



# Global Emissions of Air Pollutants and Greenhouse Gases

## EDGAR

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*Acknowledgements:*

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## What is EDGAR?

- A database of emission factors and activity data.
- Mainly international statistics- adjusted
- Mainly anthropogenic
- Multiple components: GHG, photochemical, aerosol
- Gridded and per country
- Multiple years
- Reference data set for science and policy.



# EDGAR datasets

**EDGAR 2 – 1990 emissions**

**EDGAR 3 – 1970-1995 emissions**

**EDGAR/HYDE 1890-1990 emissions**

**EDGAR Fast Track 3/2000** (per country+on 1°x1° grid)

**EDGAR 4 – 1970-2005 emissions**

**Including precursors and BC/OC**

**Possibly multiple datasets for selected sources (e.g. biomass burning)**

**At 0.1° x 0.1° grid (ca. 10-10 km)**

**EDGAR Fast Track 4/200x**

**stronger user involvement, and interactive options**

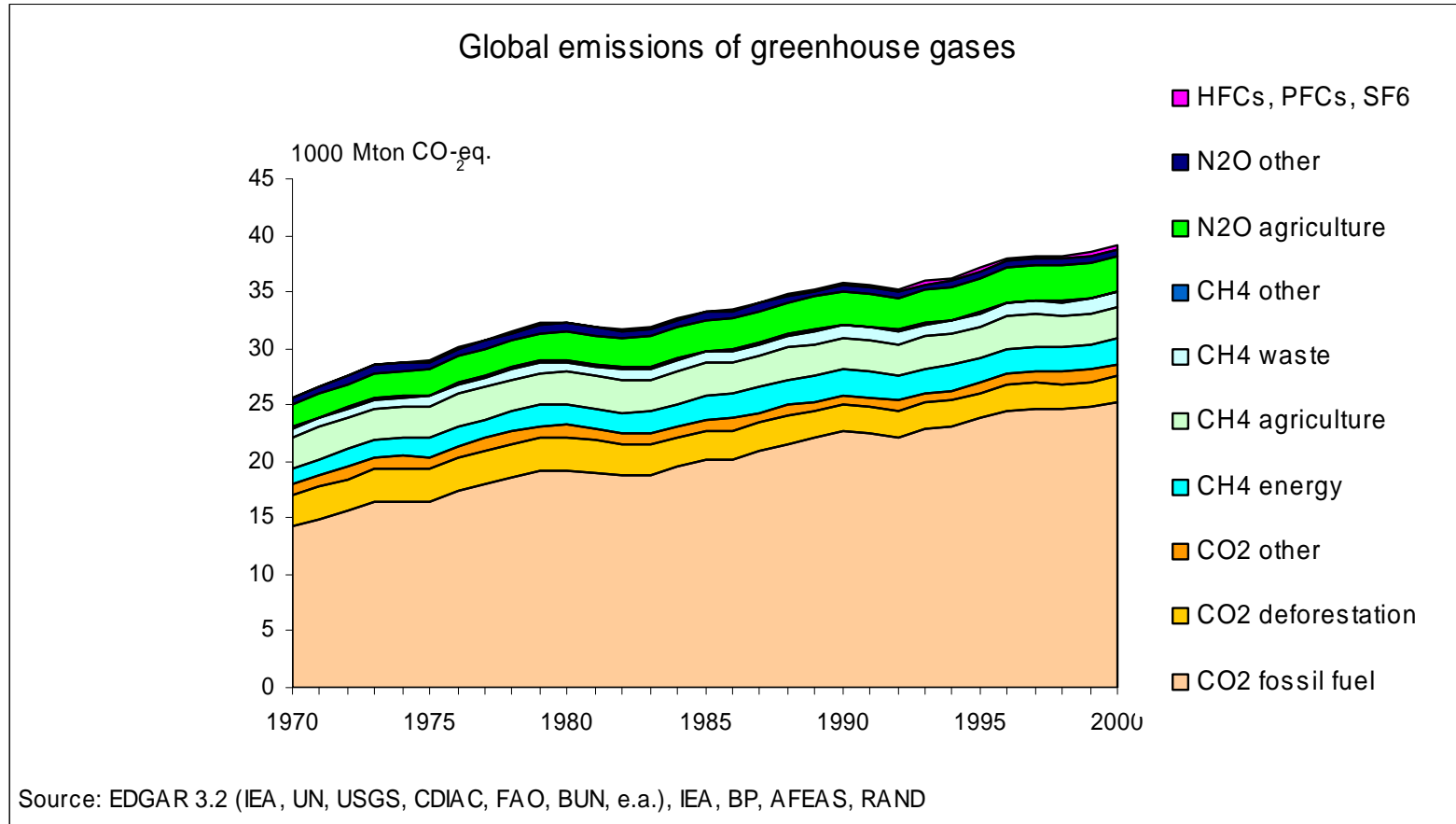
**EDGAR-HTAP**

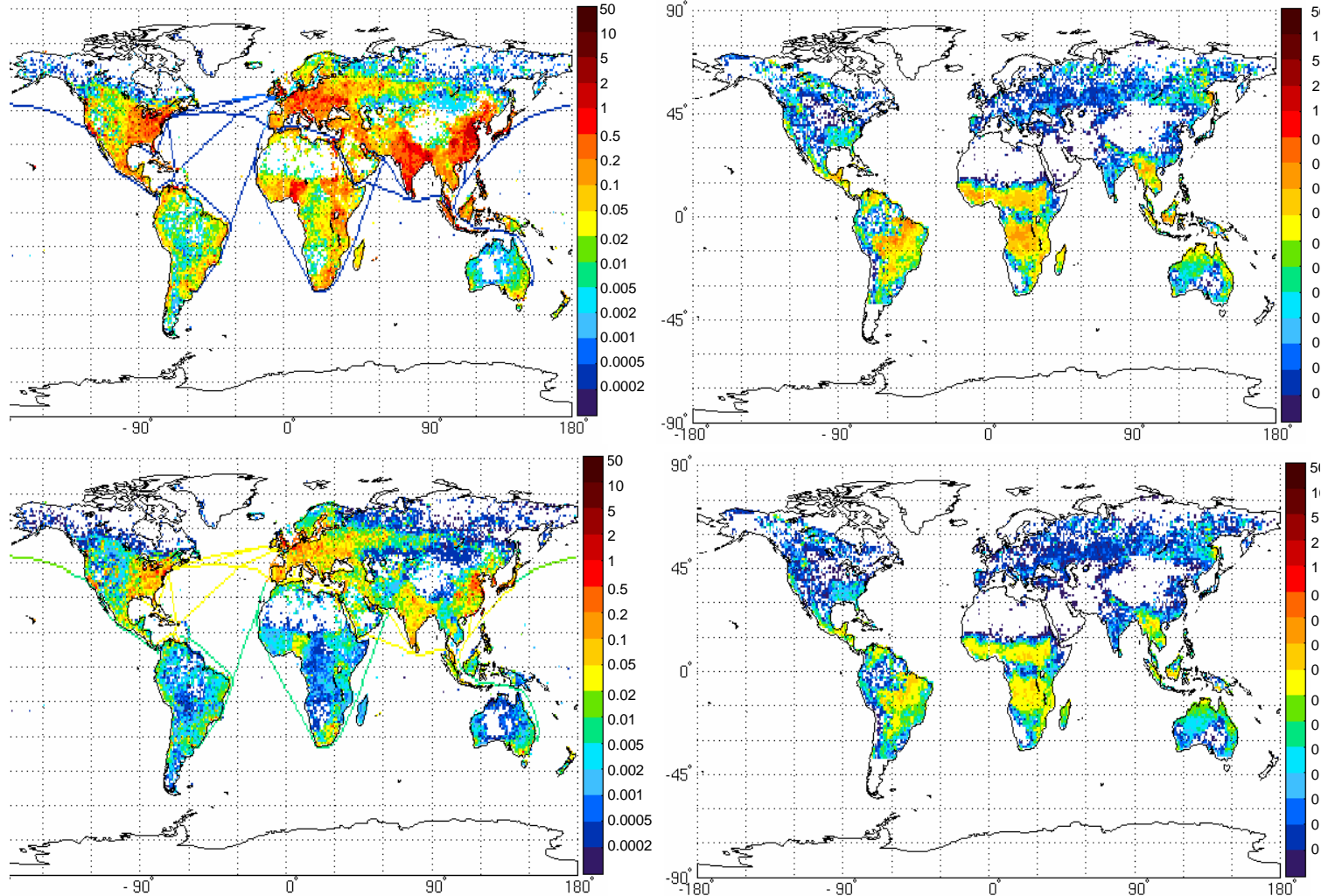
# Components

- direct greenhouse gases  $\text{CO}_2$ ,  $\text{CH}_4$ ,  $\text{N}_2\text{O}$  and new gases HFCs, PFCs,  $\text{SF}_6$ :
- CFCs, halons, HCFCs
- ozone precursors  $\text{CO}$ ,  $\text{NO}_x$ , NMVOC as well as  $\text{SO}_2$  and  $\text{NH}_3$ :
- POM, BC,  $\text{PM}_{2.5}$ ,  $\text{PM}_{10}$
- 1970-2000

