Penguin poop may help preserve Antarctic climate



The ammonia from the guano does not form the particles but supercharges the process that does, Boyer said.

“It’s really the dimethyl sulfide from phytoplankton that gives off the sulfur,” he said. “The ammonia enhances the formation rate of particles. Without ammonia, sulfuric acid can form new particles, but with ammonia, it’s 1,000 times faster, and sometimes even more, so we’re talking up to four orders of magnitude faster because of the guano.”

This is important in Antarctica specifically because there are not many other sources of particles, such as pollution or emissions from trees, he added.

“So the strength of the source matters in terms of its climate effect over time,” he said. “And if the source changes, it’s going to change the climate effect.”

It will take more research to determine if penguin guano has a

net cooling effect on the climate. But in general, he said, if the particles transport out to sea and contribute to cloud formation, they will have a cooling effect.

“What’s also interesting,” he said, “is if the clouds are over ice surfaces, it could actually lead to warming because the clouds are less reflective than the ice beneath.” In that case, the clouds could actually reduce the amount of heat that brighter ice would otherwise reflect away from the planet. The study did not try to measure that effect, but it could be an important subject for future research, he added.

The guano effect lingers even after the birds leave the breeding areas. A month after they were gone, Boyer said ammonia levels in the air were still 1,000 times higher than the baseline.

“The emission of ammonia is a temperature-dependent process, so it’s likely that once wintertime comes, the ammonia gets frozen in,” he said. “But even before the penguins come back, I would hypothesize that as the temperature warms, the guano starts to emit ammonia again. And the penguins move all around the coast, so it’s possible they’re just fertilizing an entire coast with ammonia.”

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