

Detection of Fossil and Biogenic Methane at Regional Scales Using Atmospheric Radiocarbon

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Contents of this file

Calculation of nuclear power plant emissions

Figure S1

Figure S2

Figure S3

Figure S4

Table S1

Calculation of nuclear power plant emissions

We calculated nuclear power plant emissions in units of mol yr⁻¹ by converting the ¹⁴CH₄ emission data reported to the Nuclear Regulatory Commission for 2014-15 in units of Curies (<https://www.nrc.gov/reactors/operating/ops-experience/tritium/plant-info.html>).

A Curie is defined as 37 × 10⁹ Bq, and a Bq is defined as one decay per second. As the rate of decay of ¹⁴C is given by the number of atoms divided by the mean life (8267 yr), then the amount in Curies should be multiplied by 37 × 10⁹ and by 8267. Converting units to mol yr⁻¹ involves multiplying by the number of seconds in a year (3.15 × 10⁷ s/yr) and dividing by Avogadro's number (6.02 × 10²³ atoms/mol).

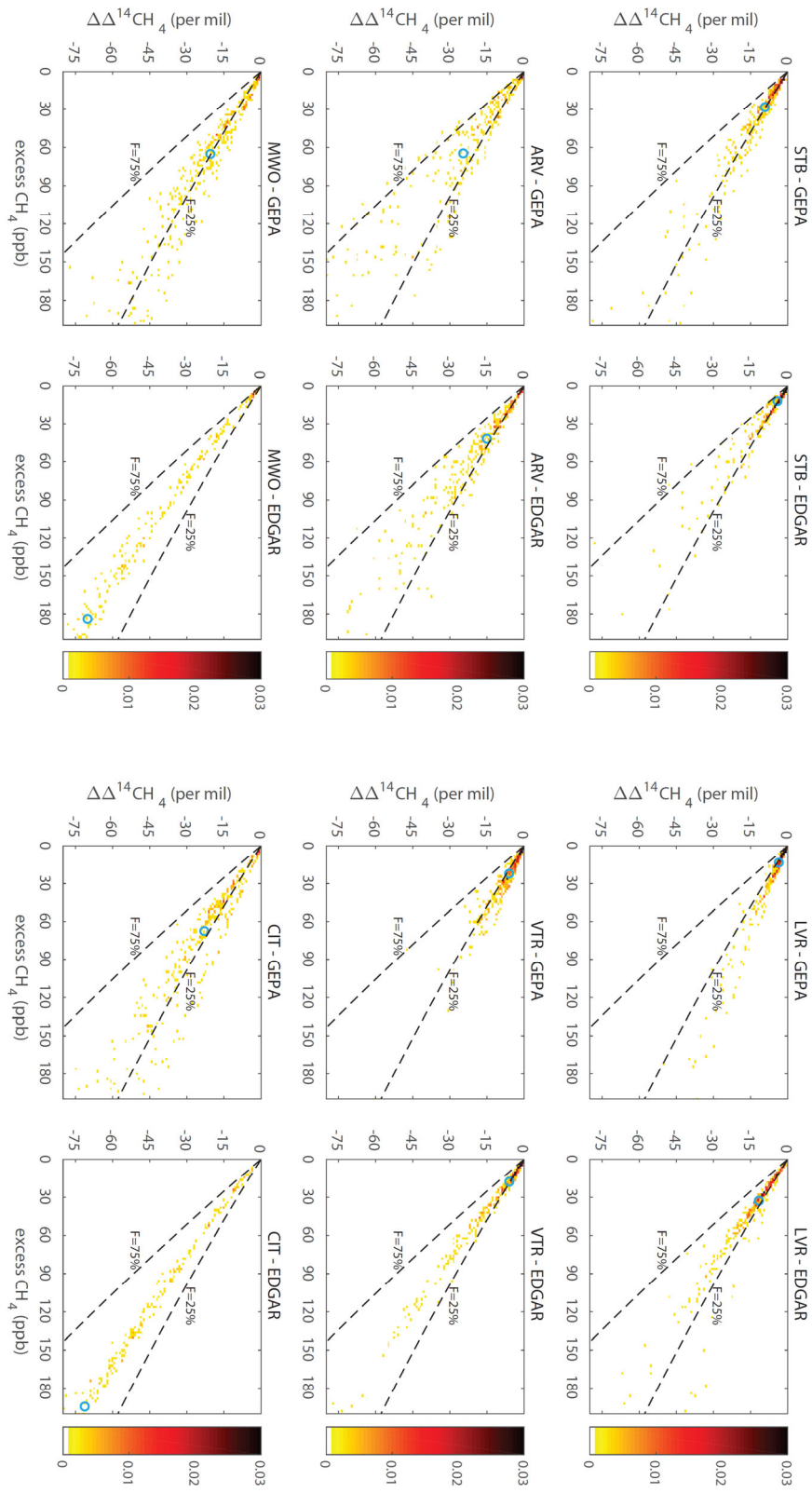


Figure S1. Same as Figure 4 for six other sites.

