ANGLAIS

Australian fires in 2019-2020 had even more global reach than previously thought

The severe, devastating wildfires that raged across southeastern Australia in late 2019 and early 2020 packed a powerful punch that extended far beyond the country, two new studies find. The blazes injected at least twice as much carbon dioxide into the atmosphere as was previously thought, one team's satellite-derived estimates revealed. The fires also sent up vast clouds of smoke and ash that wafted far to the east over the Southern Ocean, fertilizing the waters with nutrients and triggering widespread blooms of microscopic marine algae called phytoplankton, another team found. Both studies were published online September 15 in *Nature*.

Meteorologist Ivar van der Velde of the SRON Netherlands Institute for Space Research in Leiden and colleagues first examined carbon monoxide data collected over southeastern Australia by the satellite-based instrument TROPOMI from November 2019 to January 2020, during the worst of the fires. Then, to get new estimates of the carbon dioxide emissions attributable to the fires, the team used previously determined ratios of carbon monoxide to carbon dioxide emitted by the region's eucalyptus forests – the predominant type of forest that was scorched in the blazes – during earlier wildfires and prescribed burns.

Van der Velde's team estimates that the fires released from 517 trillion to 867 trillion grams of carbon dioxide to the atmosphere. "The sheer magnitude of CO_2 that was emitted to the atmosphere … was much larger than what we initially thought it would be," Van der Velde says. The emissions "from this single event were significantly higher than what all Australians normally emit with the combustion of fossil fuels in an entire year." Previous assessments of CO_2 emissions from the fires, based on estimations of burned area and biomass consumed by the blazes, calculated an average of about 275 trillion grams. Using the satellite-derived carbon monoxide data, the researchers say, dramatically improves the ability to distinguish actual emissions from the fires from other background sources of the gases, giving a more accurate assessment.

That finding has worrisome implications. The fires swiftly cut a swath through southeastern Australia's eucalyptus forests, devastating the forests to a degree that made their rapid recovery more difficult – which in turn affects how much carbon the trees can sequester, van der Velde says. Fires in northern and central Australia's dry, grassy savannas are seen as more climate neutral because the grasses can regrow more quickly, he says. […] The smoke and ash from the fires also packed a powerful punch. Scientists watched in awe as the fires created a "super outbreak" of towering thunderclouds from December 29 to December 31 in 2019. These clouds spewed tiny aerosol particles of ash and smoke high into the stratosphere.

Aerosols from the fires also traveled eastward through the lower atmosphere, ultimately reaching the Southern Ocean where they triggered blooms of phytoplankton in its iron-starved waters. Geochemist Weiyi Tang, now at Princeton University, and colleagues analyzed aerosols from the fires and found the particles to be rich in iron, an important nutrient for the algae. By tracing the atmospheric paths of the cloud of ash and smoke across the ocean, the team was able to link the observed blooms – huge patches of chlorophyll detected by satellite – to the fires.

Researchers have long thought that fires can trigger ocean blooms, particularly in the Southern Ocean, under the right conditions, says marine biogeochemist Joan Llort, now at the Barcelona Supercomputing Center and a coauthor on the study. But this research marks the most direct observation ever made of such an event – in part because it was such a massive one, Llort says.

Large ocean blooms are “yet another process which is potentially being modified by climate change,” says biogeochemist Nicolas Cassar of Duke University, also a coauthor on the study. One of the big questions to emerge from the study, Cassar adds, is just how much carbon these phytoplankton may have ultimately removed from the atmosphere as they bloomed. Some of the carbon that the algae draw out of the air through photosynthesis sinks with them to the seafloor as they die. But some of it is quickly respired back to the atmosphere, muting any mitigating effect that the blooms might have on the wildfire emissions. To really assess what role the algae play, he says, would require a rapid-response team aboard an ocean vessel that could measure these chemical processes as they are happening. […]

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I. COMPRÉHENSION

Choisissez la réponse qui vous paraît la plus adéquate en fonction du sens du texte.

1. From line 1 to line 8, it should be understood that:
(A) There was twice as much CO_2 in the atmosphere as before.
(B) The scientists didn’t expect such an increase in CO_2.
(C) The scientists overestimated the CO_2 increase.
(D) There was less CO_2 than in the past.

2. From line 1 to line 8, it should be understood that the fires:
(A) caused the extinction of some species.
(B) enriched the ocean water.
(C) altered the color of algae.
(D) reduced the size of algae.

3. From line 9 to line 15, it should be understood that the fires:
(A) were much stronger before November 2019.
(B) reached a peak in January 2020.
(C) were more threatening in November 2019.
(D) were intense between November 2019 and January 2020.

4. From line 9 to line 15, it should be understood that the region’s eucalyptus forests:
(A) were never touched by fires.
(B) had been devastated by fires previously.
(C) were the only ones to resist fire.
(D) were of no help for the scientists’ studies.

