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Soil and the Anthropocene

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The so-called "Anthropocene" may have been set-in-motion with the dawn of settled agriculture about 10 millennia ago, but accelerated with the onset of Industrial Revolution ~circa 1750. An increase in access to food through settled agriculture increased human population (billion) from 0.002-0.02 during the hunter/gatherer era to ~1 in 1800, 1.7 in 1900, 2.5 in 1950, 6.1 in 2000, 7.5 in 2016 and projected to 9.7 by 2050 and 11.2 by 2100. The environmental impact (I=PAT, where P is population, A is affluence and T is technology) includes deforestation, alterations of biogeochemical cycling of elements (C, N, P) and water, soil degradation (erosion, salinization, C and nutrient depletion), loss of biodiversity, eutrophication of natural water and global climate change. Atmospheric concentration of CO2 increased from ~280 ppm around 1750 to>400 ppm at present, along with increase in concentration of other radiatively-active gases including CH4 (722 ppb to 1883 ppb) and N2O (270 ppb to 327 ppb). The magnitude of C emitted into the environment from pre-historic era to 2010 is estimated at 456 Pg compared with that of 200 Pg from fossil fuel combustion. Presently, 38% of Earth's land surface is used for agriculture, 70% of the global fresh water withdrawal is used for irrigation, and 30-35% of global greenhouse gas emissions are contributed by agriculture. Yet, 1 in 7 persons are food-insecure and 2-3 in 7 are malnourished. Nonetheless, soil matters, because solution to global issues lies in sustainable intensification of soil by producing more from less.

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An improved inventory of methane emissions from coal mining in the China

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A more accurate greenhouse gas (GHG) emissions inventory draws too much attention. For the resource endowment and technical status, China makes coal-related GHG emissions a big part of the inventory. Lacking stoichiometric carbon conversion coefficient and influenced by geological conditions and mining technologies, led previous efforts in estimating methane fugitive emission from coal mining in China to get discordant results. This paper proposes a new method to estimate CMM emissions based on analysis the feature of gas-geology distribution, coal property, mining operation and CMM emission process in China. The active data is composed of easy-to-access parameters i.e. *in situ* gas content, residual gas content and raw coal production, and determine mining influence coefficient variation in the range of 1.3 to 2.0 by regression analysis of typical coalmine's data. It not only overcomes the shortage of overestimation by emission factors methods (Tier 1 and Tier 2), but also surmounts the deficiencies of heavy workload, short timeliness and CMM emissions post-mining absence by relative CMM emissions method (Tier 3), just like verified in a case study with smallest error of +9.59%. The CMM emissions inventory compiling by the new method is better to reflect the reality of CMM emission in China.

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