Assessing the climate impacts of Chinese dietary choices using a telecoupled global food trade and local land use framework

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Global emissions trajectories developed to meet the 2°C temperature target are likely to rely on the widespread deployment of negative emissions technologies and/or the implementation of substantial terrestrial carbon sinks. Such technologies include afforestation, carbon capture and storage (CCS) and bioenergy with carbon capture and storage (BECCS), but mitigation options for agriculture appear limited. For example, using the Global Calculator tool (http://www.globalcalculator.org/), under a 2°C pathway, the 'forests and other land use' sector is projected to become a major carbon sink, reaching -15 $GtCO_2e\ yr^{-1}$ by 2050, compared to fossil emissions of 21 $GtCO_2e\ yr^{-1}$. At the same time, rates of agricultural emissions remain static at about 6 $GtCO_2eyr^{-1}$, despite increasing demands for crop and livestock production to meet the forecast dietary demands of the growing and increasingly wealthy global population. Emissions in the Global Calculator are sensitive to the assumed global diet, and particularly to the level and type of meat consumption, which in turn drive global land use patterns and agricultural emissions. Here we assess the potential to use a modified down-scaled Global Calculator methodology embedded within the telecoupled global food trade framework, to estimate the agricultural emissions and terrestrial carbon stock impacts in China and Brazil, arising from a plausible range of dietary choices in China. These dietary choices are linked via telecoupling mechanisms to Brazilian crop production (e.g. Brazilian soy for Chinese animal feed provision) and drive land and global market dynamics. 'Spill-over' impacts will also be assessed using the EU and Malawi as case studies.

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