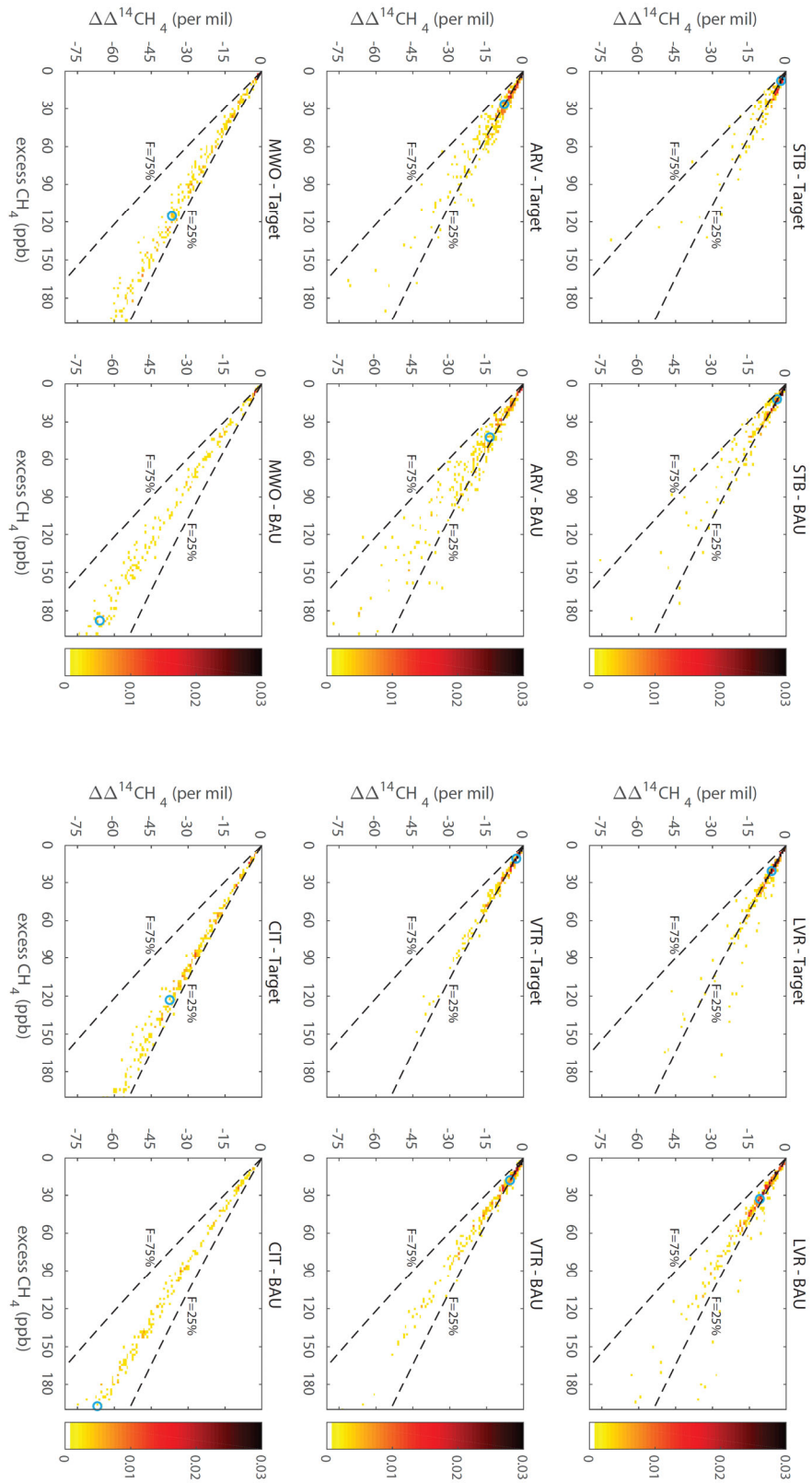


Figure S2. Same as Figure 6 for six other sites.

