



Atmospheric constraints on methane emissions from vegetation

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Recently it has been discovered that methane is directly emitted from living plants and plant litter. Initial extrapolations of this new source point to a global source strength of 63-236 TgCH₄/yr, which is roughly comparable to wetlands (commonly considered the largest source of methane). If plants really constitute such a large source, then this has major implications for the global methane budget. In that case, the question arises why this source hasn't been discovered earlier. The least thing one would have expected is the notion that some significant process was still missing. In fact, recent SCIAMACHY measurements do indicate that methane emissions in the tropics have previously been underestimated. Furthermore, measurements of preindustrial d¹³C-CH₄ are difficult to explain with the established natural budget. However, earlier studies have also demonstrated that the surface measurements from the global monitoring networks can be explained fairly well by a model that doesn't account for vegetation emissions or any unknown missing process. We have performed initial transport model calculations to gain further insight into this matter. Specifically we will address the important question whether plant emission could explain the SCIAMACHY measurements. Furthermore, we have studied whether model simulations that account for a substantial vegetation source can still be reconciled with background measurements of CH₄ and d¹³C-CH₄. Based on our findings, we will propose a revised methane budget that satisfies important new and previously existing atmospheric constraints on modern and preindustrial methane.