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Interactive comment on “Modelling economic and biophysical drivers of agricultural land-use change. Calibration and evaluation of the Nexus Land-Use model over 1961–2006” by F. Souty et al.

Anonymous Referee #1

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Title: Modelling economic and biophysical drivers of agricultural land-use change. Calibration and evaluation of the Nexus Land-Use model over 1961-2006 Author(s): F. Souty et al. MS No.: gmd-2013-167

General comments This paper is not easy to read, although the authors have tried their best to present the enormous amount of data used in their complex NEXUS model, and the description of the model, and the different comparisons made with other (sometimes independent) data. Perhaps it is a good idea to move much more of the technical detail to the supporting information, and have a more general description in the main text. The authors have compiled their NEXUS model from various other models. It is not clear why the model is not spatially explicit, while the underlying models such as

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LPJml do their calculations on a spatial grid. That should not be a major step, and is an advantage when analyzing future scenarios

Specific comments NEXUS describes crop yields for dynamic crops as a function of fertilizer and pesticide use. I do not know if this is a good approach, since due to various improvements (see e.g. section 3.5, first sentence), potential yields have increased since the 1960s. For some crops, current actual yields even exceed what was considered to be the yield potential in those years. So I wonder how such changes have been taken into account in NEXUS.

Animal manure inputs are not considered in NEXUS approach for crop yield. This leads to a serious underestimation of nutrient inputs in many, primarily developing, countries, where synthetic fertilizer use is unimportant compared to that of animal manure. Also, human excreta played an important role in countries like China in the 1960's and 1970s, and decreasing after that.

Many sections are very difficult to read, e.g. page 6987.

The difficulty to predict cropland areas reported by FAO in 1960 is not surprising and may not only be a problem of the model, but also associated with uncertainty in the data. For example, in China and FSU there was the 5-year plan economy that had large influence on the agricultural statistics, and in many African countries areas are guestimates more than statistics. The fact that recent years are matching should give confidence. The authors could check FAO Agriculture Towards 2030/2050 estimates, since FAO outlooks use their own corrections that are not in FAOSTAT.

The first sentence of the concluding remarks suggests that we now understand how difficult it is to model land use. I wonder what is actually the purpose: develop a model, or test the best approach, or find out how difficult it is?

Interactive comment on Geosci. Model Dev. Discuss., 6, 6975, 2013.

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