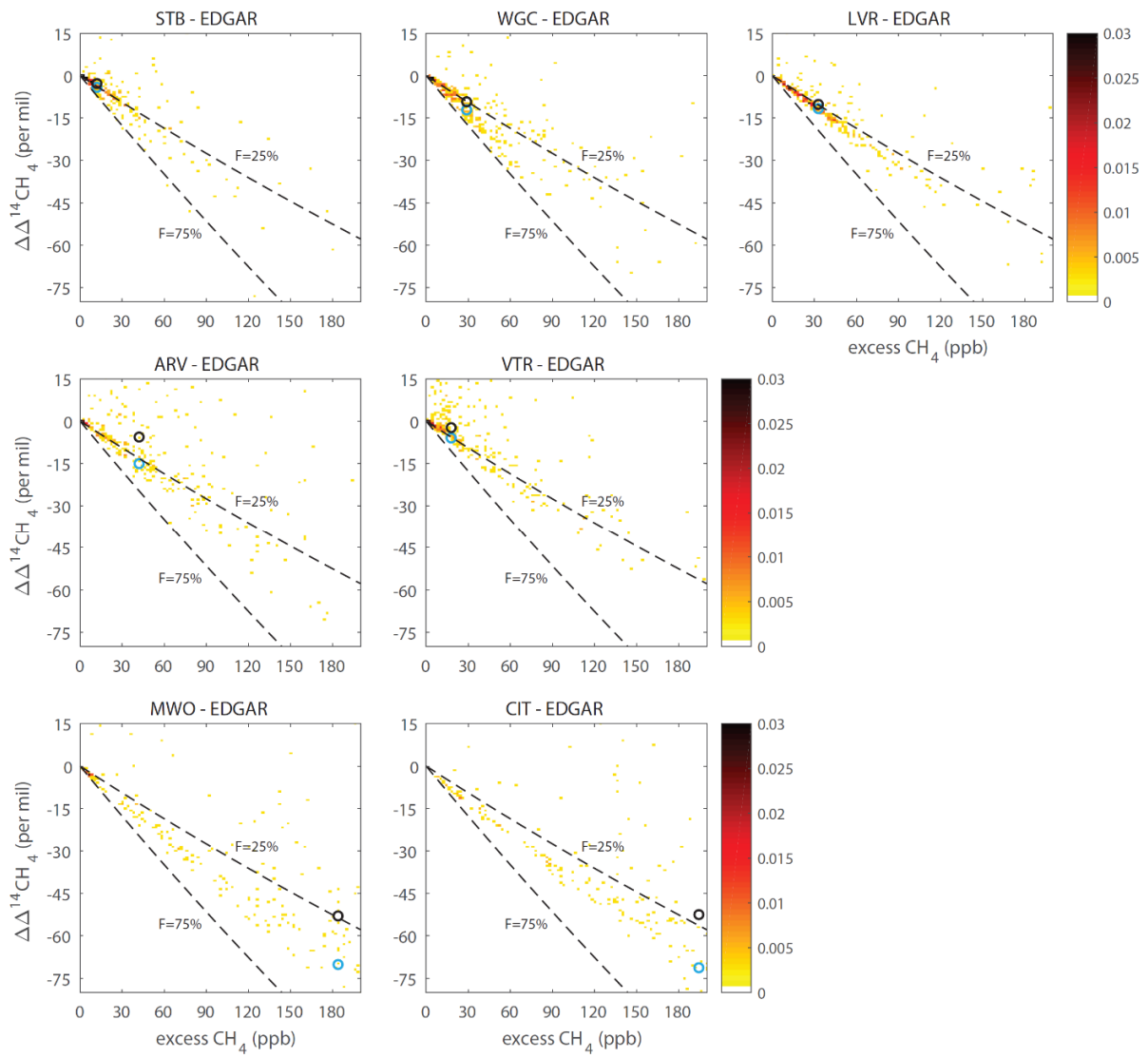


Figure S3. Same as Figure 7b and 7c for seven other sites.

