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Revealing the sulfur dioxide emission reductions in China by assimilating surface observations in WRF-Chem

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Supplements

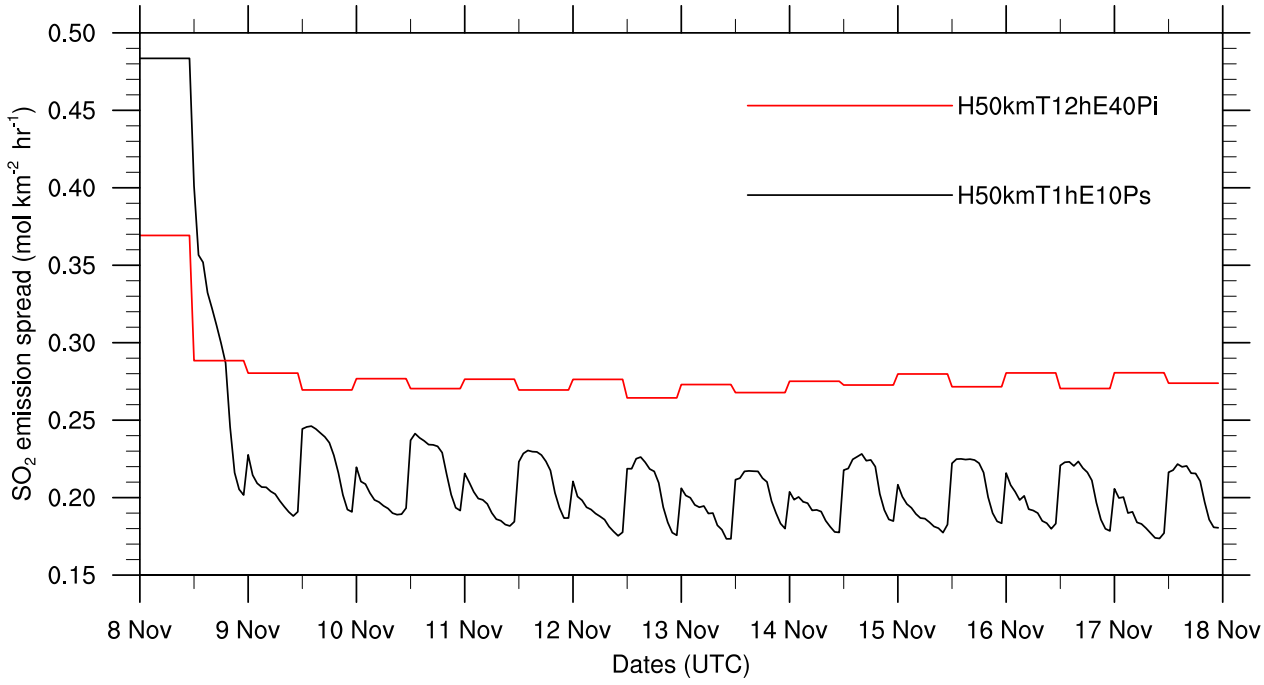

Figure S1. Time series of the hourly ensemble spreads of the forecast SO_2 emissions averaged over China from 00:00 UTC 8 November to 23:00 UTC 17 November 2016.

