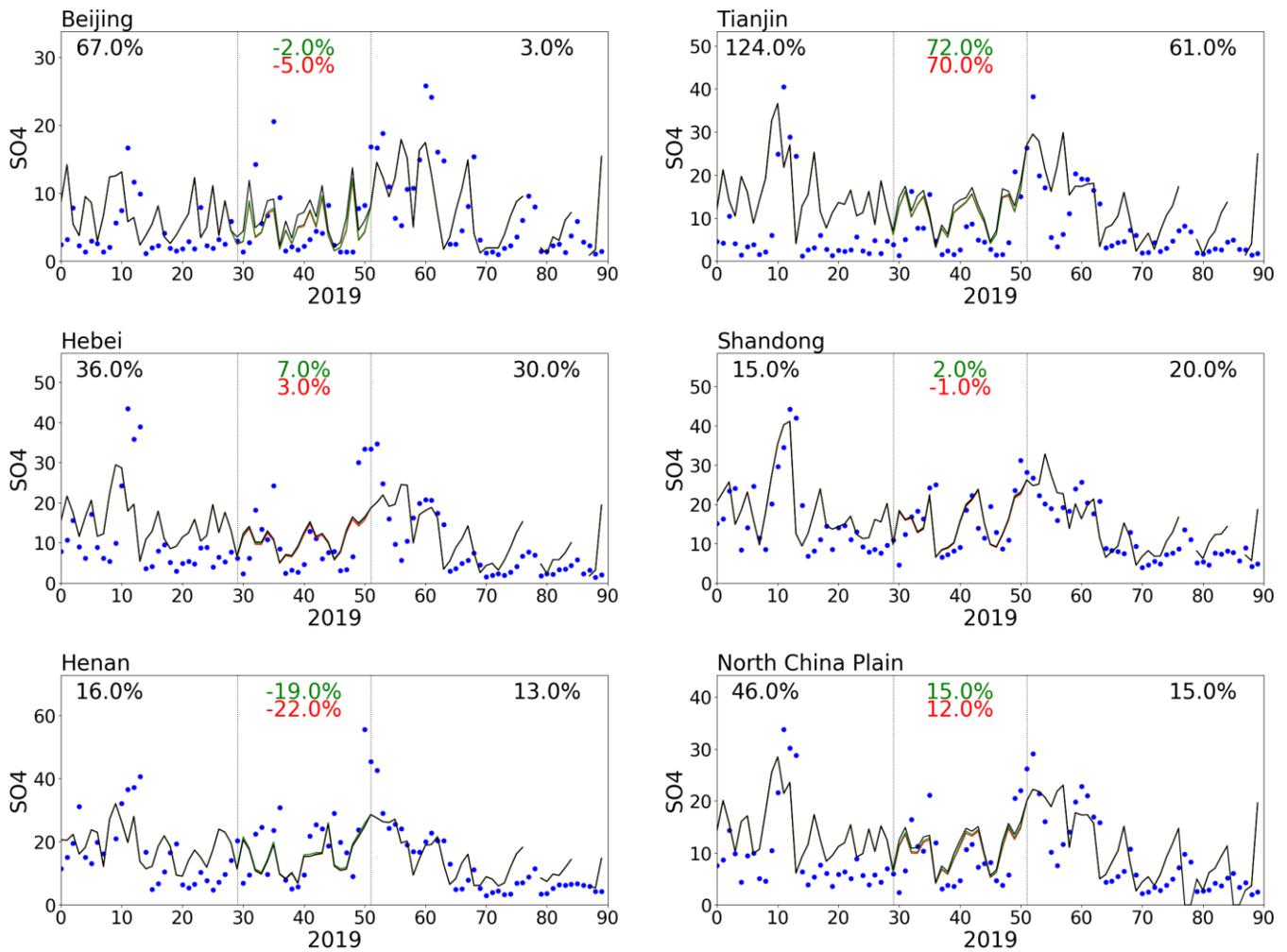
Figure S9 Comparison of the simulated average concentrations of SO_4^{2-} in NCP (the percentage numbers indicate the normalized mean biases in hypothesis and actual simulations respectively for Period 2. Blue dots: observations; Black line: simualtions using adjusted emission with no consideration of shutdown influcences; Red