RESPONSE TO PEER REVIEW COMMENTS

A methodology for *Voluntary Emission Reductions in Rice Management Systems* was developed by Terra Global Capital, with support from the Environmental Defense Fund, Applied Geosolutions and the California Rice Commission, and submitted to ACR for approval through the public consultation and scientific peer review process.

The methodology was submitted to ACR on May 16, 2011. ACR conducted its standard internal methodology screening and provided this to the methodology authors on May 17. The authors submitted a revised methodology on June 9. The revised methodology was posted for public comment from June 12 – July 22.

Following public consultation, the methodology was submitted to three anonymous peer reviewers, experts in the field of rice production systems and GHG accounting. Peer review comments and responses are summarized below.

General / Overall Comments by Peer Reviewers

	1st review	Response	2nd review	Response	3rd review	Response	4th Review	Response
1	The report describes a methodology to reduce GHG emissions from rice production through modified management strategies. Emission reductions are calculated by using DNDC model simulations while indirect emissions (from rice straw use) are derived from emission factors. The methodology refers to model calibration, but it not clear what that really constitutes in terms of field measurements (see next comment). The methodology related to the DNDC simulation is described in sufficient detail and the writing is clear in these sections.	n/a	n/a	n/a	n/a	n/a	n/a	n/a
2	My principal concerns stem from the very ambiguous statements related to calibration of the DNDC model. I fully agree with the approach that *"… the project area is located in an area for which the accuracy of*	We have tried to clear up some of the ambiguity and completely restructured the methodology with clear parameterization, calibration, and validation steps. This statement is revised as "*In addition, the project area is*	The authors have done a very good job in clearing up ambiguities. The revised version contains much improved descriptions of	n/a	n/a	n/a	n/a	n/a

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	predicted GHG emissions by DNDC can be quantified following the procedures in this methodology." However, where is the description on the quantification of the accuracy?	*located in an area for which the accuracy of predicted GHG emissions by DNDC can be quantified following the procedures in Section 8.4*"	calibration and validation.					
3	What does the methodology actually imply in terms of • Protocol of the field measurement (e.g. which sampling frequency is needed?) • required observation periods (one or several seasons?) • acceptable deviation of the simulated records from field observations	A protocol for the field flux measurements is now included in section 8.4.1 it includes (1) sampling frequency – varies throughout the year, (2) required observation periods – at least 1, but more are highly recommended, (3) there is no maximal acceptable deviation, since the uncertainty deduction approach is sufficient to ensure that model predictions remain conservative. Projects must demonstrate that there is no systematic bias introduced by the model. The last point is clarified in Section 8.4.1: "*In addition, the remaining deviation between the modeled and measured results is used to calculate an uncertainty deduction which, when applied to modeled emission reductions, ensures that emission reductions remain conservative*"	Again, the revised version is much better than the previous draft.	n/a	n/a	n/a	n/a	n/a

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4	In Ch 2.3 there is a statement: "*The quantification of uncertainty around modeled emission reductions requires empirical measurements of N2O fluxes"*. In turn that seems to imply that there is no need for CH4 measurements. Why? As someone who has extensively worked with the DNDC model, I would strongly object to the notion that there is no need for at least verifying that DNDC really works under site-specific settings.	This statement was revised as: "*The quantification of uncertainty around modeled emission reductions requires empirical measurements of CH_4 fluxes*"	There seems to be some confusion around this statement. 1) A search of this sentence in the manuscript did not yield any hits. 2) Does that mean that there is no need for N2O measurements? If yes, this should be justified.	1) Sorry for the confusion. This sentence with slightly different wording appears in section 2.1: "*This requirement is necessary because the quantification of uncertainty around modeled results can only be done with local and specific data consisting of empirical measurements of CH_4 fluxes*" 2) Correct. A justification was added to a footnote: "*Note that empirical measurements of N_2O fluxes are not required since these are not the primary target of this methodology. Peer-reviewed literature indicates that the uncertainty around changes in N_2O fluxes due to the project activities is insignificant relative to the change in CH_4*	Accepted	n/a	n/a	n/a

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				fluxes (Li, 2000; Pathak et al., 2005; Babu et al., 2006). As a consequence, the prediction of changes in N_2O fluxes by the DNDC model are sufficient for GHG accounting purposes."				
5	Moreover, the requirements for a calibration of GHG emissions are not described at all. Even if we assume that there the calibration is only needed for N2O, there should be clear guidelines on: •protocol of the field measurement (e.g. which sampling frequency is needed?) •required observation periods (one or several seasons?) •acceptable deviation of the simulated records from field observations.	Section 8.4.1 contains the requested guidelines.	Yes, this new section makes a huge difference as compared to the previous version. However, I have 3 comments: 1) This section mentions "*gas fluxes from a representative field close to the project area must be used to calibrate the DNDC model*". This statement seems to exclude a regional calibration conducted on the project field itself. Why? If this is not meant,	1) This was not intended. The statement was rephrased to: "*During the regional calibration, measured methane fluxes from the project area itself or a field close to the project area that is representative for the project area must be used to calibrate the DNDC model*." 2) We have now included a minimal detection limit requirement: "The detection limit of the analytical equipment has to be minimally 20 µl l^{-1} (ppbv)." We excluded Photo	Accepted	n/a	n/a	n/a

