

Supplement

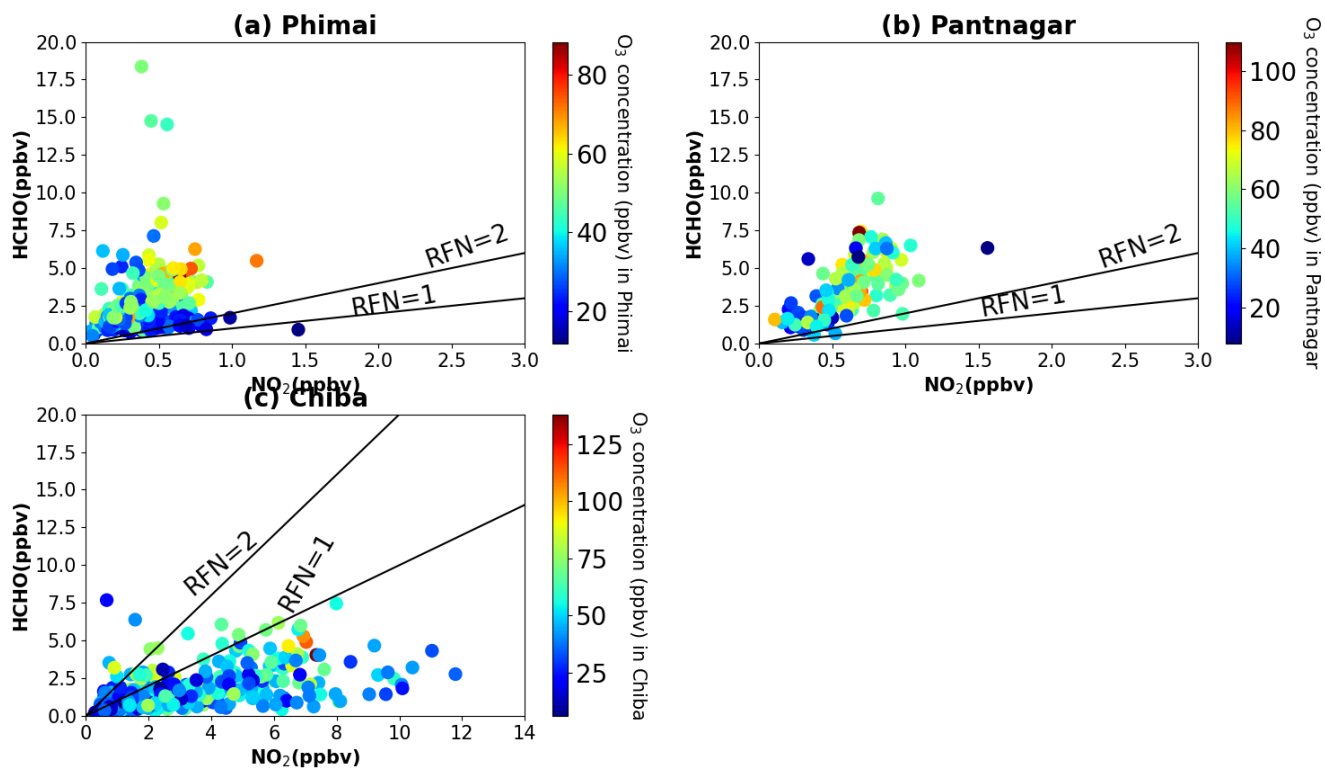


Figure S1. The scatter plot of HCHO and NO₂ concentrations in the 0-2 km layer at (a) Phimai, (b) Pantnagar, and (c) Chiba, colored with the O₃ concentrations in the 0-2 km layer at the respective sites. The solid lines indicate $R_{FN} = 2$ and $R_{FN} = 1$ benchmark.