line: simualtions using adjusted emission with consideration of shutdown influcences; Green line: simualtions using adjusted emission with consideration of shut-down influcences but without SO_2; unit: μg m^{-3})
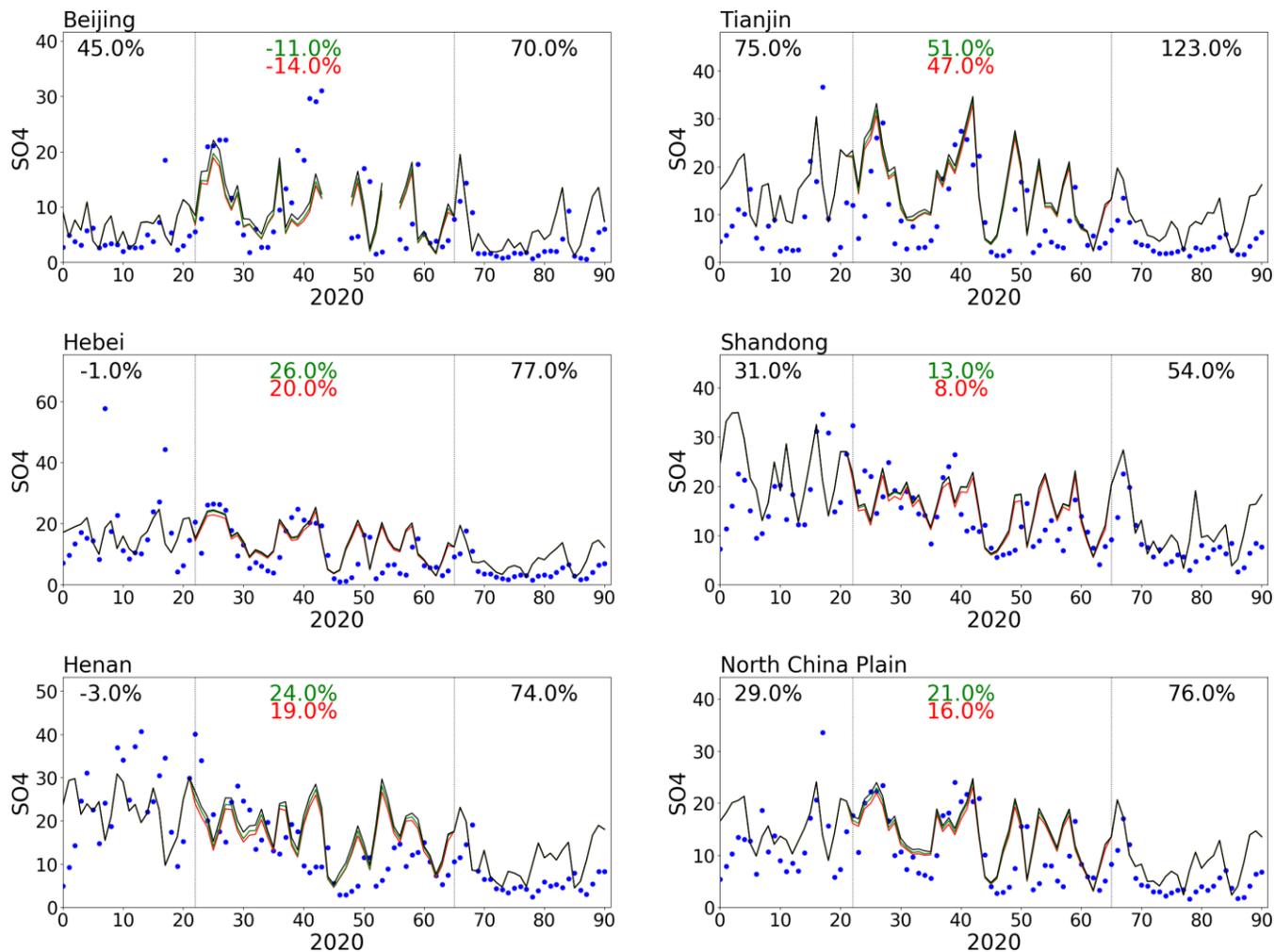
Figure S10 Same as Figure S9 but in 2020
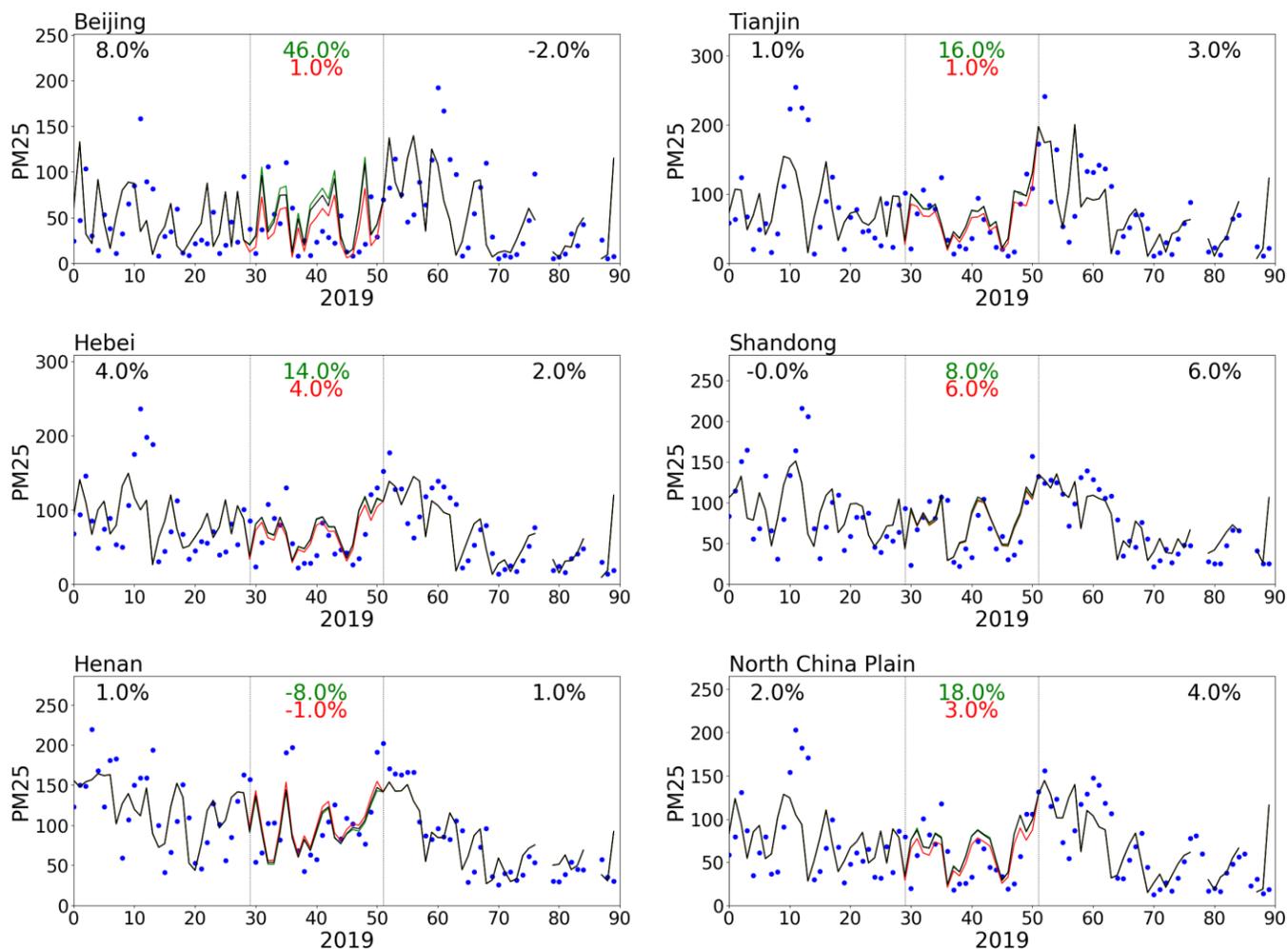