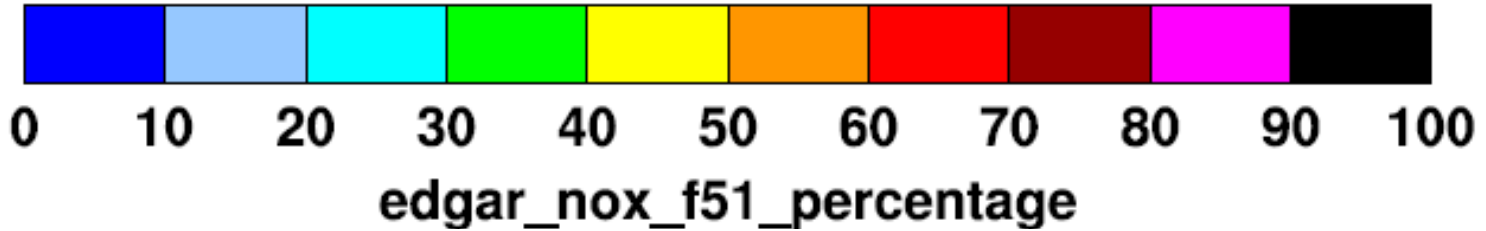
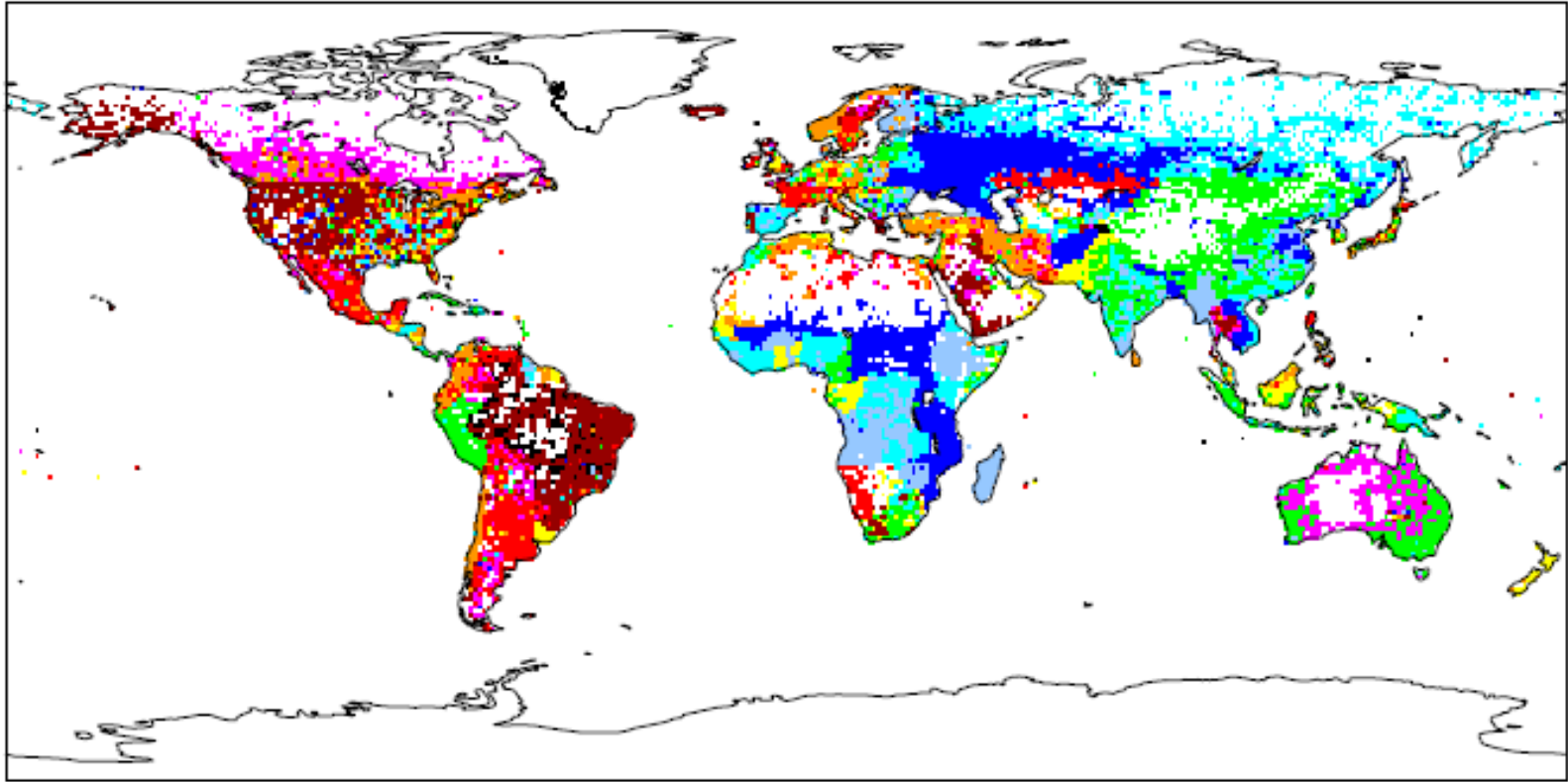
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# EDGAR3.2: Global trends Kyoto gases





**Figure 4-2. Geographical distribution of global emissions.** Global emissions of carbon monoxide (top panels) and nitrogen oxides (bottom panels) from anthropogenic sources (left panels) and biomass burning (right panels), gridded at  $1^\circ \times 1^\circ$  resolution, taken from the EDGARv32FT2000 dataset (units  $10^9 \text{ kg m}^{-2} \text{ s}^{-1}$ ).