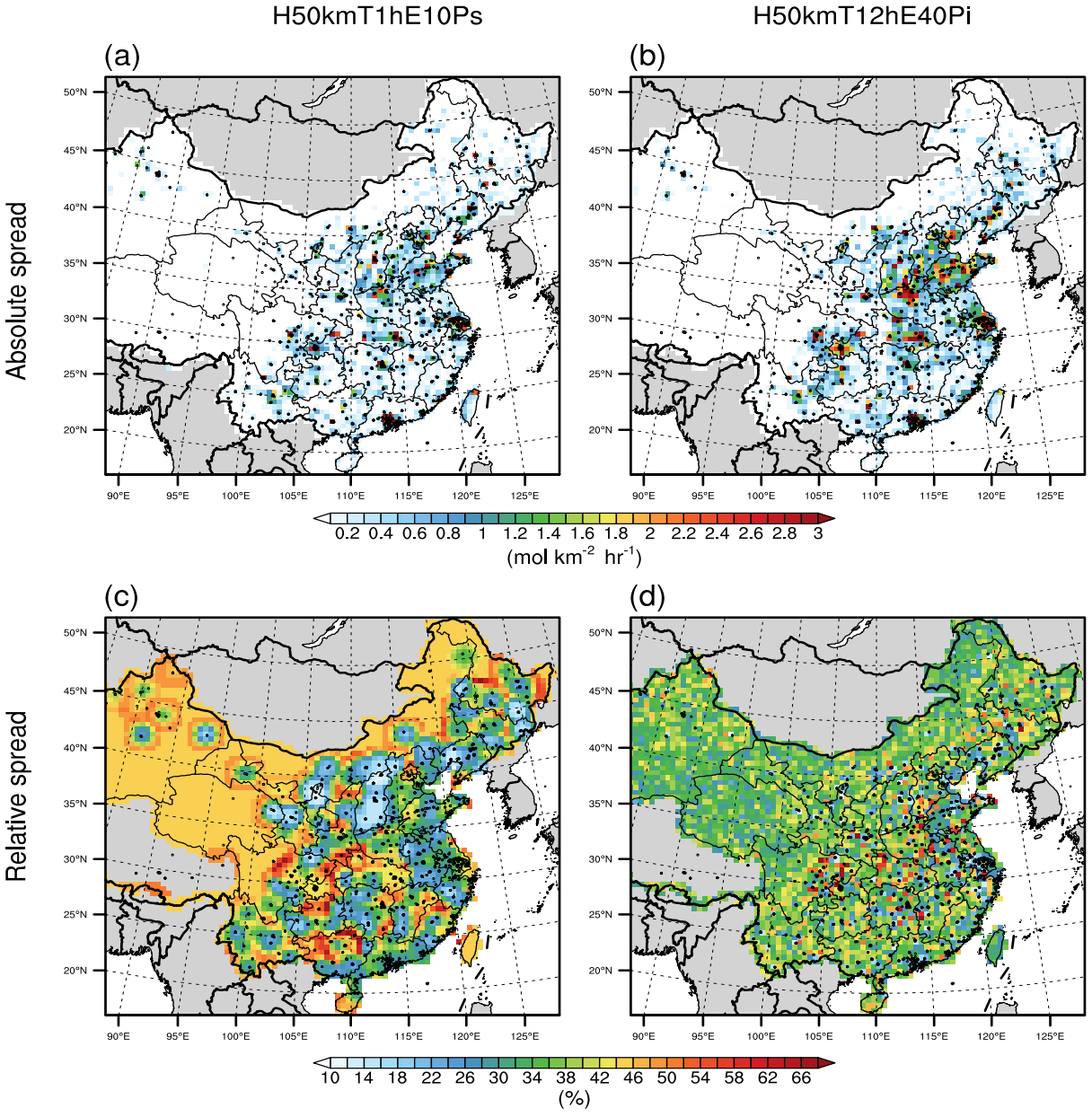

Figure S2. Spatial distributions of the ensemble spreads of the forecast SO_2 emissions at 00:00 UTC November 13. The locations of the assimilated observation sites of the China National Environmental Monitoring Centre (CNEMC) are shown as the black circles.