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			the statement should 2) "*The analytical equipment to measure the chamber gas concentrations, i.e. the Gas Chromatograph, Photo Acoustic Monitor, or other equipment, must…*" This statement MUCH TOO VAGUE! Instead the methodology should require a certain detection limit of the analytical instrument. Gas chromatography is a proven technology, but photoacoustic devices are basically unsuitable for flooded fields due to interference of CH4 and	Acoustic Monitoring as an example and replaced the Photo Acoustic Monitor by "Gas Chromatography, a Tunable Diode Laser or other laser-based equipment" 3) It is clarified throughout this section that "gas" means methane only. The justification is included in a footnote (see our response to a previous comment).				

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			moisture signals. Laser technique would in principle be another option, but this requires very expensive equipment. 3) It is not clear if the mentioned "measurements of gas fluxes" include N2O. Please specify!					
6	The intended calibration procedures get even more confusing after reading Chapter 8.4 (Crop Yield Calibration). What is the function of a yield calibration in the context of calibrating GHG emissions? Or does the methodology assume that yield calibration is sufficient for the methodology as a whole? In case of the latter, I would clearly object to the methodology altogether.	We now make an explicit distinction between (1) regional calibration, and (2) field-specific calibration. The regional calibration is based on gas flux data, while the field-specific data is based on yield data. While the regional calibration may use gas flux data from a different field than the project area as long as it is in the same geographic region, the field-specific calibration must be conducted for each field separately.	1) While I agree with the distinction among regional vs. field-specific calibration in general, the authors should add a rationale for that. 2) Please make a clear distinction between crop data vs. yield data. Yield is only ONE component of a larger set of crop data	For points 1) and 3) The following justification was added to section 8.4: "*Even though it is optimal to collect the calibration and validation data from the project area, in addition to the yield data, this is not strictly necessary. The regional model calibration is representative for a whole region and may be used by many fields and projects, while the field-specific calibration*	Accepted	n/a	n/a	n/a

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			3) Why would you not state that "whenever possible" both gas and yield data will be collected from the same field? There should be some statement that field management might influence GHG emissions should be similar or accounted for in the model.	*must be repeated for each different field. By distinguishing the two levels of calibration, the effort to calibrate multiple projects is greatly reduced with only a minimal reduction in representativeness of the calibration and validation data. This distinction is justified as the management, climate, and general soil types remain similar across a region, while cropping yields may be very field-specific. However, whenever possible, both gas and yield data shall be collected from the project area*." 2) The field-specific calibration section was re-structured into three steps that clearly distinguish when to use yield data and when to use crop data. In addition, the following clarifying				

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				sentence was added in the introduction of the field-specific calibration: "*The field-specific model calibration shall always use yield data but may also include more general crop data when specific varieties are used or when the yield-based calibration is insufficient. These more general crop data include the default partitioning of carbon into different plant compartments, C/N ratio of the different plant compartments, and the thermal degree days required to reach maturity*."				
7	This methodology represents an improvement over previous efforts using IPCC Tier 1 approach (based on global default values), but it seems questionable to what extent the methodology could possibly improve estimates based on the Tier 2 approach	The methodology forms an improvement on existing tier-2 approaches in that (1) variables such as weather, timing of flooding and draining are included in the calculation of the emission reductions, and (2) emission reductions are discounted based on actual	OK -- noted	n/a	n/a	n/a	n/a	n/a

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	(which is based on actual GHG measurements). Again, the rigor of calibration will be an important feature in determining the accuracy of this new methodology.	GHG measurements and will, therefore, be at least as accurate as a tier-2 approach in all cases and more accurate in most cases.						
8	Who is the targeted audience of this document? The rice grower, the rice commodity group, or rice commission, or others? The language should be adjusted according to the targeted audience.	The targeted audience for a methodology is the carbon developer and a third-party auditor. As a consequence, the methodology is quite technical. The methodology is not intended for rice growers or rice commodity groups. However, the methodology is accompanied by a short document that explains it use in less technical terms.	Yes, much improved now, however, it may be necessary to provide 'extension level' publications for each area.	Agreed. We are working with individual producers and industry representativeness to communicate the merits of the protocol to all producers.	n/a	n/a	n/a	n/a
9	How well does DNDC predict N_2O in flooded rice systems? This issue is of significance as the proposed changes in management practices will likely lead to a decline in CH_4 but an increase in N_2O. Can studies be cited that show a good prediction between modeled and measured N_2O in flooded rice fields in CA (or elsewhere in the world). If not, is the use of the DNDC not premature for rice systems?	DNDC predicts N_2O well in rice systems according to the following three studies that have compared modeled and measured results: • Babu, Y.J., Li, C., Frolking, S., Nayak, D.R., Adhya, T.K., 2006. Field validation of DNDC model for methane and nitrous oxide emissions from rice-based production systems of India. Nutrient Cycling in	Good, please provide a short paragraph (with references) stating that the DNDC model can predict fluxes of both gases. Some of these references on the left are not in the reference list.	The introduction was adjusted with the following sentence: "*the DNDC model has been shown to be highly valid across a wide range of management practices and geographic areas in predicting both CH_4 and N_2O fluxes well (Li, 2000; Pathak et al., 2005; Babu et al., 2006)*"	Accepted	n/a	n/a	n/a