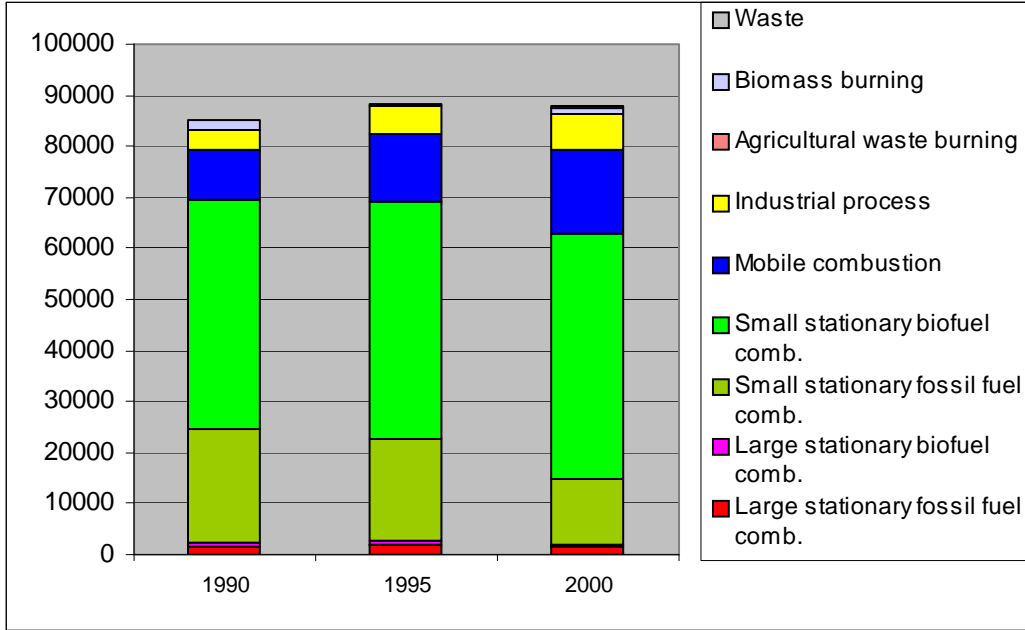


# Comparison of regional emissions results EDGAR FT2000 with REAS

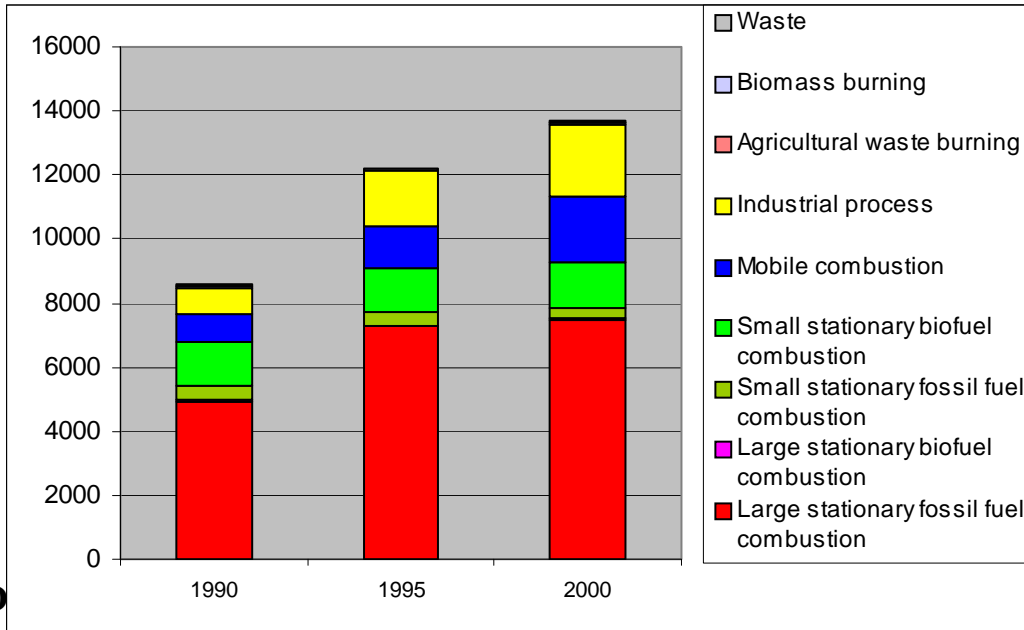


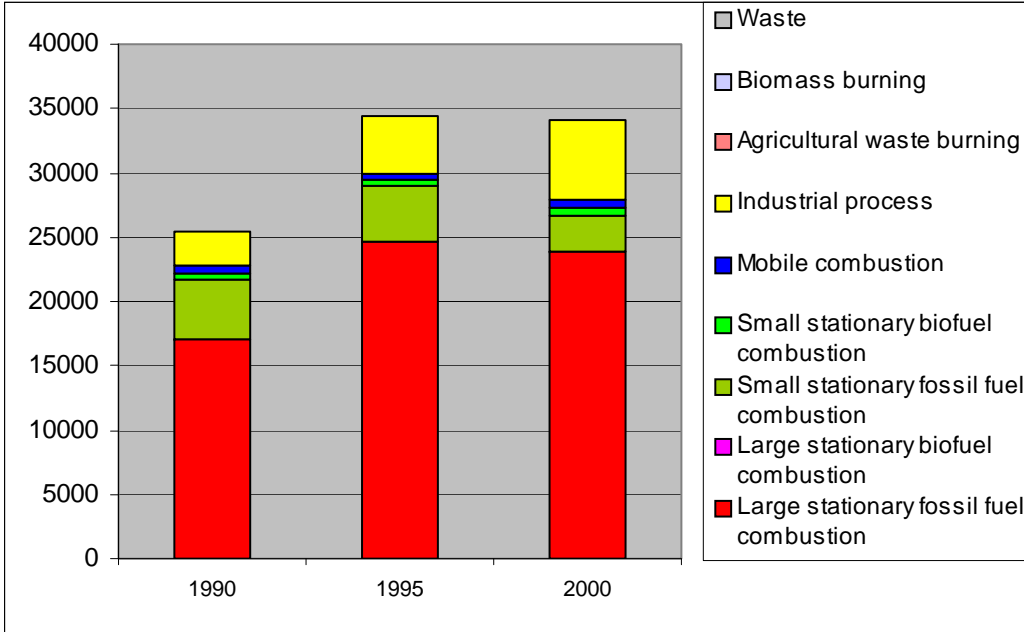


**CO emissions in kton  
(REAS study = 137011 kton in 2000)**

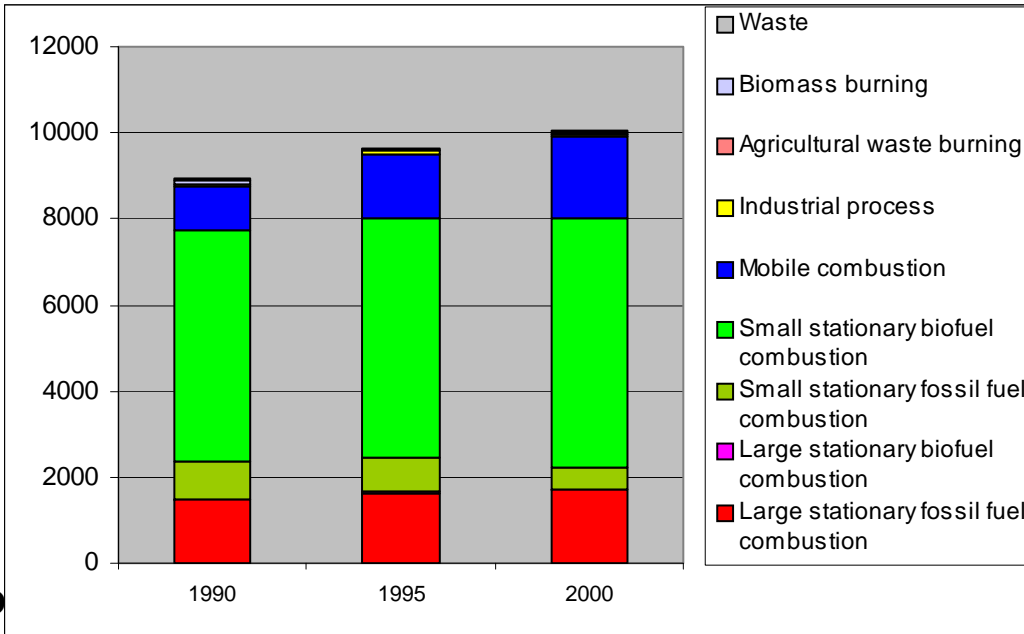


**Nox emissions in kton NO<sub>2</sub>  
(REAS study = 11186 kton in 2000)**





**SO2 emissions in kton**  
**(REAS study = 27555 kton in 2000)**



**NMVOC emissions in kton**  
**(REAS study = 14730 kton in 2000)**



# EDGAR v4




• [John.van-aardenne@jrc.it](mailto:John.van-aardenne@jrc.it)

**Database structure of EDGARv4:**


- Activity data: fuel consumption in power plants (e.g. TJ natural gas)
- Technology data: type of power plant (gas turbine, pulverized coal)
- End-of-pipe (EOP) data: emission control (e.g. wet flue gas desulphurization)
- Technology EF: uncontrolled emissions for activity-technology combination
- EOP reduction factor: % of uncontrolled emission removed by EOP measure.