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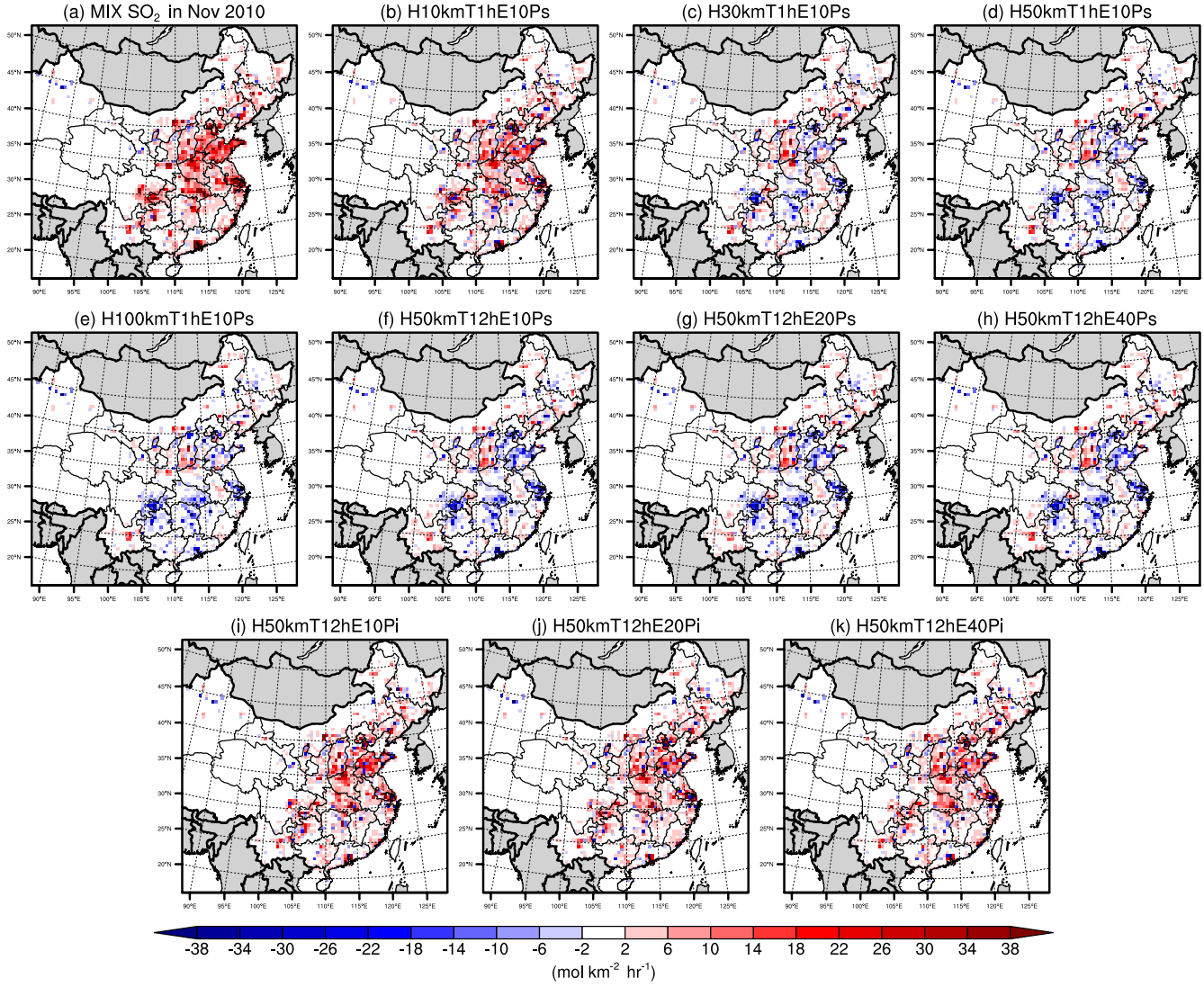

Figure S3. Spatial distributions of the mean differences of the MIX (a) and inverted SO_2 emissions in various data assimilation experiments (b-k) minus the MEIC ones in November 2016.

