Supplementary Materials

Quantification of regional terrestrial biosphere CO_2 flux errors in v10 OCO-2 MIP models using airborne measurements

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Table S1. Description for each v10 OCO-2 MIP inverse model. The information is from Byrne et al. (2023).

Simulation name	Transport model	Meteorology forcing		Prior terrestrial CO_2 flux	Prior air-sea CO_2 flux	Inverse method
		name	resolution			
AMES	GEOS-Chem	MERRA-2	4° × 5°	CASA-GFED4.1s	CT2019OI	4D-Var
Baker	PCTM	MERRA-2	1° × 1.25° prior, 4° × 5° opt	CASA-GFED3	Landschützer v4.4	4D-Var
CAMS	LMDz	ERA5	1.9° × 3.75°	ORCHIDEE (climatological)	CMEMS	Variational
CMS-Flux	GEOS-Chem	MERRA-2	4° × 5°	CARDAMOM	MOM-6	4D-Var
COLA	GEOS-Chem	MERRA-2	4° × 5°	VEGAS	Rödenbeck 2021	EnKF
CT	TM5	ERA5	2° × 3°/1° × 1°	CT2019 CASA GFED4.1s	CT2019OI	EnKF
OU	TM5	ERA-Interim	4° × 6°	CASA-GFED3	Takahashi	4D-Var
TM5-4DVar	TM5	ERA-Interim	2° × 3°	SiB-CASA	CT2019 Opt Clim	4D-Var
UT	GEOS-Chem	GEOS-FP	4° × 5°	BEPS	Takahashi	4D-Var
WOMBAT	GEOS-Chem	MERRA-2	2° × 2.5°	SiB-4 w/MERRA-2	Landschutzer 2020	Synthesis with MCMC
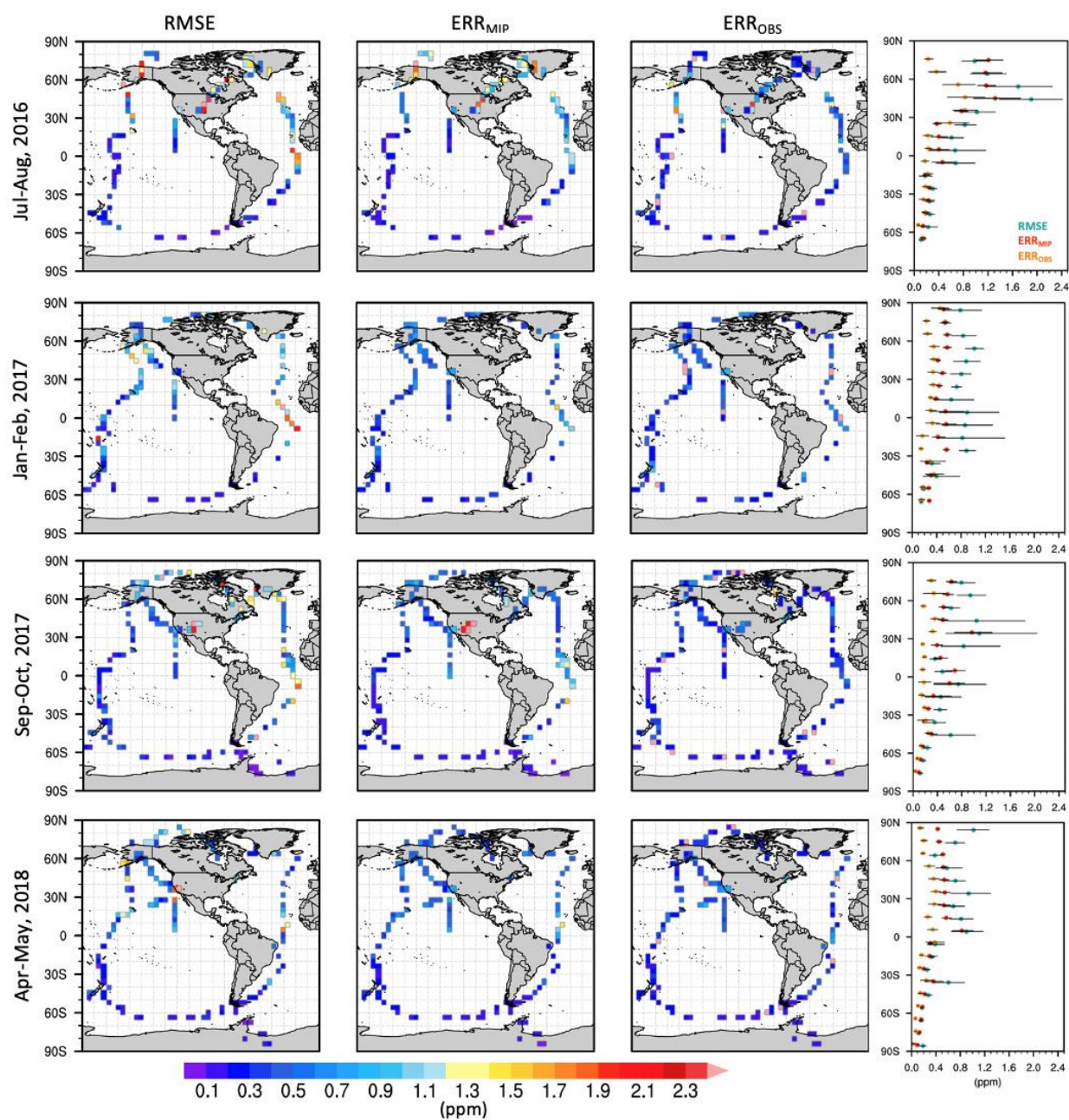