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		Agroecosystems 74, 157–174. • Li, C., 2000. Modeling trace gas emissions from agricultural ecosystems. Nutrient Cycling in Agroecosystems 58, 259–276. • Pathak, H., Li, C., Wassmann, R., 2005. Greenhouse gas emissions from Indian rice fields: calibration and upscaling using the DNDC model. Biogeosciences 2, 113–123.		This was re-iterated in a newly added footnote in the introduction – see our response on General.4.				
10	How does a reduction in yield be compensated? If drill seeding is implemented in year 1 and a decline in yield is observed because there will be a learning curve when switching from wet seeding to dry seeding, leading to a possible, temporary decline in yield. Mid-season drain may well likely lead to a reduction in yield and a delayed harvest, based on some preliminary, non- replicated studies. If this decline in yield/delayed	We are not entirely sure what is meant by "compensated". A reduction in yield may cause market leakage. As a consequence, a reduction in yield will reduce credits. The reviewer is correct to question whether this methodology will be economically viable. We have a number of pilot projects in which we hope to better understand the economics of the methodology.	Economics will be the driving force at this time and it would be good to have this information in place before presenting farmers with different options. There will be strong resistance to making changes and it is likely farmers will insist on some sort of "compensation"	We fully agree with the reviewer. We are working together with a group of 20 pilot farmers to understand farmers' willingness to adopt some of these practices. These comments fall more in the bucket of outreach and communication, which is beyond the scope of this technical	Accepted	n/a	n/a	n/a

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	harvest and higher likelihood of rain at harvest (higher drying cost) is not economical justifiable, will that be the end of the voluntary emission reduction? Or, what are the incentives for the farmer to take these risks?		when they perceive yield losses. Also, there is a learning curve to these new practices (especially converting from wet to dry seeding or vice versa) and often in the first couple of years of trying yields may be lower. Fertility management practices are different, farmers need different planting equipment, and herbicide management is completely different. Most rice CA farmers wet seed and do not have a drill seeder. These are costly.	protocol. We envision that through our pilot activities and feedback from growers, we will have to further fine-tune this protocol. However, we would like to move forward with piloting the protocol using a select number of producers.				
11	Should reduction in GHG be based on ton of grain produced rather than by ha? In general, if yield declines and more land has to be put into production, the GHG per ha may have declined but as	The mechanics to account for market leakage are meant to take a potential increase in emissions outside of the project area due to land use change into account. If yield declines, carbon credits are	OK, but realize that for some farmers yields may be lower simply because they need time to learn the new practice (see #10 above)-	Agreed. The protocol is robust against this possibility.	n/a	n/a	n/a	n/a

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	more land has been put into production, the total GHG across all (more) acreages will have increased. Or at least both ways to calculate GWP should be taken into consideration.	reduced to account for the potential increases in emissions from other lands being put into production.	converting to dry seeding especially.					
12	If straw is removed from the field, there is a loss of nutrients which has to be replaced. Over the years it has been estimated that the farmer has to add an additional 25 kg per ha of N when straw is removed. Is this increase in fertilizer-N taken into consideration? What about other nutrients like K? Straw contains up to 1.4% K so if half of the straw is removed (say 5000 kg/ha) there could be a removal of 70 lb K/ha.	Yes, any increase in fertilizer due to a loss of nutrients must be explicitly accounted for (the parameter "Additional nitrogen fertilizer to account for nutrient losses during straw removal.") is explicitly mentioned as a critical input parameter in Section 8.2. We agree that other nutrients such as K will likely have to be compensated. However, the greenhouse gas emissions related to the increase in application rates for other parameters are most likely insignificant. A note was added to Section 8.2: "*Note that the loss of other nutrients such as K will likely have to be compensated as well. However, the greenhouse gas emissions related to the increase in*	Do you have a reference that supports the statement that "application rates for other parameters are most likely to be insignificant". One also needs to consider off-site carbon costs related to manufacturing and transporting the nutrients (not just applications to the field). Potassium is of greatest concern being a very costly nutrient and removal of rice straw will remove 50 to 100 kg K/ha.	This conclusion was reached after discussions with early adopters, industry representatives, and extension people. A full lifecycle analysis is beyond the scope of a carbon protocol. However, the reviewer is right that the increase in fertilizer production and transportation from replacing NPK nutrients leads to significant GHG emissions. We added a section (9.3.3) to calculate this increase in GHG emissions as *IFEF*, which is now deducted in the final	Authors need to be explicit in what their boundaries are for determining emissions. We mentioned the problem related to fertilizer (which they address). Also in section 9.3.2, they are accounting for the end use of straw. While I am not suggesting a life-cycle analysis, they do need to indicate	Thanks for bringing this to our attention. Table 1 ("Overview of included greenhouse gas sources") is now updated and includes explicitly the GHG boundary for the protocol. Specifically, we included emissions from production and transportation of N, P, and K fertilizer in this table. This table should make it completely clear where the boundary is.	Accepted	n/a[1]

[1] See additional comments and responses on the issue of residue baling and removal in the document *Voluntary Emission Reductions in Rice Management Systems – PEER REVIEW REPORT ROUNDS 5 6 7*, posted on the ACR rice methodology webpage.

