Supplement

Figure S1: Latitude-longitude distributions of CH$_4$ at the levels of 800, 500, and 200hPa (the left, middle, and right panels respectively) observed by GOSAT-TIR for the season JFM 2011. The first upper panels (a1-a3) show GOSAT-TIR CH$_4$, the second upper panels (b1-b3) show GOSAT-TIR a priori CH$_4$, the third upper panels (c1-c3) the GOSAT-TIR observation points numbers, the fourth upper panels (d1-d3) show GOSAT-TIR CH$_4$ standard deviation, respectively.
Figure S2: Same as Fig. S1, but for OND 2011.
Figure S3: Latitude-longitude distributions of CH₄ simulated by MIROC4-ACTM at the levels of 800, 500, and 200hPa (the left, middle, and right panels respectively) for JFM 2011. The first (a1-a3) and second (b1-b3) upper panels show the difference in CH₄ between GOSAT-TIR and ACTM_Cao and ACTM_WH, the third (c1-c3) and fourth (d1-d3) panels show STD of ACTM_Cao and ACTM_WH, respectively.
Figure S4: Same as Fig. S3, but for AMJ 2011.
Figure S5: Same as Fig. S3, but for JAS 2011.
Figure S6: Same as Fig. S3, but for OND 2011.
Figure S7: Seasonal variation of CH₄ derived for levels of 800 and 200 hPa over considered regions from GOSAT-TIR (solid line), ACTM⁴K_Cao (dashed line), and ACTM⁴K_WH (dotted line), respectively. At the background bar plots represent Cao and WH CH₄ fluxes. Please note the different scale of y-axes (left) for fluxes.
Figure S8: Time-altitude cross-section of CH$_4$ from GOSAT-TIR retrieval, GOSAT-TIR a priori and ACTM$_{WH}$ (the left, middle, and right panels respectively) for considered regions.