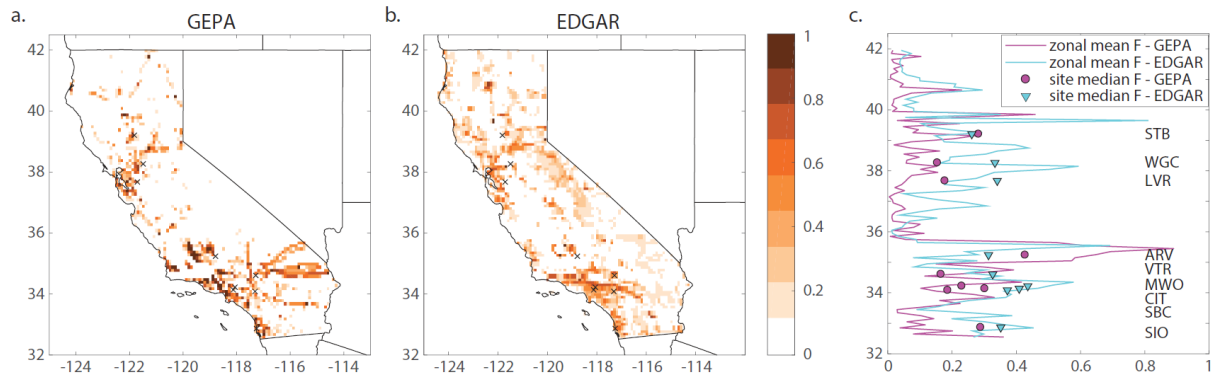


Figure S4. Fossil fraction of CH₄ emissions in California in GEPA [Maasakkers et al., 2016] in a., and in EDGAR [EDGAR, 2011] in b. Observation sites are shown with crosses. Zonally-averaged emission-weighted fossil fraction of emissions in California in GEPA and EDGAR (lines) and median fossil fraction of excess CH₄ concentration for simulations using GEPA and EDGAR (symbols) in c. Observation site codes are listed in c.

Table S1. List of specific sectors included in fossil and biogenic categories for GEPA and EDGAR emissions estimates.

	GEPA	EDGAR
Fossil	1A_Combustion_Mobile 1A_Combustion_Stationary 1B1a_Abandoned_Coal 1B1a_Coal_Mining_Surface 1B1a_Coal_Mining_Underground 1B2a_Petroleum 1B2b_Natural_Gas_Distribution 1B2b_Natural_Gas_Processing 1B2b_Natural_Gas_Production 1B2b_Natural_Gas_Transmission 2B5_Petrochemical_Production 2C2_Ferroalloy_Production	1A1_1A2. Energy Manufac. Transf. 1A3a_c_d_e. Non-road trans. 1A3b. Road Trans. 1A4. Energy for Buildings 1B1. Fugitive from Solid 1B2a. Oil Prod. and Refineries 1B2b. Gas Prod. and Dist. 2. Industrial Process and Product Use 7A. Fossil fuel fires
Biogenic	4A_Enteric_Fermentation 4B_Manure_Management 4C_Rice_Cultivation 4F_Field_Burning 5_Forest_Fires 6A_Landfills_Industrial 6A_Landfills_Municipal 6B_Wastewater_Treatment 6D_Composting	4A. Enteric Ferm. 4B. Manure Management 4C_4D. Agricultural Soils 4F. Agricultural Waste Burning 5A_C_D_F_4E. Large Scale Biomass Burning 6A_6C. Solid Waste Disposal 6B. Wastewater