EOLO home page - Microsoft Internet Explorer

Address: http://edgar.jrc.it/eolo/



disclaimer





**MANAGE DB**

**Activity Data (AD)**

- Activity data (AD)
- Technology and EOP
- Technology based AD

**Emission Factors (EF)**

- Emission Factors (EF)
- EOP Emission Reduction perc
- Technology based EF

**Emissions**


- Emissions

**Gridding Files**

Please make a selection then press submit

Dataset	Substance	Location	Activity codes	Actions
User: edgar_draft Dataset Name: V4.0_EM_AGS <small>multiple selection (CTL+click) only for PLOT (care double codest)</small>	NOx	Region: - Country: -	IPCC code lev.1: 'null' Process Code: - wildcard selection: null	<input checked="" type="radio"/> No Totals <input type="radio"/> Totals by Country <input type="radio"/> Totals by Region <input type="radio"/> Totals by IPCC <input type="radio"/> Totals by EDGAR <input checked="" type="radio"/> by EDGAR codes <input type="radio"/> by IPCC codes <input type="radio"/> by Regions Plot Display download STD download

**OPERATIONS MAP**



**EMISSIONS DATASET**

Data set: V4.0\_EM\_AGS(edgar\_draft) - start/end year: 1970 - 2005

Description: Emissions from agricultural soils

**CODING SYSTEM**

- EDGAR Activity Codes
- Georeferencing codes
- Substances
- Units of measurement
- References

**COMPUTATIONS**

- Compute AD Tech
- Compute EOP EF
- expand EF wildcard
- Compute Emissions
- Scale Emissions on grids

**TOOLS**

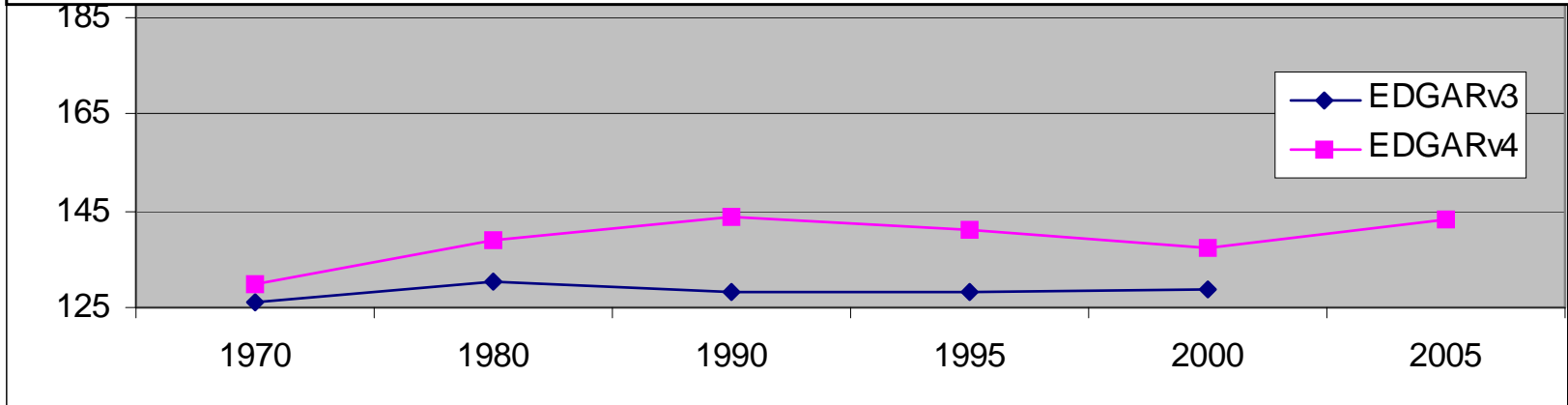
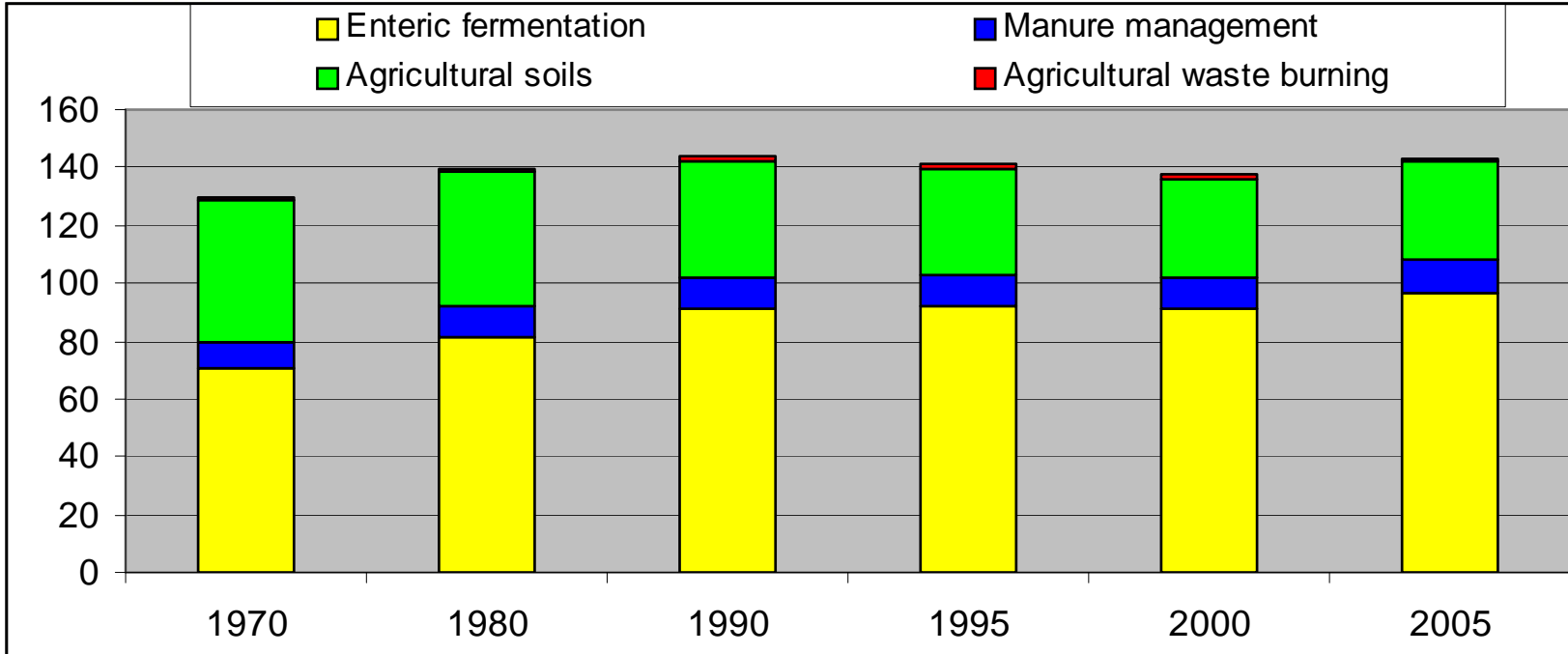
- UPLOAD new data
- Expand EF wildcards
- Documentation (JRC internal only)
- Log-out