Figure S1. Spatial distributions of RMSE, ERR$_{OBS}$ and ERR$_{MIP}$ for each Atom campaign period. Right-hand panels show their latitudinal distributions smoothed by 10° moving average (dot) with 95% confidence intervals derived from 1000 bootstrap samples of datasets (error bar)

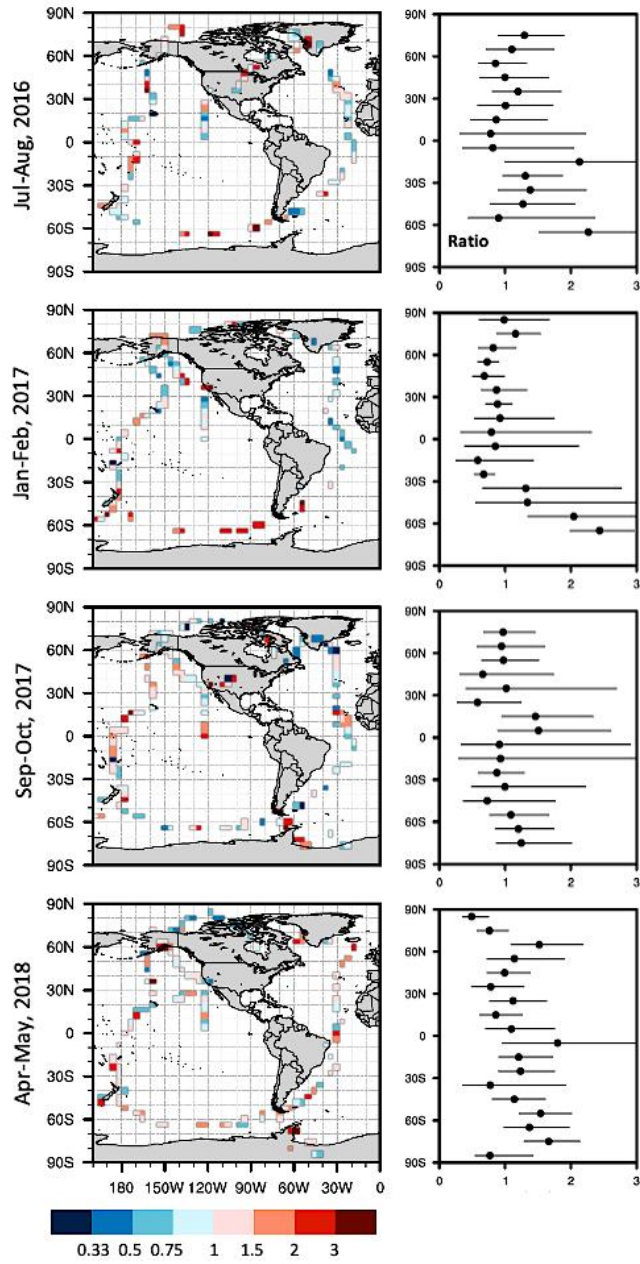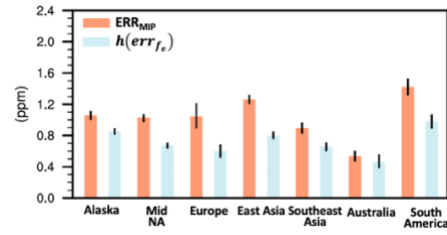**Figure S2. Same as Figure S1 but for Ratio.**

Figure S3. Regional mean values of ERR$_{\text{MIP}}$ and $h\left(err_{f_e}\right)$ for the period 2015-2017. The error bars represent the 95% confidence intervals derived from 1000 bootstrap samples of datasets.
