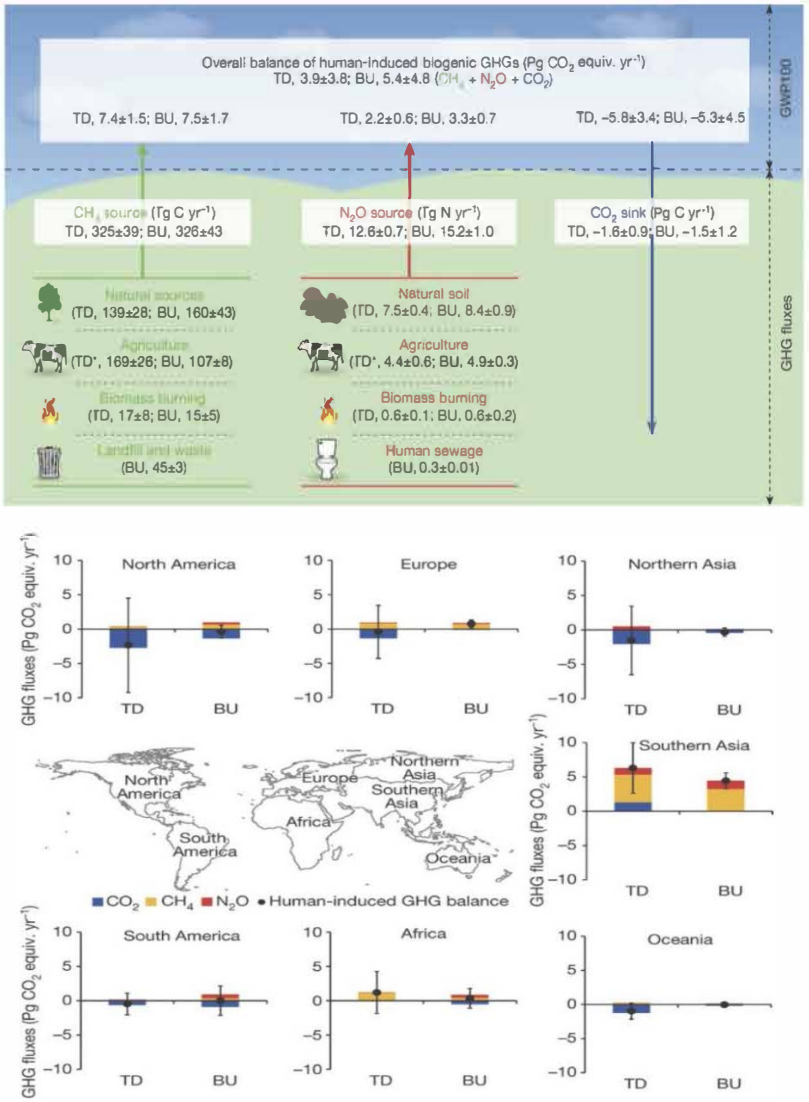
Tian, H.Q. et al. (2016) The terrestrial biosphere as a net source of greenhouse gases to the atmosphere, *Nature*. 531, 225–228 doi:10.1038/nature16946 (10 March 2016)

For the first time, here we looked at the net balance of the three major greenhouse gases -- carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O) -- for every region of Earth's landmasses, and revealed surprisingly that human-induced emissions of methane and nitrous oxide from terrestrial ecosystems overwhelmingly surpass the ability of the land to soak up carbon dioxide emissions. This makes the terrestrial biosphere a contributor to climate change.

Key results:

- The results show that the cumulative warming capacity of concurrent biogenic CH_4 and N_2O emissions is a factor of about two larger than the cooling effect resulting from the global land CO_2 uptake from 2001 to 2010.
- The results indicate that there is a net positive cumulative impact of the three GHGs on the planetary energy budget, with our 'best estimate' being 3.9 ± 3.8 Pg CO_2 equiv. yr^{-1} (TD: Top-Down) and 5.4 ± 4.8 Pg CO_2 equiv. yr^{-1} (BU: Bottom-UP).
- The findings suggest that a reduction in agricultural CH_4 and N_2O emissions, particularly in Southern Asia, may help mitigate climate change.



Upper-right: *The overall biogenic GHG balance of the terrestrial biosphere in the 2000s. TD and BU approaches are used to estimate land CO_2 sink, CH_4 and N_2O fluxes for four major categories. Global warming potential (GWP100) is calculated after removing pre-industrial biogenic emissions of CH_4 and N_2O. Negative values indicate GHG sinks and positive values indicate GHG sources.*

Lower-right: *The balance of human-induced biogenic GHGs for different continents in the 2000s.*

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