Ugly side of pretty rivers

Rivers and streams may look enticingly picturesque but they have a downside too. Methane gas in rivers and streams contribute more to global warming than nitrous oxide (N2O), say scientists. Nitrous oxide (N2O) emissions have been the leading area of concern for scientists investigating the role of streams and rivers in global climate change for the past decade. A potent greenhouse gas, nitrous oxide is produced in riverbed sediments through nitrification and denitrification. Efforts to understand the rate at which nitrous oxide diffuses through the water to the atmosphere have dominated the field, yet diffusion is not the only relevant mechanism nor is nitrous oxide the only relevant gas.

Now, observations by Baulch et al. suggest that the global warming potential of methane gas, which they measured bubbling up from several riverbeds, exceeds that of nitrous oxide. Gases produced in river sediments can travel to the atmosphere by diffusing through the water column, escaping as bubbles, or through plant-facilitated transport.

The researchers measured methane and nitrous oxide concentrations in the water and in riverbed bubbles and measured bubble accumulation in surface bubble traps for four Ontario streams to sort out whether diffusion or ebullition is dominant for each gas.

They find that 10 to 80 percent of methane emissions are in the form of bubbles, while nitrous oxide emissions are almost completely through diffusion. They also found that methane bubbles surpass diffused nitrous oxide in terms of global warming potential, which they suggest could warrant a rethinking of the importance of streams and rivers to global warming. The research has been recently published in Journal of Geophysical Research- Biogeosciences (ANI 16-1-12).