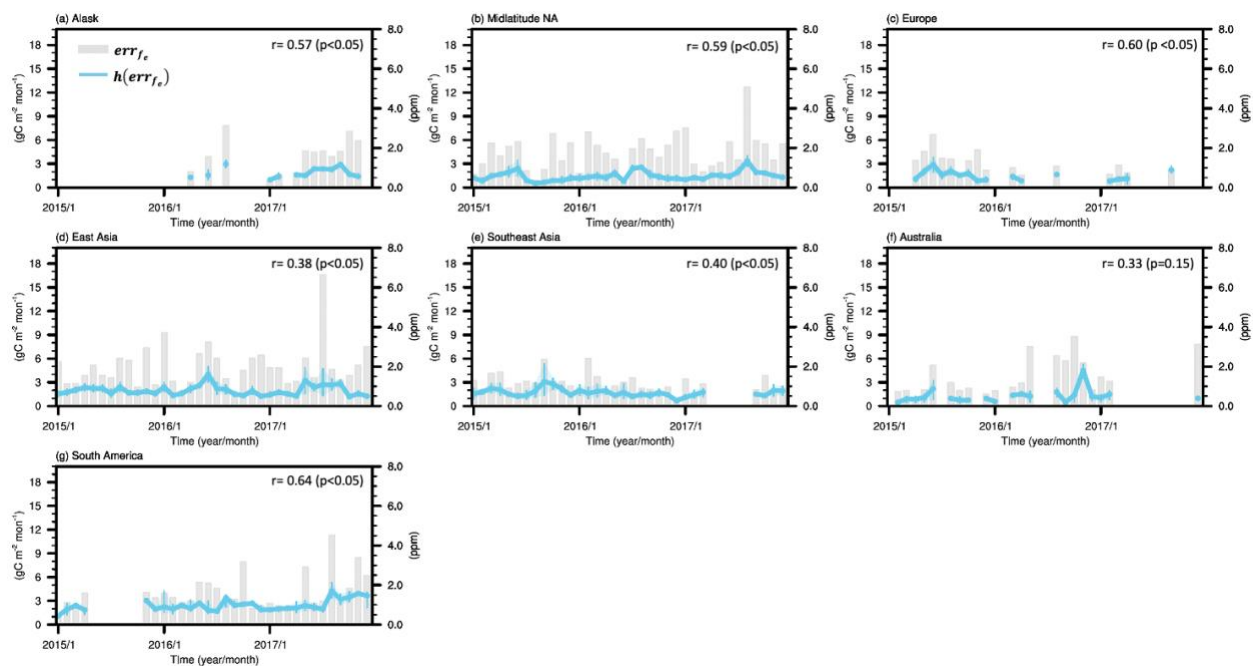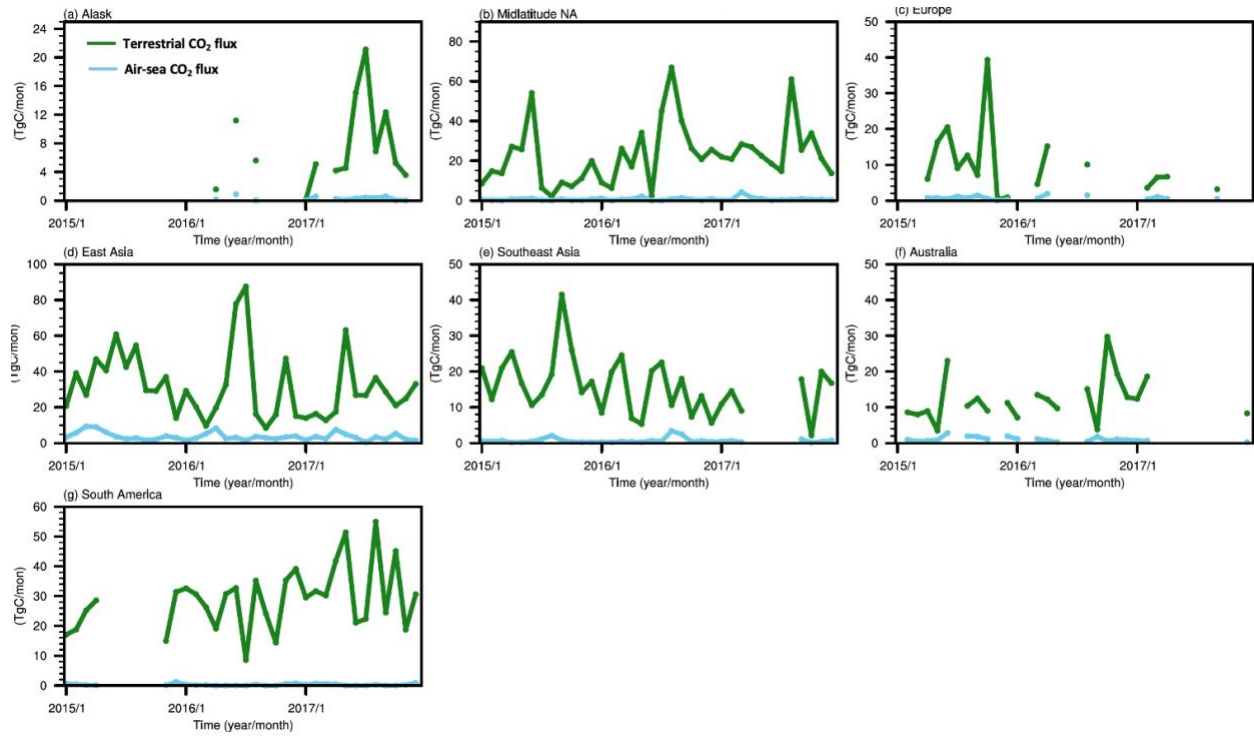
Figure S4. Monthly variations of $h\left(err_{f_e}\right)$ (line) and err_{f_e} (bar) for each region. The upper right number indicates the correlation coefficient between them.

Figure S5. Monthly variations of one standard deviation of OCO-2 MIP inversion estimates in total terrestrial CO_2 fluxes (green line) and total air-sea CO_2 fluxes (blue line) within the effective area to aircraft measurements for each region.