Figure S11 Comparison of the simulated average concentrations of $PM_{2.5}$ in NCP (the percentage numbers indicate the normalized mean biases in hypothesis and actual simulations respectively for Period 2. Blue dots: observations; Black line: simualtions using adjusted emission with no consideration of shutdown influences; Red line: simualtions using adjusted emission with consideration of shutdown influences; Green line: simualtions using adjusted emission with consideration of shut-down influences but without primary $PM_{2.5}$; unit: μg m^{-3})

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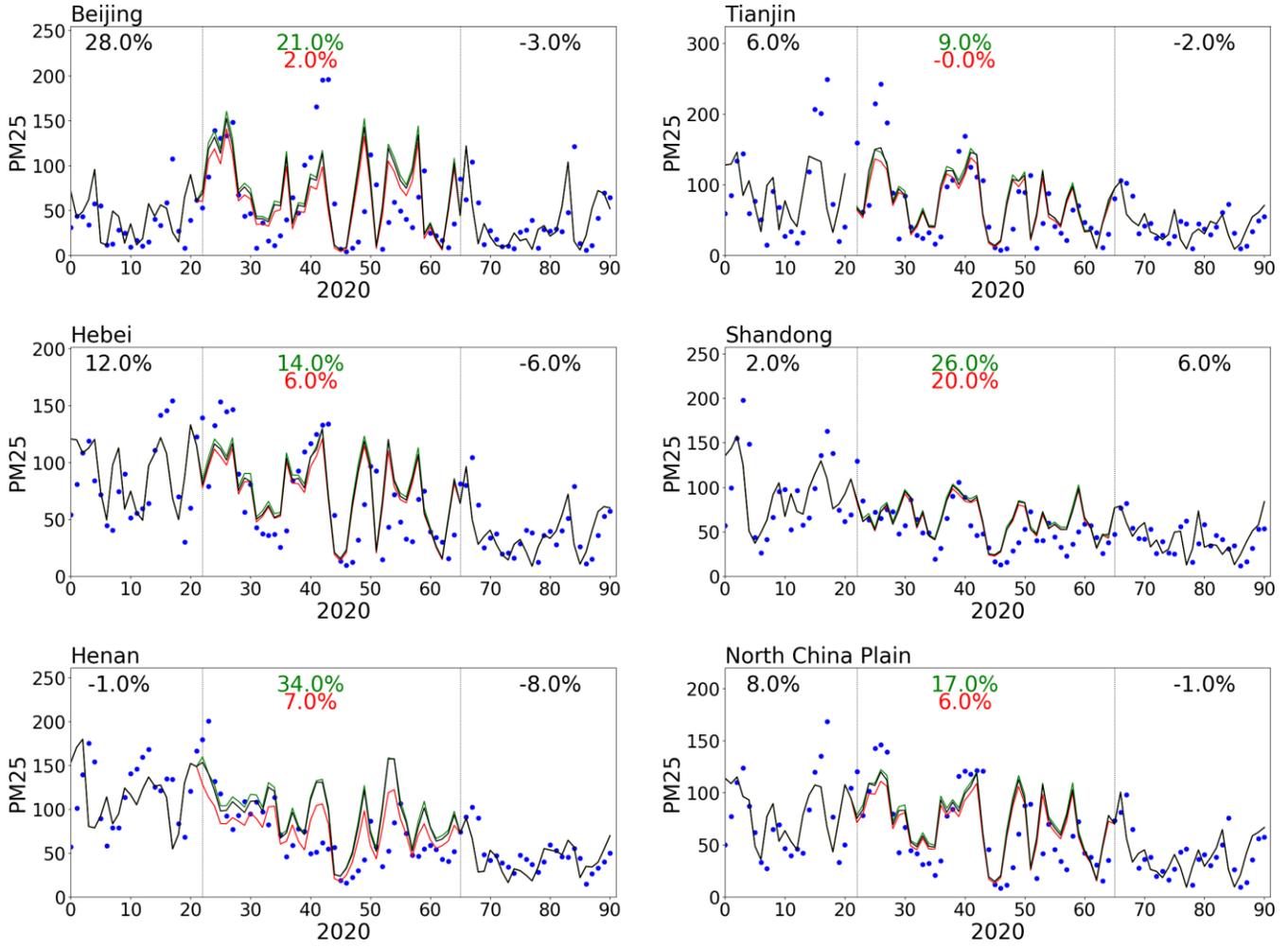
Figure S12 Same as Figure S11 but in 2020

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