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		application rates for other nutrients are insignificant."		calculation of emission reductions (see equation 6).	exactly where their boundaries for this project are and when they are going to account for offsite effects.			
13	From the document, it is unclear what the farmer will get if s/he reduces GHG emissions. What is the incentive for the farmer? Do you know what the value of a credit is? Again, if this document, or a revised form, is presented to farmers, some info on credits and its value should be included.	The methodology is not meant to be presented to farmers. We have a separate information document that explains the value. In addition, we will apply the methodology on a number of pilot field sites in California and Arkansas. Value of credits varies. In general carbon credits sold on the voluntary market have been averaging $3-5/metric ton CO_2e while California compliance credits (i.e. those generated under protocols approved by the California Air Resources Board; note that this rice methodology is under consideration by CARB) have secured higher prices in the $7-9/ton range, and these prices are expected to increase in the future.	OK	n/a	n/a	n/a	n/a	n/a
14	ACT3 asked for implementation of dry seeding. At the moment	We were grateful to Prof. Will Horwath from UC Davis to use (yet) preliminary unpublished	This is the only direct comparison of this sort and it is one	We hope to add more data in the near future. The statistical	But if you only have one data	A situation where only 1 data point	Accepted	n/a

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	about 5% of the farmers use the dry seeding approach. Is there any side by side comparison on GHG emissions between wet and dry seeded rice in CA that can be cited here? I am not aware of any published study on this comparison and what the effect is on GHG and yield. If data are not available and that comparison has not been tested in some scientific way, how can it be proposed as an action item? Is it premature to propose ACT3 as one of the 3 changes in management practices?	data from California to compare GHG emissions from wet and dry seeded rice in a side-by-side comparison. These data are presented in Section 15.3.4.	year of unpublished data. This seems pretty scant to base a recommendation on.	discounting approach used makes the calculations robust against bias through the paucity of data. This was tested in Monte Carlo runs.	point to work with how can you verify your results?	would not be eligible according to the protocol; the protocol requires to have at least 8 measurement points. See near line 1085: *This protocol requires the standard deviations to be calculated based on only at least 8 pairs of measured and simulated annual emissions that have been measured over at least 2 growing seasons.*		
15	Once a 1000 acres site has been selected and (some) farmers have already started dry seeding, removed straw, and reduced winter flooding by 10 %, how does that affect the credit counting? What is the base line that will be used here? Been progressive (so to speak) becomes counterproductive and financial unattractive to	Only changes to management can lead to marketable emission reductions. In practice, growers need to provide historical records for the five years preceding the project to determine if project actions are additional or not. Suppose that a grower has conducted dry seeding in these 5 years, dry seeding must be included in the baseline, and	Document must show how adoption will not penalize 'early adopters' who will be the leading force in expanding the program. Why would it not be better to highlight changes from 'regional management' as the	The dilemma here is that the protocol must at the same time not penalize early adopters and be acceptable for buyers of carbon credits who are only willing to pay for farmers who effectively changed their practices. We are currently developing a	Can you provide a reference in the document stating that rotational winter flooding creates greater habitat diversity or is this conjecture?	There is no peer-reviewed literature that has directly studied the habitat impacts of rotational winter flooding as such. However, it is well established that, in general, habitat diversity increases species diversity. In addition, literature	This seems reasonable as long as you know that rotational flooding does lead to GHG benefits? If this has not been properly documented the work needs to	It is well established that any decrease in flooding leads to GHG benefits; therefore, we consider the GHG benefits of

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	participate. In other words, the less progressive ('bad') a farmer is at time zero, the better s/he will be off.	no credits from dry seeding can be claimed. However, to incorporate the very valid point made by the reviewer that early adopters and innovative farmers are being left out, we have added the possibility of passing the additionality test using a performance based standard that is based on the common practice of a certain management practice (See Section 15.2), and not on the existence of implementation barriers that are specific to the grower or field. Please note that it is still necessary to use the 5-year history of a specific farm for the baseline.	base criteria? How was the 10% figure for reducing winter flooding arrived at? Are the authors sure that this will not impact wildlife?	strategy together with ACR to incentivize early adopters. This language will be included in the final protocol but is considered an ACR policy decision (since it involves balancing environmental integrity with commercial concerns) rather than a technical issue for peer review. The 10% figure was arrived through consultation with the rice industry and conservation groups. To all parties involved, 10% seemed a reasonable threshold. It was clarified that it is not only the total acreage of fields that are flooded that counts but also the diversity of the habitat that is created. The system of rotational winter		indicates that different flooding depths attract different bird species (e.g., Colwell and Taft, 2000[2]). Rotational flooding requires fields to drain regularly and will, therefore, lead to a very diverse habitat with different flooding depths. This rationale was confirmed by wildlife specialists and conservation groups that we are collaborating with. This reasoning was included in the introduction as following: *This practice [rotational flooding] leads to GHG benefits – on the condition that the total number of flooded acre-months is reduced compared*	be done ASAP.	rotational flooding established.

