Merging KK10 land use to the HYDE dataset after 1850

To bring the *KK10* land use scenario up to present day, we developed a *merging* strategy to incorporate HYDE's post-industrial land use variability. While the HYDE database was developed with land use statistics for crop and pasture on a per country basis from the FAO (2008), these data were only available in a consistent manner from 1961 to the present (Klein Goldewijk *et al.*, 2011, Klein Goldewijk & Ramankutty, 2004). The HYDE data for all years prior to 1961 are based on extrapolation of late 20th century spatial patterns of land use to the past, modulated by historical estimates of population on a per-country basis, and a per-capita land use area of roughly 1 ha. As HYDE land use estimates are most reliable from 1961 onwards, we chose 1961 as the final year for the *merged* interpolation between KK10 and HYDE (thereafter ALCC estimates for the *merged* scenario are identical to HYDE). The *merged* strategy is illustrated in the below figure in contrast to our alternative *interpolated* strategy, in which land use fractions for each gridcell are linearly interpolated from the final year of the KK10 data (1850) to the HYDE land use fractions at year 2000.

Description of the *merging* process: The starting point for the data merge depended on whether corresponding gridcells between the *KK10* dataset and *HYDE* dataset matched within 1% any time between 1500 and 1850. If gridcells matched, we blended the datasets from the time of the match (lower panel of figure), but if land use estimates between the two datasets never matched over this period we started the blending at 1850, when *KK10* dataset ends (upper panel of figure). For most gridcells, ALCC estimates do not cross and the blending starts at year 1850. In order to capture the variability of *HYDE* over the last several centuries, we first calculated the difference between the actual *HYDE* ALCC estimates (linearly interpolated between decadal timesteps) and a direct linear interpolation from the starting point of blending (determined as described above) to 1961. Subsequently, this difference was added to a linear interpolation of the *KK10* scenario at the starting point of the merge to year 1961 of *HYDE*.