Methane: Emissions increase and it's not good news
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This is the trend underlined in a study recently published on Earth System Science Data (among the authors, the CMCC researchers Simona Castaldi and Sergio Noce from IAFES—Impacts on Agriculture, Forests and Ecosystem Services Division), complemented by an article in Environmental Research Letters.

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-UQUS) in France, under the umbrella of the Global Carbon Project that initiated the work. It represents an up-date of the global methane sources and sinks to the atmosphere for the period 2000-2017. 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.

"We know well," commented CMCC researchers Simona Castaldi and Sergio Noce, "that carbon dioxide is the major driver of climate change, but methane has undoubtedly an important role in this process. This study recently published on ESSD is the result of the great effort of an international research team of more than 90 co-authors; it represents an update of a research previously published in 2016 summing up our current knowledge on methane emissions, their trends and evolution, while combining knowledge of more than 70 research centers all around the world. Each researcher gave a contribution according to her/his own expertise: at the CMCC we dealt with an estimate of CH$_4$ emissions from termites at the global scale—CH$_4$ is released during the anaerobic decomposition of plant biomass in their gut -."

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 and improved emissions inventories and
estimates especially from inland water emissions
will be needed in the future.

A likely major driver of the recent rapid rise in
global CH$_4$ concentrations is an increase of
emissions mostly from agriculture and waste
management; 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. The rest is attributed to transport (e.g. road
transport) and industry.

64% of global methane emissions originate from
the Tropics, 32% from the Northern mid-latitudes
and only 4% from the Northern high latitudes.

Therefore, methane emissions from boreal regions
did not increased significantly. This means that the
high climate sensitivity of boreal regions does not
(yet) translate in large increase in methane
emissions.

**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$_4$.
Then North America likely contribute to 5-7 million
tons, including 4-5 million tons from U.S..

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 and -2
million tons, depending on the approach used for
the estimation. This decrease is mainly related to
the agriculture and waste sector.

To meet the objectives of Paris Agreement, not
only CO$_2$ emissions need to be reduced but also
methane emissions.

Despite still some uncertainties in methane sources
and sinks, the recent increase in methane
concentrations suggests a dominant anthropogenic
contribution.

Although methane is a potent greenhouse gas, its
effect is relatively short, remaining in the
atmosphere for about 10 years, and reducing
methane emissions would have a rapid positive
effect on climate.

Methane therefore might offer growing
opportunities for climate change mitigation while
providing rapid climate benefits and economic,
health and agricultural co-benefits.

**More information:** Marielle Saunois et al, The
Science Data* (2020). DOI: 10.5194/essd-12-1561-2020

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