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Land-Use and Climate : first results from the LUCID experiments ; implications for experimental design in IPCC-AR5

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The project "Land-Use and Climate, IDentification of robust impacts" (LUCID) was conceived under the auspices of IGBP-iLEAPS and GEWEX-GLASS, to address the robustness of 'local' and possible remote impacts of land-use induced land-cover changes (LCC). LUCID explores, using methodologies that major climate modelling groups recognise, those impacts of LCC that are robust – that is, above the noise generated by model variability and consistent across a suite of climate models.

To start with, seven climate models were run, in ensemble mode (5 realisations per 31-years long experiment), with prescribed observed sea-surface temperatures (SSTs) and sea ice extent (SIc). Pre-industrial and present-day simulations were used to explore the impacts of biogeophysical impacts of human-induced land cover change.

The imposed LCC perturbation led to statistically significant changes in latent heat flux and near-surface temperature over the regions of land cover change, but few significant changes in precipitation. Our results show no common remote impacts of land cover change. They also highlight a dilemma for both historical hind-casts and future projections; land cover change is regionally important, but it is not feasible within the time frame of the next IPCC (AR5) assessment to implement this change commonly across multiple models.

Further analysis are in progress and will be presented to identify the continental regions where changes in LCC may have been more important than the combined changes in SSTs, SIc and CO2 between the pre-industrial times and nowadays.