Geophysical Research Abstracts
Vol. 15, EGU2013-4946, 2013
EGU General Assembly 2013

Tropical small streams are a consistent source of methane

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To date only a few studies have quantified diffusive methane emissions from headwater streams therefore the magnitude and seasonal variation of these emissions remain poorly understood. Here we present results from two Western Amazonian small streams (first and second order) in Tambopata National Reserve, Peru. Towards the end of wet season, April-May 2012, the streams were sampled using a static floating chamber to accumulate methane. Samples were drawn from the headspace twice daily over period of four days on three separate occasions. The methane concentrations were analysed using a gas chromatograph and the linear part of concentration increase used to calculate the flux rates. The streams were consistently outgassing methane. The seasonally active first order stream outgassed 6 $\pm$2.4 nmol CH_4-C m^{-2} s^{-1} and the second order stream 20 $\pm$4.0 nmol CH_4-C m^{-2} s^{-1}. The latter flux rate is comparable to fluxes measured from seasonally flooded Amazonian forest in previous studies. The range measured in our streams is comparable to previous results in temperate streams and the lower end of fluxes observed in some peatland streams. The only other study on Amazonian small streams detected methane fluxes that were 100 times greater than those measured here. Depending on the density of small streams in Amazonian basin and the prevalent flux rate, the fluvial methane fluxes may constitute a significant global warming potential. Upscaling to the Amazon basin, assuming small stream density of 0.2 %, as was found at our field site, and the flux rates detected, yields an annual global warming potential equal to approximately 1.5 Mt of CO_2 which is of minor importance compared to aquatic CO_2-C flux of 500 Mt yr^{-1} from the basin. However, if the higher fluxes detected in the previous study were prevalent, the basin wide methane flux could become significant. Further studies are needed to establish the stream density in the Amazon basin and typical methane flux rates.