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Interactive comment on "Greenhouse gas emissions from Indian rice fields: calibration and upscaling using the DNDC model" *by* H. Pathak et al.

Anonymous Referee #2

Received and published: 11 February 2005

Title: Greenhouse gas emissions from Indian rice fields: calibration and upscaling using the DNDC model.

Authors: H. Pathak, C. Li and R. Wassmann

Overall comments: This paper deals with calibrating the DNDC model to estimate GHG emissions from rice fields in India, and upscaling the model estimates. It is an interesting paper that warrants publication, however, there are quite a few minor corrections that could be made to improve the paper. The number of significant figures seems unreasonable in most instances. A more detailed section on the evaluation of the model is warranted (section 3.1). Additionally, an estimate of the uncertainties in the GHG estimates would be very interesting. Some discussion of uncertainty was brought up in the

introduction, and a presentation of some of these calculations would be appropriate.

Specific Comments:

Page 82:

Line 7: “Adequately capture” doesn’t inform the reader well of what the specific problem is. Only after reading further do I assume it means that DNDC was overestimating the CH4 fluxes since it was not leaking out DOC and substrates with the excess water.

Page 85:

Section 3.1 - Evaluation of the model

Table 1 shows very good agreement between Observed and Simulated results. Were different datasets used to calibrate, and test the model?

It would be interesting to see how the timing of simulated and observed emissions compare. It has been our experience that DNDC does well at estimating the annual emissions but can sometimes lag in the timing of specific events with respect to N2O emissions. The inclusion of a such figure would be very interesting. Additionally, I would put more importance on a figure detailing simulated emissions vs measured emissions than Figure 2 and 3, which only show simulated results.

Page 87:

The initial peak in N2O emissions at the beginning of the year has no corresponding peak at the end of the year (Figure 3). Is this initial peak a one-time emission event, or is it an annual emission event? N2O emissions (Figure 3) between JD 150 and 200 are very sporadic. If these fields are continuously flooded, it is unclear how rainfall and flooding events (Line 6) could have influenced this to produce sporadic emissions. A more detailed section on simulated N2O emissions is merited.

Technical Corrections:

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Page 78:

Line 1-2: the first sentence in the abstract could be dropped.

Line 17: Not clear by what is meant by “GHG related issues”

Page 79:

Line 3: (rewording suggestion): are the key greenhouse gases (GHG) that contribute towards global warming at 60, 15 and 5% respectively.

Line 6: should use a more recent reference

Line 8: GHG emission from soils

Page 80:

Line 2: (rewording suggestion) model but did not simulate N2O or CO2 emissions.

Line 3: (rewording suggestion) Other models however do simulate the entire set of greenhouse gases , DayCent (Parton et al., 2001), DNDC (Li, 2000) Ě

Line 5: the models have not been frequently used for tropical regions.

Page 81:

Line 12: the parameterization

Line 14: and variations in climate and soil properties.

Page 82:

Line 5: improved the model’s ability to predict rice crop yields in India.

Line 18: The experiments were conducted at the

Page 83:

Line 13: Model sensitivity was evaluated for changes in the application rates of N

fertilizer and irrigation on rice yields and GHG emissions using the baseline Ě

Page 84:

Line 9: It was decided that since much of the statistical data was district based that districts should be chosen as the basic geographic unit of the database to maintain Ě

Line 18: rainfed lowland rice systems simulations were done

Page 85:

Line 13: 3.2 Sensitivity analysis - Section header might be able to be shortened to just Sensitivity analysis . Table 2 lists the sensitivity analysis as including manure applications but it is currently not included in the section header.

Line 15: Different application rates of N fertilizer significantly

Line 17: Emissions of CO2 Ě (sentence needs to be reworded as it is currently awkward to read)

Page 86:

Line 20: Should quantify the emissions. Smaller than other countries does not inform the reader very well.

Line 21: 4.2 M ha (Check decimal places and be consistent)

Page 87:

Line 4: 112.3 g ha-1 d-1 (not day)

Line 15: The majority of soils in India are alkaline in pH (pH>7.5) while soils in Ě

Line 26: In the case of upland rice

Page 88:

Section header should be changed from Emission of GHG. Scaling up GHG emis-

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sions?

Line 5: 42.25 Mha

Line 8: fields was reduced to Ĕ

Line 9: The intermittent flooding approach

Line 24-25: 106 kg CH4-C (check decimals - 2 decimal)

Page 89:

Line 13: Ĕ the major impacts of water management and various N fertilizer rates on rice cropĔ

Line 17: N2O emission was determined. The tradeoffs that exist between CH4 , CO2 , and N2O mitigation measures demonstrated the challenge of mitigating GHG emissions when focusing on the biogeochemical cycles in terrestrial ecosystems

Line 21: use “should” rather than “would”

Table 2: Should center column headers and numbers

Table 4: Minimum and Maximum values for N2O emissions are reversed.

Interactive comment on Biogeosciences Discussions, 2, 77, 2005.