[2] Colwell and Taft, 2000. Waterbird communities in managed wetlands of varying depths. The International Journal of Waterbird Biology. 23: 45-55.

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				flooding is believed to create greater habitat diversity.		*to baseline conditions - while likely supporting waterbird conservation since the variety in flood depth creates more species diversity as the depth of flooding attracts different species (Elphick and Orick, 2003).*		
16	Different rice varieties may lead to differences in CH_4 emissions. Lindau et al. (Effect of rice variety on methane emission from Louisiana rice, Agri. Eco. Environm. 1995; 54:109-114) shows differences of >60% in CH_4 emissions between rice varieties. Do farmers have to stay with the same rice variety for 5 years once they sign up? Along this topic, is DNDC able to detect difference in GHG between varieties?	DNDC is able to model differences in GHG emissions from changes in the duration of flooding specific to the rice variety without a need to re-calibrate. The DNDC model includes a calibrated parameter set for a short-to-medium grain japonica rice varieties. However, if varieties have a different root exudation per unit of grain production, DNDC must be re-calibrated. We changed the text in Section 8.4.2 as following: *The specific rice variety used strongly impacts CH4 emissions (Lindau et al., 1995). The DNDC model includes a calibrated parameter set that is sufficient for most short-to-medium grain japonica rice varieties as*	Our work shows highly significant differences between varieties in their CH_4 emissions. This suggests that there needs to be a specific input for this and that a 'general' value is not sufficient. I believe it should be made clear that when data are made available there will be specific coefficients for varieties. This issue of variety remains unclear to me. Varieties, even within the same maturity group	The following sentence was added to section 8.4.2: "*Crop parameterization values for other varieties may be published as an addendum to this methodology as they become available.*" The section on field calibration (8.4.2) was restructured and the following text was added to ensure that variety-specific increases in CH4 are included in the re-parameterization of the crop parameters: "*However, if other varieties are used, the DNDC rice*	In section 8.4.2 you state that "The DNDC model includes a calibrated parameter set that is sufficient for most short-to-medium grain japonica rice varieties…" A few sentences down you write "However, if other varieties are used, the DNDC rice parameterization must be changed using crop data of the variety	The ambiguity was removed by omitting "most". This section was further clarified as: *Therefore, if short-to-medium grain japonica rice varieties are used, project proponents can proceed to step 2. However, if long-grain varieties are used, the DNDC rice parameterization must be changed using appropriate crop data.*	Accepted	n/a

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		long as the "maximum biomass" parameter is manually tuned to reflect variations in yield due to local soils and climates that are not yet incorporated in the model (see further in this section). However, if long-grain varieties are used, an appropriate parameter set for such varieties must be used. *Growers are allowed to change varieties after the start of the project as long as the new variety was included in the calibration dataset. If project activities did not impact the decision to change the variety, variety shall be considered a non-critical input variable. However, if the variety change is the result of a project actions, variety shall be considered a critical input variable.*	(similar flood duration), can have vastly different emissions. It is not just the crop duration but root exudates, arenchyma pathway (affecting O2 and CH4 transport), etc. Even if root exudation were the only difference between varieties, how do they plan to measure these differences in order to recalibrate the DNDC model within the time frame of this project?	*parameterization must be changed using crop data of the variety used. Crop data may be collected by project or proponents or sourced from publically available reports and peer-reviewed data. In addition, if there is evidence in the scientific literature that CH_4 emissions are greater for the selected variety, project proponents must tune crop parameters until the greater CH_4 emissions are simulated well.*"	used." This is ambiguous and if they are going to state that "most varieties" then they need to say exactly which ones they are talking about. Also, what if a grower changes to a different variety and they do not know have the information required for that variety? Personally, I feel that variety should be left out of this. While we know varieties differ, we do not always know why. I guess that	If farmers switch from short-to-medium grain to long-grain varieties and no information is available for the long grain variety, the farmer is not eligible to participate in the carbon project anymore. We fully agree. We believe that the changes described above strike a solid middle ground. The specific variety is now left out of the methodology, only the large buckets of "short-to-medium grain" and "long		