5. From line 16 to line 25, it should be understood that:
(A) Australia emits fewer emissions than other countries.
(B) The 2019-2020 fires rejected 517 trillion grams of CO_2 into the atmosphere.
(C) Around 275 trillion grams of CO_2 were released during the fires.
(D) The use of a satellite increased the estimate accuracy.

6. From line 26 to line 33, it should be understood that:
(A) More long-term damage was caused in northern Australia than in other regions.
(B) Eucalypsus forests are more fragile than savannas.
(C) Grassy regions were left untouched by the fires.
(D) Trees recover much faster than grass.

7. From line 26 to line 33, it should be understood that late in December 2019:
(A) Big clouds were formed in the sky.
(B) The CO_2 emissions vanished for a while.
(C) Ash particles were spread on the soil only.
(D) Little smoke was seen in the air.

8. From line 34 to line 40, it should be understood that aerosol particles:
(A) traveled from the Southern Ocean to the North.
(B) were iron-free.
(C) quickly reached the Western region.
(D) gave birth to phytoplankton in the water.

9. From line 34 to line 40, it should be understood that algae:
(A) need iron to survive.
(B) release a lot of iron.
(C) can prevent the fire from spreading.
(D) feed solely on iron.

10. From line 41 to line 45, it should be understood that scientists ... how much CO_2 has been absorbed by phytoplankton.
(A) know exactly
(B) don't care about
(C) still wonder
(D) are about to find out

11. From line 46 to line 54, it should be understood that when algae die:
(A) all the carbon they have absorbed falls to the sea floor.
(B) they attract even more CO_2.
(C) they continue taking in CO_2 for a while.
(D) some of the absorbed carbon goes back into the air.

12. From line 46 to line 54, it should be understood that to study the algae-based CO2 capture process, scientists:
(A) will use a big recipient.
(B) will need to go to the ocean.
(C) will have to collect a lot of money.
(D) will have to recruit a very large team of specialists.

II. LEXIQUE

Choisissez la réponse qui vous paraît la plus appropriée en fonction du contexte.

13. wafted (line 5) means:
(A) changed
(B) increased
(C) stopped
(D) floated

14. scorched (line 15) means:
(A) touched
(B) burnt
(C) taken
(D) forgotten

15. sheer (line 17) means:
(A) impressive
(B) only
(C) approximate
(D) low

16. accurate (line 24) means:
(A) logical
(B) intensive
(C) precise
(D) understandable

17. worrisome (line 26) means:
(A) obvious
(B) amazing
(C) large
(D) alarming

18. swiftly (line 26) means:
(A) immensely
(B) rapidly
(C) systematically
(D) consequently

19. swath (line 26) means:
(A) strip
(B) circle
(C) square
(D) box

20. in awe (line 31) means:
(A) stupefied
(B) calmly
(C) nervously
(D) suddenly

21. spewed (line 33) means:
(A) took
(B) hid
(C) removed
(D) emitted

22. triggered (line 35) means:
(A) killed
(B) lifted
(C) caused
(D) fought

23. iron-starved (line 35) means:
(A) iron-poor
(B) full of iron
(C) polluted with iron
(D) rejecting iron

24. muting (line 51) means:
(A) imitating
(B) reinforcing
(C) leading
(D) preventing

III. COMPÉTENCE GRAMMATICALE

Choisissez la réponse adéquate.

25. …. specialists deny global warming.
(A) A great many
(B) Many a
(C) Great many
(D) Great a many

26. Phytoplankton provide food for …. sea creatures.
(A) wide range of
(B) wide range
(C) a wide range of
(D) a wide range

27. They will need …. money to carry out the research.
(A) a lot
(B) lot
(C) a lot of
(D) lots

28. …. they try, …. desperate they feel.
(A) More / more
(B) More / the more
(C) The more / more
(D) The more / the more

29. You …. believe them.
(A) would better
(B) should better
(C) had better
(D) have better

30. Many sea species ….
(A) have already disappeared.
(B) have disappeared already.
(C) already have disappeared.
(D) already had disappeared.

31. …. involved in the project.
(A) She'd rather get not
(B) She'd rather not get
(C) She'd not rather get
(D) She'd get rather not

32. They …. to have finished their study.
(A) said
(B) say
(C) are said
(D) will say

33. This is …. striking …. it wasn't expected at all.
(A) more / as
(B) all more / as
(C) all the more / that
(D) all the more / as

34. This is a …. old sample.
(A) three-hundreds-years
(B) three-hundred-years
(C) three-hundred-year
(D) three-hundred of years

35. They …. a new star recently.
(A) discovered
(B) have discovered
(C) had discovered
(D) discover

36. …. you need further information, please tell us immediately.
(A) Would
(B) Should
(C) Will
(D) Shall

37. If they …. more careful, they …. so much money.
(A) have been / would lose
(B) are / wouldn't lose
(C) were / will have lost
(D) had been / wouldn't have lost

38. There's …. carbon dioxide in this place.
(A) twice less
(B) two times less
(C) half as much
(D) half less

39. The oceans are becoming …. polluted.
(A) the more and the more
(B) more and the more
(C) the more and more
(D) more and more

FIN