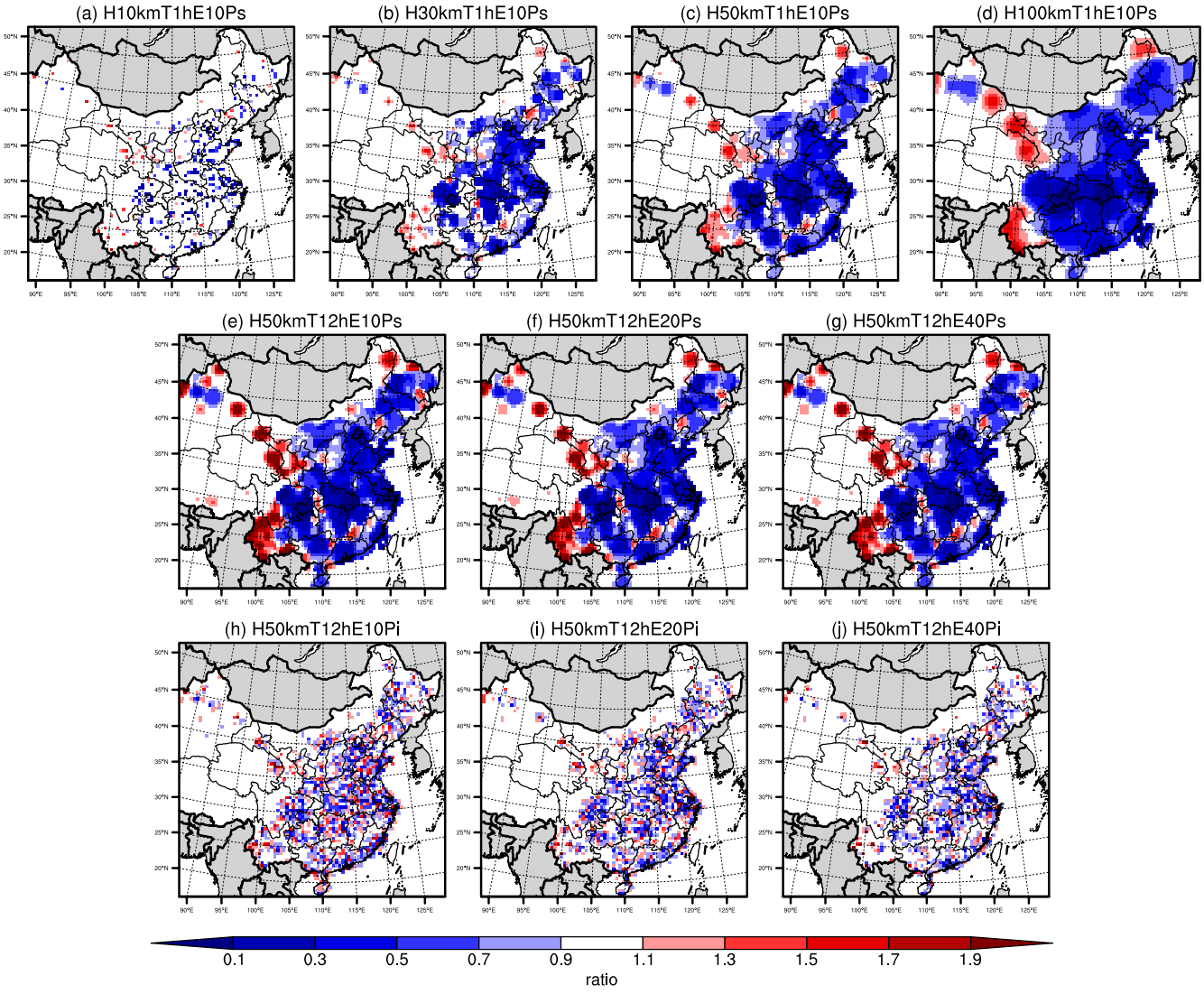

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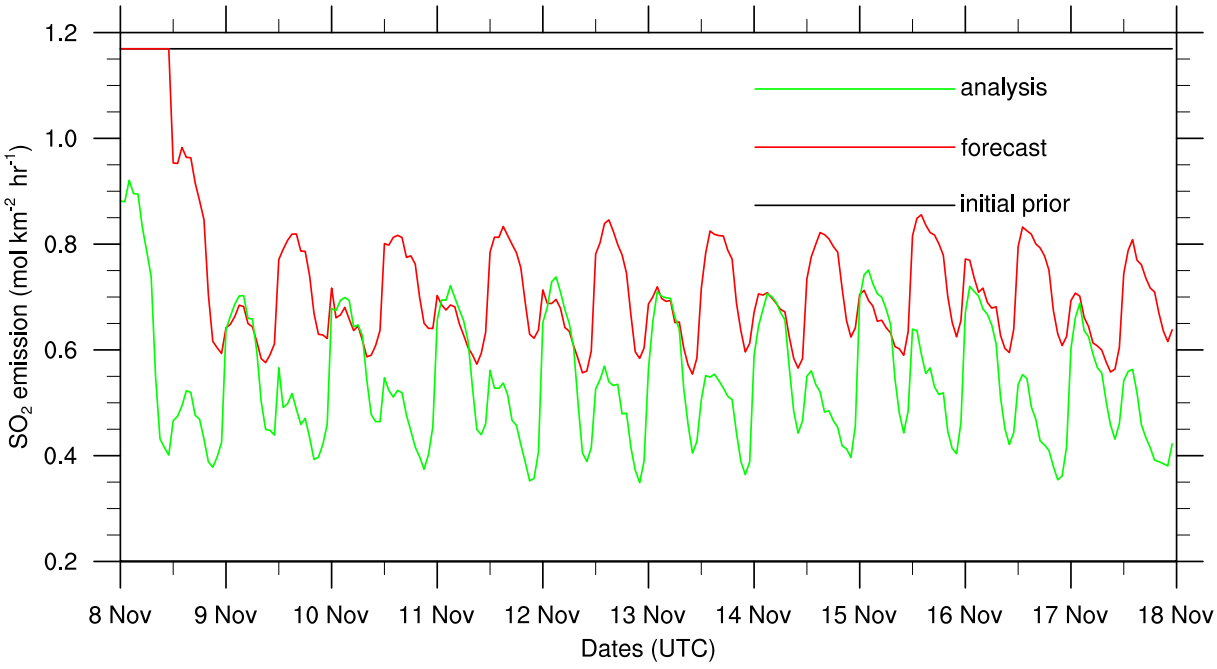
Figure S4. Spatial distributions of the mean ratios between the inverted SO_2 emissions in various data assimilation experiments and the MIX ones in November 2016.