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					if a grower uses a shorter duration variety the model would account for the period of shorter flooding without requiring all the specific variety constants.	grain" are included. The former category can be accounted for using the standard DNDC parameterization, while accounting for long grain varieties requires re-parameterization.		
17	This document puts forward a protocol that can be used to evaluate GHG reductions using DNDC model simulations as a way to evaluate GHG mitigation practices in California and Arkansas. Overall, the approach used would apply to much of the rice production in California but only a very small percentage of production in Arkansas.	We have made moved all aspects that are specific to California to a section in the appendix (Section 15.3) in an attempt to make the methodology less California-specific. An effort to create a similar Arkansas-specific module is underway. We simply do not have the calibration data yet for the Mid-South.	I agree	n/a	n/a	n/a	n/a	n/a
18	I have not directly used the DNDC model but feel that a considerable amount of 'calibration' would be necessary if it were used for rice in rotation with soybean.	That is correct. Future versions of the methodology may contain provisions to include rotations such as rice-soybean rotations.	Good	n/a	n/a	n/a	n/a	n/a
19	As the document stands it would be helpful to specify	This is now included in applicability condition nr. 3:	Good for California but not for Arkansas	This requirement was relaxed: "*The rice*	Accepted	n/a	n/a	n/a

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	that its more immediate use would be for fields that have a history of continuous rice production.	"*The rice fields shall remain under continuous rice cultivation after the start of the project with no more than one fallow season for every five years.*"	where most fields are rotated with soybean.	*fields shall remain under semi-continuous rice cultivation after the start of the project with no more than three seasons for every five years in which no rice is grown (e.g., fallow or soybean).*" Provisions to allow for non-rice cropping seasons are included throughout the text. Note that credits can only be generated during the rice growing seasons.				
20	I am concerned that, given the range of management practices (varieties, tillage, fertilizer rates and times), soil types, and yearly weather fluctuations present in Arkansas rice production, model estimates will not be accurate in many cases. Having said this, I feel this is the best approach and that keeping recommended 'changes' to only practices that will result in GHG reductions across a range of management and climate	We agree with the reviewer. We have tried to provide sufficient prescription to decide which model inputs can change between baseline and project scenarios, so that model uncertainty in emission reductions is minimized.	Good	n/a	n/a	n/a	n/a	n/a

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	variables would be viable.							
21	There will be a need to collect significant 'verification' data.	That is correct. However, we try to minimize the need for verification data by allowing projects to use fields in the region for the "regional calibration", one of the two calibration steps, and by allowing "regional calibration modules", in which the regional calibration is done and verified for a whole region.	What is the time frame for this?	The first new regional calibration module will be for the U.S. Mid-South and will be submitted to ACR by mid 2012.	n/a	n/a	n/a	n/a
22	There are a number of typos in the document which can be identified with the spell checker.	Thank you for bringing this to our attention. We have spell-checked and reviewed the new version.	OK	n/a	n/a		n/a	n/a
23	I would change the word 'methane' into CH_4, whenever appropriate and be consistent.	This was done as requested	OK	n/a	n/a		n/a	n/a

2 Summary Description of the Methodology/Revision[3]

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	A more comprehensive presentation of the required activities in the field is urgently needed.	We have tried to make the methodology more generally applicable, and less dependent on specific activities, the idea being that activities must be	Yes, much improved	n/a	n/a	n/a	n/a	n/a

[3] See additional comments and responses on this section in the document *Voluntary Emission Reductions in Rice Management Systems – PEER REVIEW REPORT ROUNDS 5 6 7*, posted on the ACR rice methodology webpage.

