



Mechanisms of aerobic methane production from terrestrial vegetation

A. McLeod (1), S. Fry (2), G. Loake (2), D. Messenger (1,2), D. Reay (1), K. Smith (1), B-W. Yun (2)

(1) School of GeoSciences, University of Edinburgh, UK, (2) School of Biological Sciences, University of Edinburgh, UK (andy.mcleod@ed.ac.uk / Phone: +44-131-650-5434)

The production of a range of volatile organic compounds from terrestrial vegetation is well known but it is only recently that the important greenhouse gas methane has been reported to have a hitherto unknown source via an aerobic process in terrestrial plant foliage. Such a source could explain unexpectedly high atmospheric concentrations of methane detected over tropical rainforests by satellite observations and has potential impacts on greenhouse gas accounting and the global methane budget. Atmospheric methane is thought to originate mostly from anaerobic microbial processes but recent publication of experimental observations, atmospheric measurements and subsequent analyses suggest that there is the possibility of a modest methane flux from the foliage of terrestrial vegetation. Some published investigations have been unable to demonstrate methane emissions from foliage whilst others have suggested that some plants may emit small amounts of methane. However, only recently have there been suggestions about a possible mechanism for such aerobic methane production. In this paper we present experimental data that demonstrate the production of methane and other reactive trace gases from plants subject to environmental stresses, including ultraviolet (UV) radiation, and particularly from the pectin component of plant cell walls. These observations suggest a potential mechanism for this hitherto unexplained methane source and have important implications not only for the global methane budget but also for terrestrial sources of other reactive trace gases.