

Can no-till farming help mitigate heat waves?

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Changes in cropland management practices are seen as a possible option to mitigate regional and global climate change. In particular, practices aiming at retaining crop residues and reducing tillage (no-till farming) may have a potential to sequester carbon in soils [1]. On the other hand, the biogeophysical impact (e.g., albedo and evapotranspiration changes) of such practices has yet to be investigated [2]. Using a regional climate model, we examine the biogeophysical effect of no-till farming over Europe. We consider a no-till scenario where surface albedo is increased over croplands based on values from in-situ measurements. The cooling effect owing to no-till farming appears to be larger during warm events. This is due to the low cloud cover during these events, thus leading to a more efficient radiative cooling from albedo change. This implies a strong potential of no-till farming to mitigate heat waves. For instance, we find that under a drastic no-till scenario the 2003 heat wave would have been colder by several degrees over regions like France. On the other hand, crop residues tend to prevent soil evaporation which might increase surface temperature in the short term, but would save water and thus lead to cooler temperature in the long run. Additional simulations taking into account this effect will also be presented. References [1] Smith, P., D. Martino, Z. Cai, D. Gwary, H. Janzen, P. Kumar, B. McCarl, S. Ogle, F. O'Mara, C. Rice, B. Scholes, O. Sirotenko, 2007: Agriculture. In Climate Change 2007: Mitigation. Contribution of Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A. Meyer (eds)], Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA. [2] Lobell, D. B., G. Bala, and P. B. Duffy (2006), Biogeophysical impacts of cropland management changes on climate , Geophys. Res. Lett. , 33 , L06708, doi:10.1029/2005GL025492.