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
		described in a GHG Project Plan or in a follow-up module.						
2	If intermediate flooding in the summer will be implemented, CH_4 will decrease and N_2O will increase with likely a yield penalty (based on somewhat anecdotal evidence obtained at the CA Rice Experimental Research Station). I remain concerned how a possible yield decline will impact the implementation of proposed ACT.	The methodology contains provisions on how to account for a decline in yield. Increases in N_2O emissions due to intermittent flooding are included in the GHG accounting procedures of the methodology.	Is the provision you are referring to the same as your response to question 10? If so I do not think any adoption will happen as it is nearly impossible to reduce water without some reductions in grain yields. Need to make sure that this is interpreted as no mid-season drain only dry seeding.	Note that it is not required that yields remain constant; there will only be a small discount in the GHG emission reduction values if this happens.	n/a	n/a	n/a	n/a
3	An issue is made throughout the document that the farmer still has to burn every 8 years, even if no burning was implemented in the past. Although statistically that is correct and 13 % of the area is still been burned, why does the farmer have to burn 13 % of his area? I agree that the farmer cannot burn more than 13 % but leave it up to the farmer to burn less or not at all. Why is	We recognize the ambiguity of the statements regarding burning. Note that the farmer does not have to burn. We meant to say that a burn event has to be scheduled *in the model runs*, even if the farmer does not burn. This provision was included for simplicity and to remain conservative. The farmer can still decide whenever he burns. The sentence in the summary	Does the model not have an option for 'no burning'? There are no reliable estimates on the area that is burnt in Arkansas thus going to be managed in the model?	We understand the requirements to schedule burn events in the simulation runs were confusing. Therefore, we removed these provisions in the second revision. This provision was replaced by: "*Straw burning events must be scheduled in the*	Accepted	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	the report so rigorous and every 8 years straw has to be burned?	description was changed as: "*For simplicity, when designing the management schedule for use with the mechanistic model to calculate emissions, a burn event must be scheduled in the model runs every 8 years, regardless of whether this burn event effectively occurred. It is the farmer's decision whether to burn or not.*"		*baseline scenario as they occur according to surveys and historical data.*"				
4	I am confused about statements that planting and harvest dates must remain similar in one paragraph and then in the following paragraph it states that baselines are only partially fixed ex-ante due to weather conditions etc. If weather conditions play havoc setting the baseline, it will continue to play havoc once the 5 year period starts.	This text was clarified as following: "*[…] a distinction is made between critical management parameters – parameters that are directly or indirectly related to the project activities – and non-critical management parameters – parameters that are completely unrelated to the project activities. All non-critical management parameters must remain similar between the project and the baseline simulations; only the critical input parameters under the project scenario may be different from*	OK	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
		the baseline scenario. *In contrast to other carbon projects in which baselines are entirely fixed ex-ante, in the current methodology, baselines are only partially fixed ex-ante. Only the values of the critical management parameters are fixed ex-ante. All non-critical management parameters must change with the actual management.*"						
5	Waterfowl. I do not understand the logic of switching from passive to active winter flooding to reduce GHG. By rotating all fields into an active winter flooding program, all fields will show (higher?) GHG emissions. As the rate of GHG (CH_4) will be driven by substrate availability (straw) and will decline when substrate runs out, DNDC should be able to predict that by rotating all fields into an active winter flooding program, GHG may in fact increase.	We do not fully understand the statement. There will be only a net reduction if the duration and frequency of winter flooding is reduced across all fields. In any case, it seems that the reviewer agrees that the quantification approach taken is robust and that DNDC will simulate an increase in emissions under the conditions provided by the reviewer.	It is not clear in the text how the duration of winter flooding will be reduced and how flooding will be circulated between fields. Will certain fields be flooded for one month while others are unflooded and then these fields drain while filling up other fields? This needs to be clarified and presented in a more specific manner. Also, what would the effect of this be on wildlife? You would not only	The rotational flooding was clarified as: "*This methodology allows project participants to reduce the total area of passive winter flooding and supports (but not requires) switching to a more actively managed flood management (maintenance of water depth of 10 -15 cm level during winter flooding) by rotating winter flooding across fields in which certain fields are flooded for some time while others remain unflooded and in a*	Again refer to previous comment asking for reference. Also if the requirement is to have flooded fields flooded to 10-15 cm this may provide less diversity. Currently, fields are managed to have fields of differing water depth which attract different species.	We agree with this concern. Initially, this requirement was put in due to research that indicated that, when flooding depth is homogeneous, biodiversity is greatest when water depth is flooded to 10-15 cm (Elphick and Orick, 2003). However, other research indicates that a heterogeneous flooding depth across fields creates a diverse habitat and is optimal for species diversity. After consultation with our conservation partners	Accepted	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
			be reducing the amount of acreage by 10% during the winter season but it would be reducing the acreage flooded at any given time by a much higher percentage. Have these reductions in flooded areas been evaluated from a wildlife standpoint?	*next phase, the flooded fields are drained while flooding the other fields. […]This practice leads to GHG benefits – on the condition that the total number of flooded acre-months is reduced compared to baseline conditions - while supporting waterbird conservation.*" The practice of rotational flooding was actually recommended by conservation groups. The rotation of flooding gives waterfowl a more diverse habitat than having ALL fields flooded.		and wildlife specialists, we decided to remove the requirements of having fields flooded to 10-15 cm in the revised version of the protocol.		
6	Ex-ante versus ex-post. If emissions have to be calculated ex-post, what are the variables that will be included in the ex-post calculations? Will it only be adjusted for weather conditions? I assume that DNDC is able to capture these	See before: the critical management input variables are the only variables that are allowed to be different between project and baseline. Since weather is not a critical input variable, weather must be the same for ex-post	OK	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	vagaries of the weather re CH_4 and N_2O (?) emissions.	calculations between the project and baseline scenarios.						
7	By reducing duration of flooding do you mean 'short-duration' varieties?	Yes. This statement now reads: "*Reducing the duration of flooding during the growing season, either by shortening the growing season and using short-duration varieties*"	OK, but still some short duration varieties may emit more methane due to greater root exudates or other plant properties.	This is a very good point. A cautionary footnote was added: "*An appropriate crop parameterization is required when short-duration varieties are used since some short duration varieties may emit more methane due to increased root exudation or other plant properties.*"	Please see comment in General 16	n/a	n/a	n/a
8	In the mid-south there are no restrictions on burning thus it would be advisable to indicate removal of crop residues by burning is not allowed.	If there are no restrictions on burning, why should a methodology add a requirement that burning is not allowed?	So, in the south will burning be allowed as straw removal option for participating growers?	Yes. This was stressed in the following sentence: "*Straw burning events must be scheduled in the baseline scenario as they occur according to surveys and historical data. Straw burning during the project period must follow all appropriate laws in any relevant jurisdiction in which the project area is located.*"	n/a	n/a	n/a	n/a
9	2.3.1: How are deductions determined and do they vary	The following sentence was added to section 2.2.1: "*The*	OK	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	for each field?	*uncertainty deduction must be applied to each field individually (see Section 11.1.3).*"						
10	2.3.1: Why would planting dates, harvest dates, N application rates, flooding and draining dates information not be necessary for dry seeding and required for water seeding?	We could not find any indication in 2.3.1 that indicates that these data are not necessary for dry seeding and required for water seeding. In the new version of the methodology this paragraph was removed to make the methodology more generally applicable.	Good	n/a	n/a	n/a	n/a	n/a
11	2.3.1: There is no provision for rented vs owned land. Most rice production in the mid-south is on rented land which greatly influences management.	This is definitely interesting. We are unsure how renting vs. owning land influences management. Could you please point us to resources to understand this impact.	My reference here is to the fact that more than 75% of the rice land is rented and that there are a number of rental agreements that range from cash rent to a percent of crop sales; between these there are some cost share agreements. There is a rapid turnover in many leases which would make it difficult to establish long-term cropping practices	This issue is important, but transcends this methodology and is usually not part of a methodology. It is up to the farmer as well as the landowner to follow ACR procedures to register the project and establish clear ownership of the carbon credits. No Emission Reductions Purchase Agreement (ERPA) will be signed without the explicit approval of both the landowner and the	Accepted	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
			and exactly who would get the benefits of income generated from GHG agreements ie. Would the farmer make the change in management and would the landowner get the benefits? There are a number of publications from the University of Arkansas Economics Department which deal with these issues.	producer renting the land. How the benefits are distributed among the two parties, is up to them. ACR will require, as part of acceptance of a GHG Project Plan, that the project proponent (whether this is an aggregator, land owner, or tenant renting land) provide a clear description of land ownership and carbon credit ownership in order to register a project. These arrangements are addressed in the screening of GHG Project Plans and registration of projects rather than in the methodology.				
12	2.3.2: All combined fields must be of the same soil type.	The following sentence was added to section 2.2.2 to clarify this: "*It is not necessary that fields within one spatial aggregate are of the same soil type since the methodology still requires to stratify all fields according to soil type and quantify and*	Accepted	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
		report GHG emissions for all fields individually."						
13	2.2.3: You do not say how a baseline flooded area is determined.	This was clarified as: " […] *the area under active or passive winter flooding cannot be reduced by more than 10% compared to the baseline winter flooding area, based on historical data from the 5 years preceding the project start date*."	Good	n/a	n/a	n/a	n/a	n/a

