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Biogeophysical implications of no-tillage agriculture for the European climate and hot extremes

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Cropland management practices aiming at reducing or suppressing tillage (no-till) in order to retain crop residues on the soil surface may have a potential to sequester carbon in soils and are therefore considered a possible option to mitigate climate change [1]. On the other hand, no-till systems may also modify physical properties like surface albedo thereby affecting land-atmosphere exchanges, but such biogeophysical effects have yet to be investigated [2].

Here, we investigate the biogeophysical effect of no-till agriculture over Europe using a regional climate model. A drastic no-till scenario where surface albedo is increased over croplands based on values from in-situ measurements is considered. The cooling effect owing to albedo increase under 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 wave impacts. Other biogeophysical processes besides albedo change (e.g., changes in soil water and evapotranspiration) and their climatic effect will be also discussed.

References:

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