Press Release
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Max-Planck-Institut für Biogeochemie

Recent rapid growth of atmospheric methane is attributed to increased agricultural emissions

An international consortium of multi-disciplinary scientists has compiled a synthesis of the global methane budget, documenting and analyzing its enigmatic changes since the year 2000. Unlike carbon dioxide, in the late 1990s the growth rate of methane slowed to zero, and scientists struggled to explain this unexpected change. After a period of stability until around 2006, the amount of methane in the atmosphere began to rise again. Since 2014 atmospheric methane concentrations are rising at a faster rate than at any time in the previous two decades, approaching the most greenhouse-gas-intensive scenarios proposed. The reasons for this increase are hotly debated.

The new comprehensive study, published today in Earth System Science Data, attributes the recent rapid rise in global methane concentrations to increased biogenic emissions, mostly from agriculture, rather than to increases from fossil fuels or wetlands. The study does not rule out the possibility that the rise might be in part due to a reduction of the chemical sink through which methane is destroyed in the atmosphere. A combination of top-down (atmospheric observations and inverse modeling using transport models) and bottom-up (land surface process models, inventories for anthropogenic emissions) approaches enabled the consortium to analyze and synthesize current knowledge about the global and regional methane budgets.

"One of the most difficult aspects of determining methane fluxes through atmospheric inversion is the fact that all the source categories and even the sinks are rather uncertain", explains Julia Marshall of the Max Planck Institute for Biogeochemistry in Jena, Germany, who contributed model simulations to the study. "This has led to a variety of contradictory theories being put forward in the literature to explain both the flattening of the growth rate as well as the subsequent increase. Based upon the available measurements of atmospheric methane alone, it is difficult to convincingly prove a given theory. This is where the combination of top-down and bottom-up approaches, organized within the Global Carbon Project, can help constrain the problem."

The study estimated the global methane emissions to be approximately 559 [540-570] $TgCH_4/yr$ over the period 2003-2012 through an ensemble of "top-down" approaches. The global methane sources are distributed across a range of categories, with approximately 60% considered to be anthropogenic, or directly attributable to human activity. Natural methane sources include wetlands and geologic seeps. Of the anthropogenic emissions, approximately 60% are due to agricultural activities and waste management, while approximately one third is linked to fossil fuel production and use.

Methane is a potent greenhouse gas, 28 times more powerful - per kg - than carbon dioxide on a 100-year time horizon, and its concentration in the atmosphere has increased by 150% since 1750, largely due to human activity.

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Editorial
Saunois M, RB Jackson, P Bousquet, B Poulter, JG Canadell 2016 The growing role of methane in anthropogenic climate change. **Environmental Research Letters** 11, 120207, doi: 10.1088/1748-9326/11/12/120207. http://iopscience.iop.org/article/10.1088/1748-9326/11/12/120207

Access:

- Data and figures: http://www.globalcarbonproject.org/methanebudget
- Data at CDIAC: http://cdiac.ornl.gov/GCP/methanebudget/2016/

Social media:

- Facebook https://www.facebook.com/globalcarbonproject
- Twitter: @gcarbonproject
- Infographics: http://www.globalcarbonatlas.org

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Global livestock is an important source of methane emissions with cattle being the animals responsible for the most livestock sector's emissions. (Photo by Susanne Héjja)