

Global warming plus natural bacteria could release vast carbon deposits currently stored in Arctic soil

Increasing concentrations of carbon dioxide in the atmosphere will make global temperatures rise. By studying soil cores from the Arctic, scientists have discovered that this rise in temperature stimulates the growth of microorganisms that can break down long-term stores of carbon, releasing them into the atmosphere as carbon dioxide. This will lead to further increases in global temperatures.

Carbon is held in soil either in material that is easily degraded by chemical and bacterial action (labile soil carbon), or in material that is less easily degraded by microorganisms (resistant soil carbon). About one third of the world's soil carbon is located in high latitudes such as the Arctic, and much of this effectively locked away in recalcitrant stores.

If this carbon were ever released into the atmosphere as carbon dioxide, the concentration of this 'green-house gas' would increase considerably, leading to a substantial increase in global warming.

The question that researchers in Austria, Russia and Finland asked was whether increasing global temperatures that are already predicted could enable micro organisms to use this carbon. Their results are published in this week's edition of *Rapid Communications in Mass Spectrometry*.

The researchers incubated soil cores at 2oC, 12oC and 24oC. They found that resistant soil carbon was preferentially respired by arctic microbes at higher temperatures, presumably due to a shift in microbial populations.

They also found that the change in the relative proportion of different microorganisms in the soil was not driven by a depletion of more readily available carbon, but simply by the change in temperature.

“This temperature driven change in availability of resistant carbon is of crucial importance in the context of climate change,” says co-author Andreas Richter who works at the Institute of Ecology and Conservation Biology at the University of Vienna, Austria. “It may be that the whole idea of ‘resistant carbon compounds’ in arctic soils may only be relevant within a cool world and have no place in a future warmer world.”