Vasili Abstract
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Measurements of 14C of Methane in Ancient Antarctic Ice: Methane Hydrates, Permafrost, Cosmic Rays and Natural and Anthropogenic Fossil Methane Emissions

Methane (CH4) is a powerful greenhouse gas and plays a key role in global atmospheric chemistry. Increasing natural CH emissions may provide a strong positive feedback to global warming. “Old” carbon reservoirs such as marine CH4 hydrates, permafrost and CH4 trapped under ice sheets, glaciers and permafrost are sensitive to warming and each estimated to contain 2 – 3 orders of magnitude more carbon than the modern atmospheric CH4 inventory. CH4 release to the atmosphere from these reservoirs has been considered for both the deglacial and future warming and ice retreat, but the likelihood and magnitude of such release are poorly understood. Increases in atmospheric CH4 during the last deglaciation provide an opportunity to test the hypothesis that old carbon reservoirs release CH4 to the atmosphere in response to warming. In this talk, I will show new measurements of 14C of CH4 obtained from very large samples of glacial ice dating to the last deglaciation. I will discuss the challenges involved in reconstructing the atmospheric 14C-CH4 signal and discuss implications of these results for CH4 release from old carbon reservoirs as well as for improving constraints on anthropogenic fossil CH4 emissions.