

**EMBARGO until July 15<sup>th</sup> 2020, 00.01 (CET)**



## **Methane anthropogenic emissions increase equally from fossil fuel and agriculture and waste sectors**

The Global Carbon Project (GCP) publishes an up-date of the global methane (CH<sub>4</sub>) sources and sinks to the atmosphere. This budget show that global methane emissions have increased by 9 % (about 50 Million tons) between 2000-2006 and 2017. Anthropogenic emissions appear to be the main contributors to this increase, with equal shares between fossil fuel sector and agriculture and waste sector.

The study was conducted by an international research team and led by the *Laboratoire des Sciences du Climat et de l'Environnement* (LSCE, CEA-CNRS-UVSQ) in France, under the umbrella of the Global Carbon Project that initiated the work. Two articles are published on July 15<sup>th</sup> in the journals *Environmental Research Letters* and *Earth System Science Data*.

Methane is the second anthropogenic greenhouse gas after carbon dioxide (CO<sub>2</sub>). However, methane has a warming potential 28 times higher than carbon dioxide (on a 100-year time horizon). Since 1750, atmospheric methane concentration has more than doubled due to emissions from human activities. After a period of stabilizations in the early 2000s, methane concentrations are rising again since 2007. The increase in methane concentrations follows trends of future scenarios that do not comply with the objectives of Paris Agreement.

Marielle Saunois, researcher at LSCE-UVSQ and coordinating the study, specifies that “this budget covers the state of the art of our current knowledge on each source of methane, from the largest (wetlands) to the smallest (hydrates); and more than 90 collaborators contributed”.

### **The methane budget remains uncertain, but about 60% of methane emissions are anthropogenic**

Human activities contribute about 60% of total methane emissions. Natural sources are multiple and diverse: wetland, lakes, reservoirs, termites, geological sources, hydrates etc. The uncertainties on the estimates for each of these sources remain high (more than 100% for inland water systems).

Emissions from agriculture and waste activities contribute 60% of anthropogenic emissions. Anthropogenic emissions are shared as follows between the different main sources of methane:

- 30% from enteric fermentation and manure management
- 22% from oil and gas production and use
- 18% from handling solid and liquid wastes
- 11% from coal extraction
- 8% from rice cultivation
- 8% from biomass and biofuel burning

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- The rest is attributed to transport (e.g. road transport) and industry

64% of global methane emissions originate from the Tropics (<30°N), 32 % from the Northern mid-latitudes (30°N-60°N) and only 4% from the Northern high latitudes (> 60°N).

### **Anthropogenic emissions continue to rise, with an equal share between fossil fuel sector and agriculture and waste sector**

Between the reference period 2000-2006 when atmospheric methane was stable, and the last year of the presented budget (2017), global methane emissions increased by 9 %, 50 million tons of CH<sub>4</sub>. 60 % of this increase is attributed to tropical regions and the rest to the northern mid-latitudes. Methane emissions from boreal regions did not increase significantly. This means that the high climate sensitivity of boreal regions does not (yet) translate in large increase in methane emissions.

This increase in methane emissions is mainly attributed to anthropogenic emissions: 60% related to agriculture and waste, and 40% to fossil fuel sources. A small decrease (few millions of tons) in biomass burning sources is derived.

### **Increasing emissions in Africa, Asia and North America**

The three main regions contributing to this methane emission increase are likely: Africa, China and Asia, each contributing 10-15 million tons of CH<sub>4</sub>. Then North America likely contribute to 5-7 million tons, including 4-5 million tons from USA.

In Africa and Asia (except China), the agriculture and waste sector contribute the most, followed by the fossil fuel sector. This is the opposite for China and North America, where the increase in the fossil fuel sector is largest than the one in the agriculture and waste sector.

### **Decreasing emissions in Europe**

Europe seems to be the only region where emissions have decreased: between -4 et -2 million tons, depending on the approach used for the estimation. This decrease is mainly related to the agriculture and waste sector.

### **Climate warming impact**

Temperature increase in the boreal regions leads to permafrost thaw and changes in ecosystems, by creating thermokarstic lakes for example. However, methods based on atmospheric observations do not find any signal of increasing emissions in these regions for the moment.

### **Emission increase yields increase in atmospheric methane concentrations**

Currently, methane concentrations increase in the atmosphere at a rate of about 8-12 ppb/yr since 2014, as fast as in the 80s.