Calculation for about 1500 emission processes

Option to upload data for other partners



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**Top: CH<sub>4</sub> (Mton) from agriculture by main category (EDGARv4)**

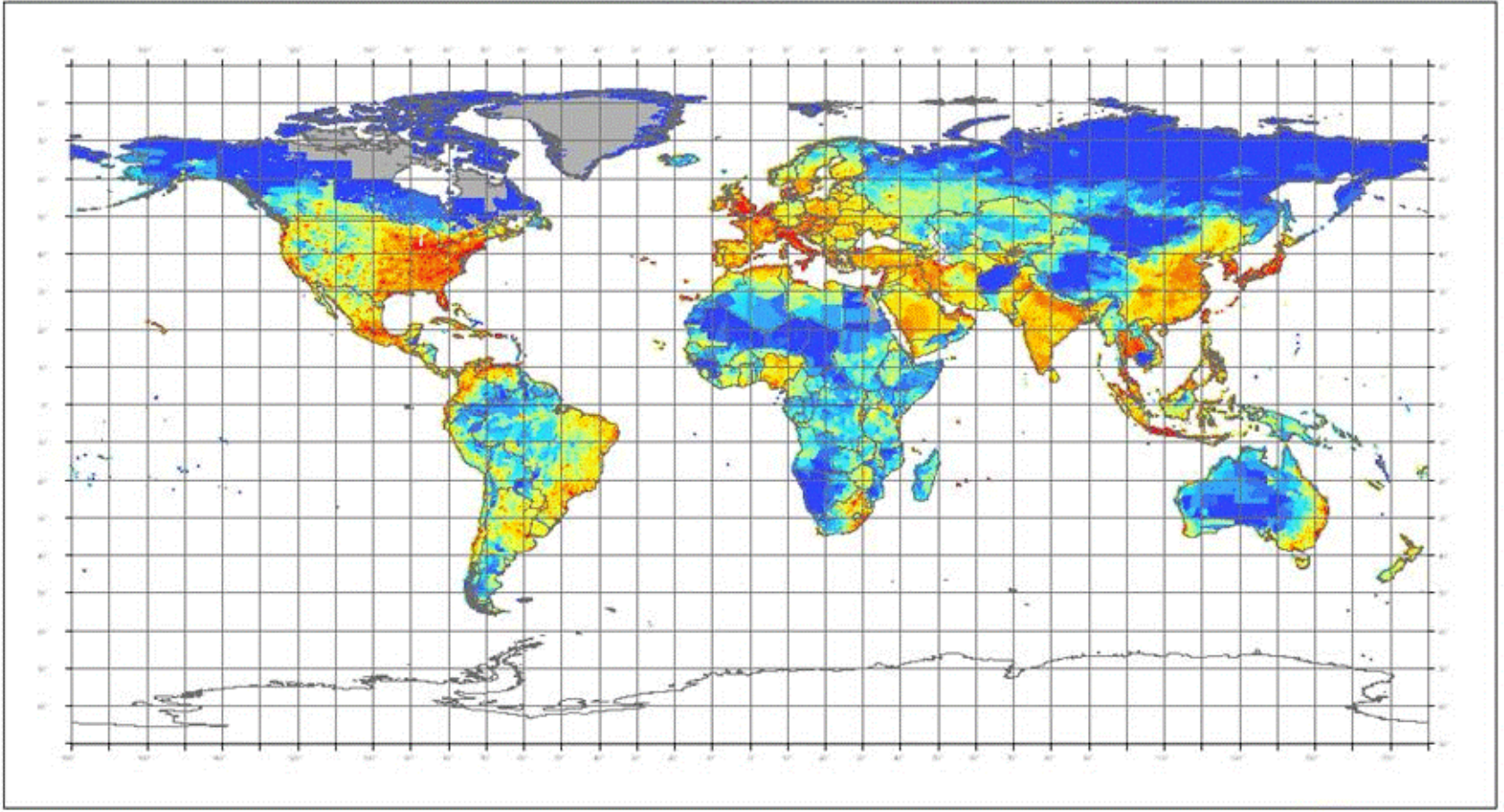
**Bottom: Comparison EDGARv3 and EDGARv4 global CH<sub>4</sub> from agriculture (Mton)**



