The use of C-isotopes in understanding the growth in atmospheric methane 2007-14.

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C-isotopes in atmospheric methane provide a powerful tool in identifying sources of emissions. Since 2007, accompanying the global rise in atmospheric methane, there has been a significant isotopic shift as methane has become more depleted in ^{13}C. Globally, destruction rates of methane by OH appear to have been broadly stable. This indicates that the growth in methane is from increased emissions. Although some anthropogenic sources are relatively 'light' isotopically, the isotopic shift and geographic locations of the growth suggests the increase is dominantly from ^{13}C-poor biological sources. There is no strong isotopic evidence for large hydrate emissions in the Arctic. Although strong emissions likely came from boreal wetlands during the anomalous Arctic summer of 2007, the more recent growth appears to have been from tropical wetlands. The isotopic shift to more ^{13}C-depleted values, and the tropical and southern hemisphere loci of much of the growth, imply fossil fuel emissions and biomass burning, though they may have increased, have not been the dominant factor. Thus the growth is primarily driven by causes linked to meteorology, not direct anthropogenic emissions. Methane has been rising strongly now for 8 years; this is becoming comparable in scale to the methane growth in some Dansgaard-Oeschger climate change events in ice core records.