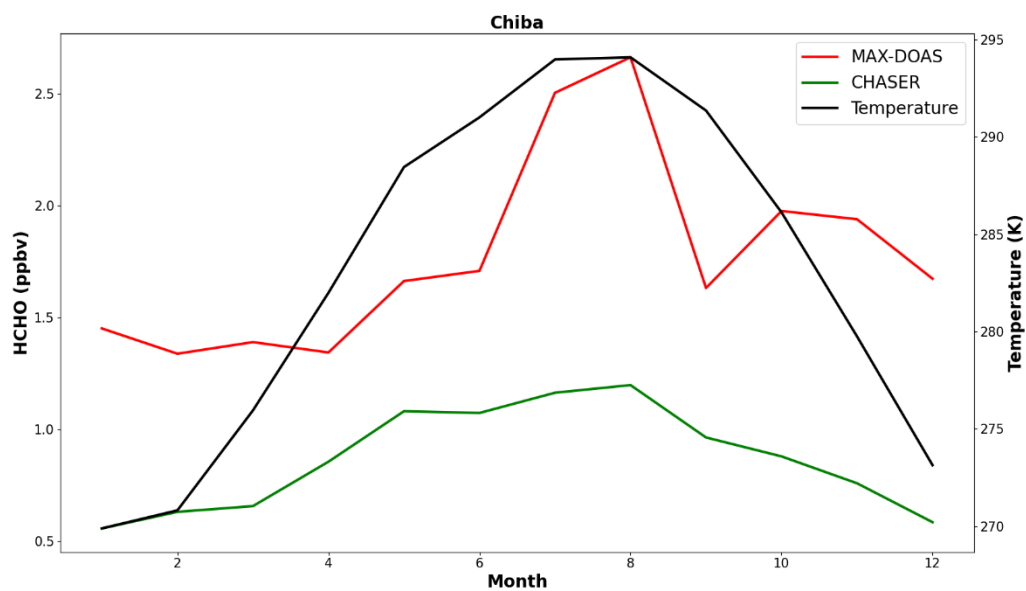


Figure S2. The seasonal variations in the observed (red) and simulated (green) HCHO concentrations in the 0-2 km layer in Chiba. Simulated seasonal changes in the temperature in Chiba are plotted in black.

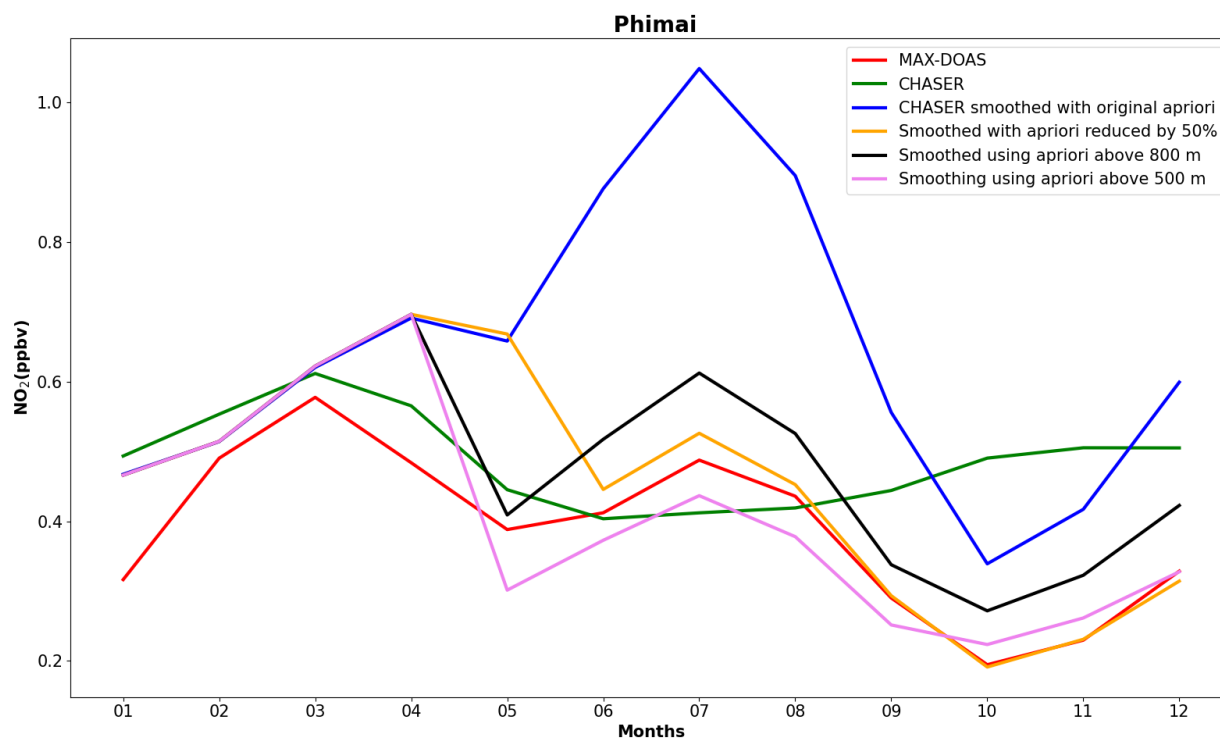


Figure S3. The seasonal variations in the observed (red) and modeled (green) NO₂ concentrations (0-2 km) in Phimai. The CHASER NO₂ concentrations are smoothed with different apriori values to demonstrate the sensitivity of the smoothed profiles. The various cases are- (i) profile smoothed with the original apriori values of the retrievals (blue), (ii) profile smoothed reducing the apriori values by 50% (orange), (iii) profiles smoothed utilizing the apriori values above 800 m (black), and (iv) profiles smoothed using the apriori values above 500 m (pink). The selected CHASER simulated time and date corresponds to the available MAX-DOAS observations at Phimai.