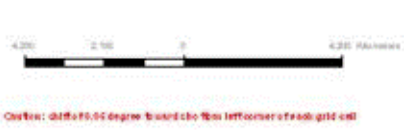
# EDGAR 4: Spatial allocation of emissions to 0.1 x 0.1 degree (first results) 1995

Road Transport (F51) - Methane (CH4) by 0.1 x 0.1 degree resolution  
World 1995

Joint Research Centre



Scale in Gt/yr/0.1 cell		
-4373.4993+ -0.00000	0.00001+ 15.00000	200.00001+ 500.00000
+ 0.00001+ 1.00000	15.00001+ 20.00000	500.00001+ 1000.00000
+ 1.00001+ 2.00000	20.00001+ 30.00000	1000.00001+ 2500.00000
+ 2.00001+ 5.00000	30.00001+ 100.00000	2500.00001+ 5000.00000
+ 5.00001+ 10.00000	100.00001+ 200.00000	5000.00001+ 1308400.98366



  
 This map is produced in the framework of the EDGAR project.  
 Copyright: European Commission, 2001

**DATA SOURCES**

AD set  
 EF set  
 Allocation  
 Reference

  
 EUROPEAN COMMISSION  
 Joint Research Centre  
  
 European Environment Agency

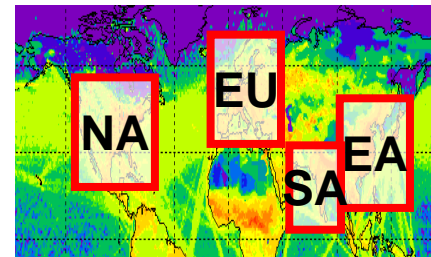
- EDGAR 4 web based version in testing phase
- Will be for 'internal' use as well as for external users
- Optional replacement of EDGAR default data with your own 'better' knowledge datasets.
- Discussion forum
- Release dates?  
Agriculture datasets: soon (within weeks)  
Other emission sources (~ 2-3 months)
- why it takes so long?  
from implied emission factors to technology based approach  
new database system  
new grid allocation and development new grid maps  
240 countries, 30 years, etc.



## Emissions Inventories and Projections for Assessing Hemispheric or Intercontinental Transport (conclusion TF HTAP Beijing 2006)

Assessment for hemispheric transport of air pollution requires global gridded emission inventories of (SO<sub>2</sub>, NO<sub>x</sub>, NMVOC, NH<sub>3</sub>, CH<sub>4</sub>, OC, BC, PM, and CO)

- The quality of emission inventories varies widely
  - For developed countries, some sector inventories are of high quality, as they have been crosschecked by field studies and laboratory tests and through air quality modeling (e.g. emissions power plants)
- For developing and newly industrializing countries, the quality of emission inventories is lower and sometimes poor
  - lack of actual emissions measurements and intensive ambient observations
  - incompleteness of the activity data, and absence of test-based emission factors.
  - A shorter history of inventory development lack of expertise and dedicated institutions.



## Recommendations of Emission workshop (Beijing, 2006) and Interim Assessment report 2007.

- improve the quality of emission methodology and inventories for sources that are poorly known:
  - biomass burning (agricultural waste, biomass for heating and cooking, and forest fires)
  - small and medium scale industry and energy production,
  - transport
  - domestic use of coal.
- Improvements can only be achieved through improved data capture in cooperation with experts from different countries and regions bringing in knowledge of the local conditions governing the emissions in various regions.
- Emissions are changing rapidly in many regions and particularly in Asian countries with rapidly economic growth (emerging economies). There is thus a strong need to update any emission data base to hold as recent data as possible.

### Phase 1 (mid-2008):

Gridded emission inventory relevant for modeling studies for year 2001 and (optional) 2004 will be delivered to HTAP model intercomparison activity

### **Method:**

- Combination of national emission totals by sector with EDGARv4 calculations for those countries and sectors for which no national data has been found.
- National inventories: *US EPA, Environment Canada and EMEP* inventories, other
- For Asia: inventories under discussion (e.g. RAPIDC inventories; others). Workshops planned for evaluating India and China inventories.

### Phase 2 (end-2008):

Evaluate uncertainties in existing inventories based on inventory comparisons and results of model results using phase 1 inventory. Define possible improvements for phase 3 inventory.

### Phase 3 (mid-2009):

Improved gridded emission data including inventory parameters like activity data and emission factors (2000-2007?). Review of EDGAR-HTAP inventory.