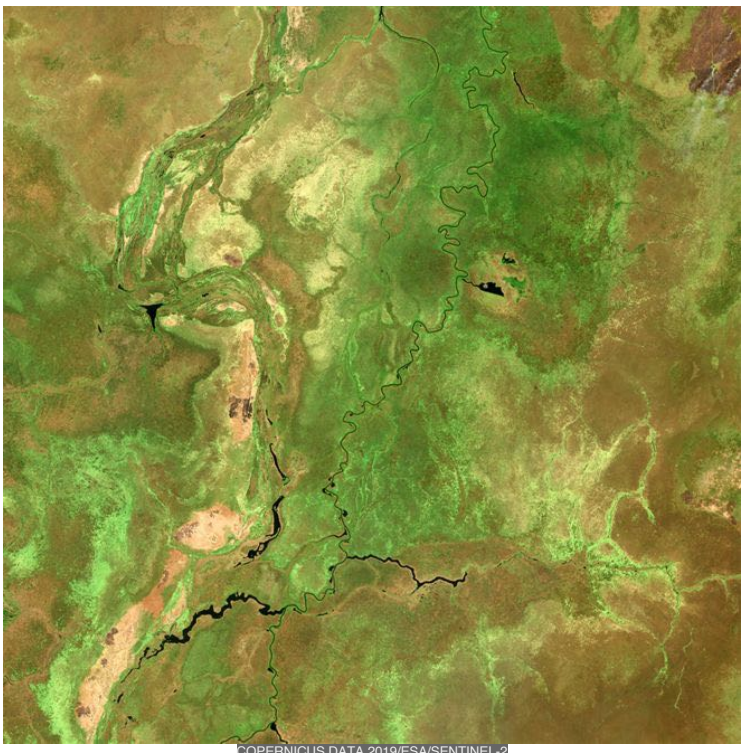
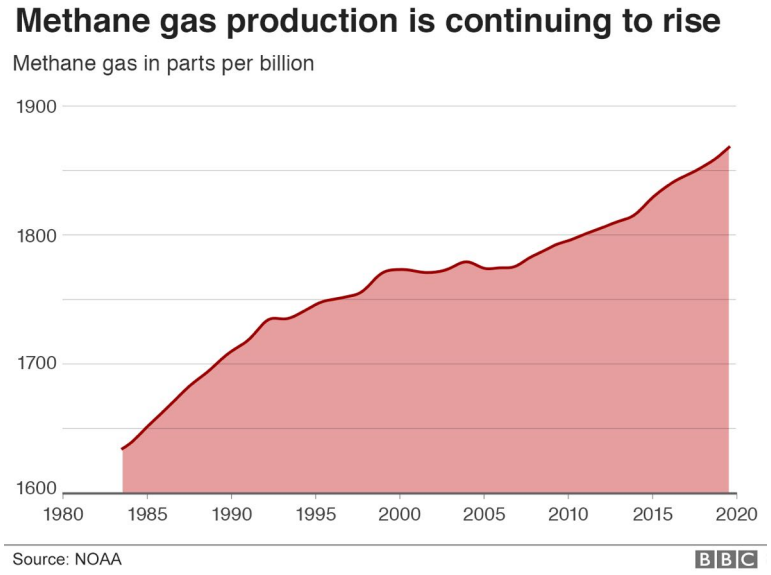
Climate change: Methane pulse detected from South Sudan wetlands

By Jonathan Amos
BBC Science Correspondent, San Francisco
8 hours ago



COPERNICUS DATA 2019/ESA/SENTINEL-2
The Sudd: Microbes in saturated soils will produce methane

Scientists think they can now explain at least part of the recent growth in methane (CH4) levels in the atmosphere.
Researchers, led from Edinburgh University, UK, say their studies point to a big jump in emissions coming from just the wetlands of South Sudan.
Satellite data indicates the region received a large surge of water from East African lakes, including Victoria.
This would have boosted CH4 from the wetlands, accounting for a significant part of the rise in global methane.
Perhaps even up to a third of the growth seen in the period 2010-2016, when considered with East Africa as a whole.
"There's not much ground-monitoring in this region that can prove or disprove our results, but the data we have fits together beautifully," said Prof Paul Palmer.
"We have independent lines of evidence to show the Sudd wetlands expanded in size, and you can even see it in aerial imagery - they became greener," he told BBC News.

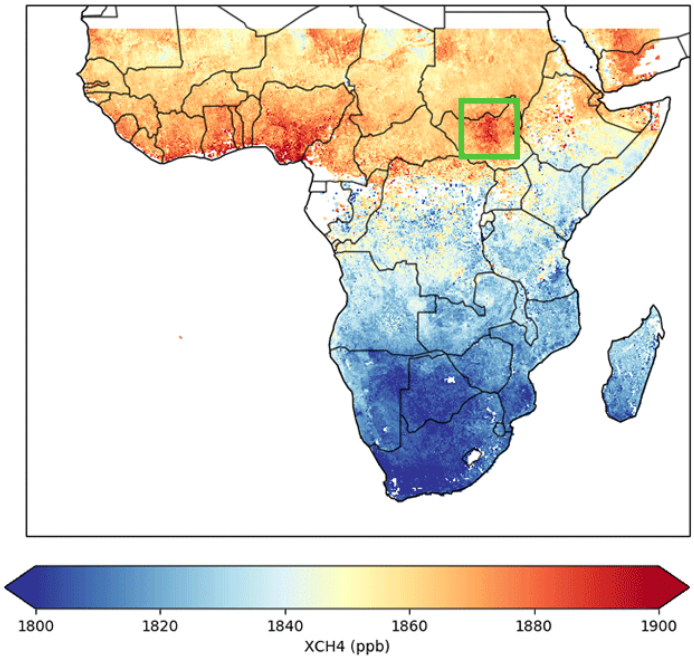


Methane is a potent greenhouse gas, and - just like carbon dioxide - is increasing its concentration in the atmosphere.
It's not been a steady rise, however. Indeed, during the early 2000s, the amount of the gas even stabilised for a while. But then the concentration jumped in about 2007, with a further uptick recorded in 2014.

