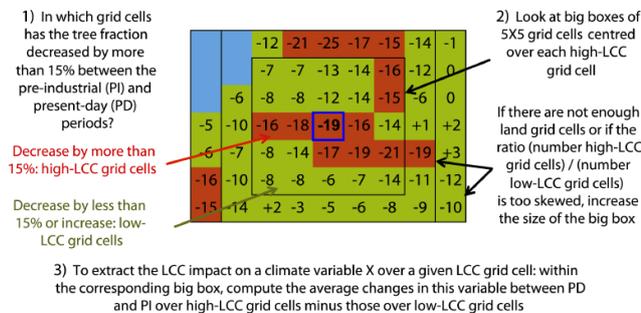


## Local versus non-local effects of land cover changes: Comparing methods of signal separation for temperature responses

**Background:** Land Cover Land Management (LCLM) changes not only affect the local climate conditions at the immediate area of change, but also have non-local effects in neighbouring and remote areas due to the alteration of global circulation patterns and/or atmospheric teleconnections. When investigating climate signals arising from LCLM, local and non-local signals should therefore be considered separately. A moving

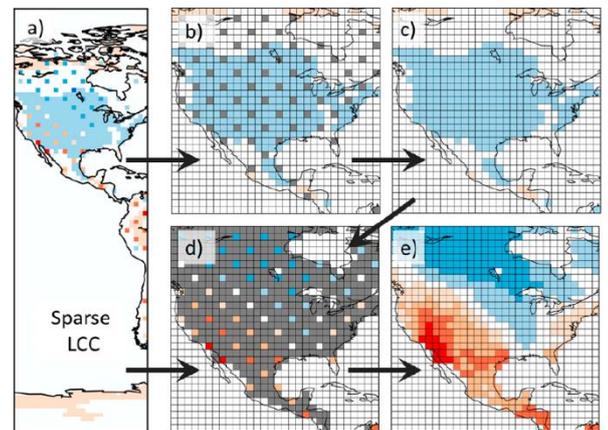


$$\text{LCC impact} = \overline{\Delta X}_{\text{PI} \rightarrow \text{PD}}^{\text{high-LCC}} - \overline{\Delta X}_{\text{PI} \rightarrow \text{PD}}^{\text{low-LCC}}$$

Figure 1: Moving-window signal separation approach (Lejeune et al. 2017)

checkerboard approach have been conducted to separate local and nonlocal effects (Winckler et al. 2019). Both methods have their pros and cons, however the differences in the signal separation results obtained from both methods and their reasons have yet to be assessed.

Figure 2: Checkerboard signal separation approach. (a) The simulated signal. (b) The nonlocal effects at no-LCC boxes. (c) The nonlocal effects interpolated to LCC boxes. (d) The difference at the LCC boxes between the simulated signal in (a) and interpolated non-local effects in (c). (e) interpolation of (d) to obtain global information on the local effects (Winckler et al. 2019).



**Goal:** Compare the signal separation results of the moving window approach to those of the checkerboard approach using existing LAMACLIMA simulations. Characterise the differences across seasons and LCLM change type and understand the mechanisms underlying the differences

**Data:** Dedicated ESM simulations from the LAMACLIMA project that isolate the effects of afforestation, wood harvest and irrigation.

**Opportunities:** Collaboration with partners of LAMACLIMA. Programming in Python and handling of large datasets.

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 Winckler, J., Lejeune, Q., Reick, C. H., & Pongratz, J. (2019). Nonlocal effects dominate the global mean surface temperature response to the biogeophysical effects of deforestation. *Geophysical Research Letters*, 46. <https://doi.org/10.1029/2018GL080211>