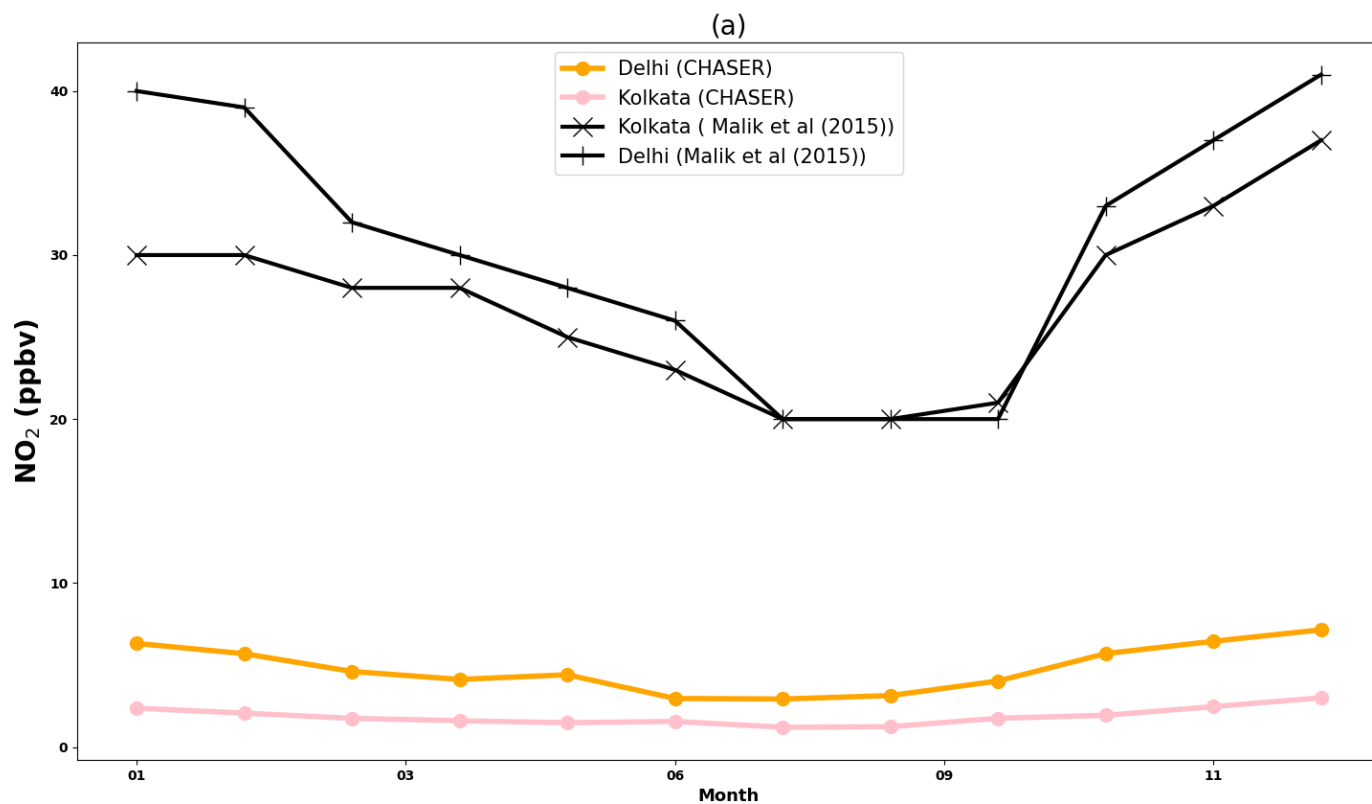


Figure S4. The CHASER simulated surface NO_2 concentrations in New Delhi, Kolkata, and the IGP region. New Delhi and Kolkata are two megacities located in the IGP region. The black curves show the surface NO_2 concentrations in New Delhi and Kolkata reported by Malik and Lal (2015).