35 **Figure S5. Time series of the hourly SO_2 emissions averaged over China of the initial MIX prior, the forecast and the analysis of the assimilation experiment H50kmT1hE10Ps from 00:00 UTC 8 November to 23:00 UTC 17 November 2016**

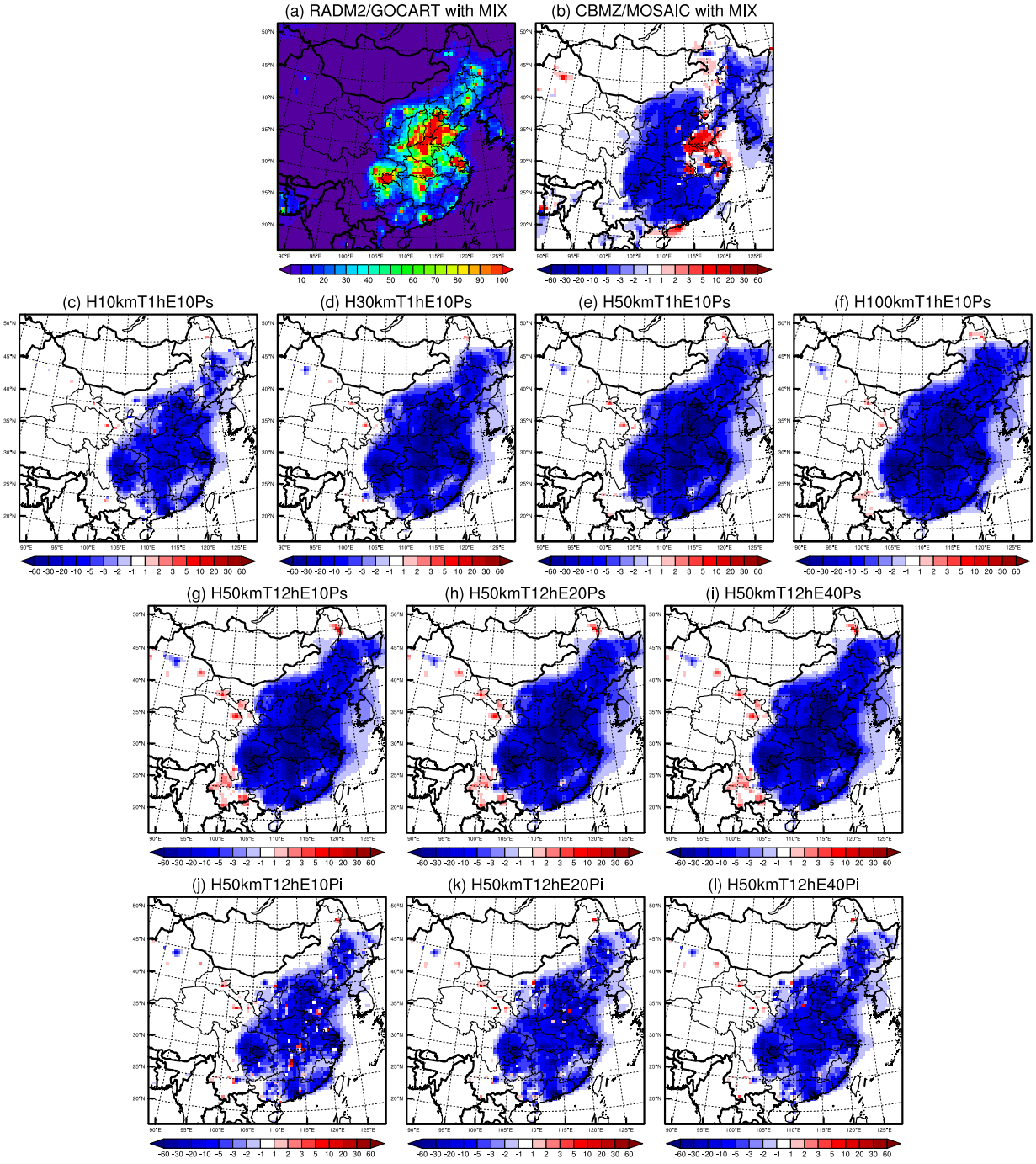


Figure S6. Spatial distributions of the mean surface SO_2 concentrations simulated with the original MIX emissions (a), the mean differences of the SO_2 concentrations simulated with the CBMZ/MOSAIC chemical scheme minus the ones simulated with RADM2/GOCART (b), and the updates of the simulated SO_2 concentrations with the inverted SO_2 emissions in various data assimilation experiments (c-l).