In 2017 and 2018, the growth rates are estimated at 8.5 et 10.7 ppb/yr, 2 of the 4 highest rates since 2000. This trend is almost as high as in IPCC<sup>1</sup> scenario (AR5) leading to a 3-4 °C increase in mean global surface temperature by 2100, not compliant with Paris agreement objectives.

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This trend needs to be confirmed in the next few years and further analyzed in terms of Paris Agreement objectives.

Methane has a lifetime of about 10 years in the atmosphere, much shorter than CO<sub>2</sub>. Marielle Saunio states that “*regular updates of the global methane budget are necessary as done for carbon dioxide because reducing methane emissions would have a rapid positive effect on climate. To meet the objectives of Paris Agreement, not only CO<sub>2</sub> emissions need to be reduced but also methane emissions.*”

<sup>1</sup> Intergovernmental Panel on Climate Change

### References:

This press communique is coordinated with the release of the global methane budget over 2000-2017, updated by the Global Carbon Project (<https://www.globalcarbonproject.org/>). It is based on the following publications with data and analyses published July 15 at 00:00 (CEST).

Saunio et al. (2020) The Global Methane Budget 2000-2017. *Earth System Science Data*. <https://doi.org/10.5194/essd-12-1561-2020>

Jackson et al. (2020). Increasing anthropogenic methane emissions arise equally from agricultural and fossil fuel sources. *Environmental Research Letters*. <https://doi.org/10.1088/1748-9326/ab9ed2>

### Press conference:

In Paris: July 10<sup>th</sup> 2020 at 9 :30am, Maison des Océans - 195 rue Saint Jacques 75005

### Access to the data:

Data for the global methane budget are available from the Global carbon Atlas, with budgets by regions and sectors. For the release of the global methane budget, the Global Carbon Atlas includes a new design and new applications related to the Global Carbon Project: CO<sub>2</sub> emissions for 343 cities worldwide, and carbon cycle and natural CO<sub>2</sub> emissions from rivers and lakes.

### Before embargo:

Pre-print of the articles and infographics are available [here](#).

Global Carbon Atlas web site supported by BNP Paribas Foundation

<http://cms2018a.globalcarbonatlas.org/>

User name: media

Password: fromLSCE2019

### After embargo:

See link to publications

Data and figures:

- <http://www.globalcarbonproject.org/methanebudget>

- <http://www.globalcarbonatlas.org>

- <https://www.icos-cp.eu/GCP-CH4/2019>

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### **About Global Carbon Project – [www.globalcarbonproject.org](http://www.globalcarbonproject.org)**

The Global Carbon project is a Future Earth Project, that aims to encourage international cooperation in carbon cycle research. In particular, it produces annual report on the carbon cycle resulting from human activities and their stocks in the environment. GCP also produces a regular update (every 2-3 years) of the global methane budget.

### **About Global Carbon Atlas – [www.globalcarbonatlas.org](http://www.globalcarbonatlas.org)**

The Global Carbon Atlas is a platform to explore and visualize the most up-to-date data on carbon fluxes resulting from human activities and natural processes. The Global Carbon Atlas is a community effort under the umbrella of the Global Carbon Project based on the contributions of many research institutions and individual scientists around the world who make available observations, models, and interpretation skills. It provides access to the CO<sub>2</sub> budget and is available in five languages (English, French, Chinese and Russian). It provides infographics and interactive visualization of the global methane budget. Anna Peregou, Patrick Brockmann and P. Peylin du LSCE contributed to the development of the website in 2019.

### **About LSCE – [www.lsce.ipsl.fr](http://www.lsce.ipsl.fr)**

The Laboratoire des sciences du climat et l'environnement (LSCE) is a french research institute managed by CEA, CNRS, université de Versailles Saint-Quentin, and Université de Paris Saclay. It is part of Institut Pierre-Simon-Laplace (IPSL), a group of laboratories in Paris Area. LSCE hosts about 300 researchers, engineers, administration staff and PhD students. LSCE research focuses on variability of past climates and changing climates, greenhouse gases and transfers into environment.

### **À propos de Climate & Biodiversity Initiative**

Since 2010, BNP Paribas foundation has been developing Climate & Biodiversity Initiative, a program aiming at improving and diffusing knowledge on climate and biodiversity, their interactions, by assessing the consequences of the warming climate, and loss in biodiversity on our environment. This program, with a budget of 18 million Euros since 2010, has funded 27 research projects selected by a scientific committee including scientists recognized in their domain (Philippe Gillet, Joanna Haigh, Jean-Pascal Ypersele, Thomas Stocker, Corinne Le Quéré, Franck Courchamp, Sonia Seneviratne et Philippe Cury).