CH4 (methane) is now climbing rapidly and today stands at just over 1,860 parts per billion by volume.
There's currently a debate about the likely sources, with emissions from human activities such as agriculture and fossil-fuel use undoubtedly in the mix. But there is a large natural component as well, and a lot of current research is centred on contributions from the tropics.

Mark Lunt: "There is still huge uncertainty about methane sources"

The Edinburgh group has been using the Japanese GOSAT spacecraft to try to observe the greenhouse-gas behaviour over peatlands and wetlands in Africa, and found significant rises in methane emissions above South Sudan centred on the years 2011-2014.
Believing the region called the Sudd could be the culprit (soil microbes in wetlands are known to produce a lot of methane), the team started looking through other satellite data-sets to make the link.
Land surface temperature observations supported the idea that soils in the region had become wetter; gravity measurements across East Africa also detected an increase in the weight of water held in the ground; and satellite altimeters had tracked changes in the height of lakes and rivers to the south.
"The levels of the East African lakes, which feed down the Nile to the Sudd, increased considerably over the period we were studying. It coincided with the increase in methane that we saw, and would imply that we were getting this increased flow down the river into the wetlands," explained Dr Mark Lunt.
Much of the extra water likely resulted as a consequence of dam releases upstream.



COPERNICUS DATA/ESA/TROPOMI
Tropomi detects a methane hotspot right over the Sudd (green square)

The Edinburgh group **published its findings on Wednesday in the journal Atmospheric Chemistry and Physics**, and, as an update to the story, Dr Lunt is presenting new data here at the American Geophysical Union meeting.
He's been looking at **methane observations made by the EU's Sentinel-5P satellite**. Its Tropomi instrument sees CH4 at a finer resolution than

GOSAT, and it's clear from the European mapper that methane emissions are still elevated over South Sudan.
The level of activity is nothing like the same as in the early 2010s, but the Sudd wetlands remain an important source.
"It's a huge area so it's not surprising that it's pumping out a lot of methane. To give context - the Sudd is 40,000 sq km: two times the size of Wales. And being that big we expect to see the emissions from space," Dr Lunt told BBC News.

Methane surge needs 'urgent attention'

By Jonathan Amos
BBC Science Correspondent, San Francisco
12 December 2016

THINKSTOCK
Rice paddies are a significant source of methane

Scientists say they are concerned at the rate at which methane in the atmosphere is now rising.
After a period of relative stagnation in the 2000s, the concentration of the gas has surged.
Methane (CH_4) is a smaller component than carbon dioxide (CO_2) but drives a more potent greenhouse effect.
Researchers warn that efforts to tackle climate change will be undermined unless CH_4 is also brought under tighter control.
"CO_2 is still the dominant target for mitigation, for good reason. But we run the risk if we lose sight of methane of offsetting the gains we might make in bringing down levels of carbon dioxide," said Robert Jackson from Stanford University, US.
Prof Jackson was speaking ahead of this week's American Geophysical Union (AGU) meeting in San Francisco where **methane trends will be a major point of discussion**.
With colleagues who are part of an initiative called the **Global Carbon Project**, he has also just authored **an editorial in the journal Environmental Research Letters (ERL)**.
This paper makes a clarion call to the scientific community to address the knowledge deficit that surrounds CH_4.

Robert Jackson: "Biological sources are probably the biggest contributors to the increase"

Quite why methane has suddenly spiked is not obvious. After barely moving between 2000 and 2006, the concentration in the atmosphere ticked upwards from 2007, and then jumped sharply in 2014 and 2015.
In those final two years, methane rose rapidly by 10 or more parts per billion (ppb) annually.
It is now just above 1,830ppb. By contrast, global CO_2 emissions have flattened somewhat of late, giving hope that the rise in its atmospheric concentration (currently just above 400 parts per million) might also slow.
"Methane has many sources, but the culprit behind the steep rise is probably agriculture," Prof Jackson told BBC News.
"We do see some increased fossil fuel emissions over the last decade, but we think biological sources, and tropical sources, are the most likely."
Agricultural sources would include cattle and other ruminants, as well as rice paddies.

Emissions from wetlands are almost certainly a significant part of this story as well. But so too could be the role played by the chemical reactions that normally remove methane from the atmosphere.
One of the most important of these is the destruction process involving the so-called hydroxyl radical.
The concentration of this chemical species in the atmosphere might also be changing in some way.
According to the ERL editorial, there needs to be a particular push on understanding such methane "sinks".

CNES
A number of new satellite sensors are planned to target methane

CH4 is about 30 times better than CO2, over a century timescale, at trapping heat in the atmosphere.
Scientists use computer models to try to project how Earth will warm given a certain mix of gases, and right now methane's growth rate is close to a path that would take the world into a very challenging future.
"If we want to stay below two degrees temperature increase, we should not follow this track and need to make a rapid turn-around," said Dr Marielle Saunois from the University of Versailles Saint Quentin, France. She is the lead author on the ERL paper.
One development that should help scientists as they grapple with the methane issue is the launch of new satellites.
A number sensors are planned that will specifically target carbon molecules.
"I'm optimistic that the scientific community and the policymakers will be able to have better information. I'm optimistic because there are new satellites coming along that will give us the power to see methane concentrations all over the world on a regular basis," explained Prof Jackson.
"Methane is more difficult to study than CO2 because it's more diffuse, but I think we're poised to make really good progress over the next few years."