

LUCID: Land-Use and Climate, IDentification of Robust Impacts

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Over the last decade there has been a tremendous increase in the literature regarding the impact of land cover change on climate at the regional and global scale. As with most of the work on the impact of Amazonian deforestation, modelling groups have used different models, different land parameterizations, different land-cover maps, different model configurations and different experimental protocols. As a result, the actual impact of large scale land cover change on the Earth's climate is firmly believed to be one of "significant and large", "only local to the perturbation", or "small enough to be ignored". Some groups find significant teleconnections that other groups dismiss as model variability. Ultimately, much of the land cover change community around the time of the third assessment of the Intergovernmental panel on Climate Change (2001) believed the case for including land cover change in climate simulations was "proven". Even if the community was not certain that global-scale teleconnections were "proven", confidence that land cover change drove significant regional impacts was very high and it was assumed that model simulations for the fourth assessment report (AR4, 2007) would take 20th Century land cover change into account and likely incorporate scenarios for 21st Century change.

The AR4 is now basically complete and the coupled climate model simulations did not take land cover change through the 20th Century, or into the 21st Century into account. Clearly, the land cover change community had failed to communicate its belief that land cover change was a major forcing factor on climate (regionally or globally). In discussions within GEWEX-GLASS and IGBP-iLEAPS, a sense that the land cover change community had proven *to itself* that land cover change was important, but not proven to the major modelling groups *how important* led to a decision to launch a major experiment to evaluate the impact of land-use induced land-cover changes on climate.

Under the auspices of GEWEX-GLASS and IGBP-iLEAPS, a project called LUCID has therefore been launched. LUCID (Land-Use and Climate, IDentification of robust impacts) is self describing: we are not trying to identify model-specific sensitivities to land cover change, rather we seek to explore, using methodologies that the major climate modelling groups recognise, those impacts of land cover change that are *robust* – that is, above the noise generated by model variability.

Our objective is therefore to identify and quantify the impacts of land-used induced land-cover changes on the evolution of climate between the pre-industrial epoch and present-day. We will use a) multi-model and b) ensemble simulations to assess the robustness of the identified changes. Assessments of the impacts of land cover change will explore the mean climate, climate variability and climate extremes. Assessment will also be made on the potential impact land-use induced land-cover change can have on the sea-surface temperatures and on ocean circulation. Among the final objectives is to build the case, if the case can be proven, to ensure land-cover changes are included in any future assessments by the IPCC.

We will briefly describe the project and present some preliminary results.