1. Introduction

This document gives information for gridded datasets of Regional Emission inventory in ASia for Persistent Organic Pollutants (REAS-POP) version 1.0 that present monthly gridded emission. See Inomata et al. (2012) for basic methodology, results, and other information about REAS-POP 1.0. Brief description of REAS-POP 1.0 as follows:

- The monthly emission of each PAH species was estimated by following equation.

$$E_{(i)} = FC_d \times EF_{(i)} \times MF + FC_{nd}/12 \times EF_{(i)} + TR/12 \times EF_{(i)} + E_{BC} \times EF_{(i)/BC}$$

where
E is the each PAH emission (mg mon^{-1}); (i) is the PAH species;
FC_d is the fuel consumption rate for the domestic sector by REAS ver1 (mg yr^{-1});
EF is the emission factor of each PAH (mg kg^{-1} or mg km^{-1});
MF is the grid-based monthly factor;
FC_{nd} is the fuel consumption rate for sectors other than the domestic one by REAS ver1 (mg yr^{-1});
TR is the traffic fuel consumption rate for on-road mobile sources by REAS ver1(km yr^{-1});
E_{BC} is the monthly black carbon (BC) emission of open biomass burning (mg mon^{-1}) from the Global Fire Emissions Database version 3 (GFEDv3);
$EF_{(i)/BC}$ is the ratio of each PAH emission (mg) against BC emission (mg) by open biomass burning.

- Fuel consumption rates were derived from REAS ver1. The fuel consumption rates were estimated on province and country levels and was divided into a 0.5° × 0.5° grid by using several databases, including population data, information on the positions of large point sources, a land cover dataset, and a land area dataset.
- The fuel consumption rates were classified into two sources, stationary and on-road mobile sources. The fuel consumption rates of the stationary sources were classified into the following five economic sectors: domestic (FC_d); industry, other transformation, power plant, and other transport (FC_{nd}). The fuel consumption rates of these stationary sources were also categorized by the following seven fuel types: coal (hard coal, brown coal, and derived coal (coke oven)), gas (natural gas), light

fuel (motor gasoline and kerosene), diesel oil, heavy fuel (heavy fuel oil and crude oil), biofuel (fuel wood, crop residue, and animal waste), and others (municipal waste and charcoal). The traffic fuel consumption rates of the on-road mobile sources (TR) were classified into seven types (light-duty gasoline vehicles, heavy-duty gasoline vehicles, light-duty diesel vehicles, heavy-duty diesel vehicles, gasoline buses, diesel buses, and motorcycles).

- These fuel consumption rates were based on the annual average value. To estimate the monthly fuel consumption rate for domestic sources, usage of the space-heating component of residential energy was divided into monthly values because the space-heating component of residential energy use depends on the outdoor temperature. The monthly factor (MF) was estimated using the ratio of monthly usage of the space-heating component of residential energy to the annual one.
- PAH emission from open biomass burning (E_{BC}) was estimated by using the burned area, the BC emission rate, and the PAH and BC emission factors. The burned area and the BC emission rate were derived from GFEDv3 with spatial resolution of 0.5° × 0.5° latitude/longitude and monthly time resolution.
- The factors affecting the emission of gas and particulate PAHs in Northeast Asia were collected from the literature. It was reported that emission factors varied widely depending on the combustion conditions. The median values of emission factors were adopted in this study.

2. Directories and file names

All gridded data are tarred and zipped (with gzip) as YYYY_GRID.tar.gz and XXX_YYYY_GRID.tar.gz. Directories and files are created by unpacking the files as follows:

REAS-POPv1.0_XXX_TOTAL_YYYY_0.5x0.5

XXX: Species codes
YYYY: Years
* See next pages for definition of each code.

(1) XXX: Species codes

Species codes	Species
Flu	Fluoranthene
Pyr	Pyrene
BaA	Benz[*a*]anthracene
Chr	Chrysene
BbF	Benzo[*b*]fluoranthene
BkF	Benzo[*k*]fluoranthene
BaP	Benzo[*a*]pyrene
IcdP	Indeno[1,2,3-*cd*]pyrene
BghiP	Benzo[*g,h,i*]perylene

3. Information to read files

All gridded data are text files and their data format is common. Points to read gridded data sets are as follows:

- First 10 lines are for header information and following lines are formonthly emissions in each grid cell from January to December.(Leap and non-leap year are considered for emissions in February.)

- Spatial resolution is 0.5 degree by 0.5 degree.

- Unit of PAHs emissions is PAH g per month.

Ex.
10
Benz[a]anthracene (BaA) emissions on 0.5 degree by 0.5 degree grid
REAS-POP_BaA_2005_0.5x0.5
Benz[a]anthracene (BaA) [g/mon], 2005, monthly, 0.5 degree by 0.5 degree
Format :
2F9.2, 12E20.8 (longitude, latitude, monthly emission value)
* Longitude and Latitude are center of grid cell
Contact :
inomata@acap.asia, kajino@mri.jma-go.jp
Lon, Lat, JAN, FEB, MAR, APR, MAY, JUN, JUL, AUG, SEP, OCT, NOV, DEC
89.75 34.75 0.89795677E+02 0.81109558E+02
0.45652206E+02 0.44189064E+02 0.23639347E+02

0.22882481E+02 0.23639347E+02 0.23639347E+02 0.22882481E+02

89.75 34.75-> Longitude: 89.75E-90.25E and Latitude 34.75N-35.25N 0.89795677E+02-> January, 0.81109558E+02-> February, ……,

0.23639347E+02-> November, 0.22882481E+02-> December

References

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Ohara, T., Akimoto, H., Kurokawa, J., Horii, N., Yamaji, K., Yan, X., and Hayasaka, T.: An Asian emission inventory of anthropogenic emission sources for the period 1980–2020, Atmos. Chem. Phys., 7, 4419–4444, doi:10.5194/acp-7-4419-2007, 2007 [link].

Giglio, L., Randerson, J. T., Van der Werf, G. R., Kasibhatla, P. S., Collatz, G. J., Morton, D. C., and DeFries, R. S. : Assessing variability and long-term trends in burned area by merging multiple satellite fire products, Biogeosci. 7, 1171-1186, 2010.