



Oceanic Contribution to Atmospheric Methyl Bromide

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Atmospheric methyl bromide, CH_3Br , is a source of stratospheric bromine radical, which is a catalyst for ozone destruction. Its use is to be phased out by 2005 under the Montreal Protocol. However, it is still not clear as to what is the relative contribution from anthropogenic and biogenic sources. Using stable carbon isotopes, we estimate the relative contribution by perhaps the largest natural source, marine biological production, and the anthropogenic source. *Phaeocystis* sp., a ubiquitous prymnesiophyte and the largest biogenic producer of CH_3Br , is responsible for about 30% of global oceanic methyl bromide. By measuring the carbon isotopic composition of *Phaeocystis*-derived CH_3Br in laboratory cultures and taking into account chemical and biological degradation rates, we calculate that the most probable carbon isotopic signature of this source to the atmosphere is between -9 and 14 per mil (PDB). The carbon isotopic composition of anthropogenic CH_3Br , on the other hand, is about -50 per mil and that of the second-most important natural source, salt marshes, is near -41 per mil. The large differences in isotopic signature among the major sources allow us to calculate fairly precise relative source strengths, in spite of the large range of values reported here. Combining these data with the measured atmospheric CH_3Br isotopic signature of -43 ± 2 per mil, we estimate the contribution of the biological marine source to be between 10% and 20% (with an upper limit of 25%) of the anthropogenic methyl bromide source.