3 Definitions and Acronyms[4]

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	Define DNDC, GHG, ACR, CDM, OFEF, QA/QC	A separate list of acronyms is included in the methodology (see Section 3.2)	OK	n/a	n/a	n/a	n/a	n/a
2	Winter flooding is also done to create waterfowl habitat, not only to increase decomposition.	The definition was altered as following: "*Flooding of fields during the off-season is practiced to decompose rice straw and create waterfowl habitat*"	OK	n/a	n/a	n/a	n/a	n/a

4 Applicability Conditions

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response

[4] See additional comments and responses on this section in the document *Voluntary Emission Reductions in Rice Management Systems – PEER REVIEW REPORT ROUNDS 5 6 7*, posted on the ACR rice methodology webpage.

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	In Ch 4. 5: Yield and credits discounted. I am confused here. If a yield decline is due to pests, weeds, etc. I can see that credits be discounted. But is the imposed management practice, i.e. learning how to do the drill seeding operations or drying and wetting the soil during the growing season, leads to a decline in yield, why are then credits discounted?	In fact, if a yield decline is due to pests or weeds, credits should not be discounted. The pests and weeds would have happened anyhow. The impact of pests and weeds on yields will be incorporated in the emission reduction calculations. However, if a yield decline is caused by the project actions, this yield decline may impact land-use change and emissions on other fields due to market leakage effects. Therefore, emission reductions must be discounted. The following sentence was added to clarify: "*This uncertainty deduction is necessary to account for potential market leakage effects (see Section 13.1)*"	Yields may decline for any number of reasons. The authors are wrong to assume that certain weeds or pests would have been there regardless if a farmer switches from wet to drill seeding. Weeds in particular are very different between these two systems so weeds are there due to project actions. This also gets to our original point, when a farmer makes a switch from wet to drill seeding there is a learning curve. Weed (species and herbicides used to control), fertility and water management are very different and it may take a few years for a farmer to learn how to manage such a system. During this period yields may	We agree with the reviewer and acknowledge the ambiguous nature of our response. The sentence in the response should read "*In fact, if a yield decline is due to pests or weeds, that are unrelated to the project activities, credits should not be discounted*" The practical aspects of the practices and weather are beyond the scope of the methodology. However, we are working closely together with early adopters to understand the limitations and challenges of each project activity. In the beginning, only producers that were already seriously considering some of these practices may be convinced to change practice	OK, but you also state that if a yield decline is a result of project activities then credits will be discounted. The point we have been making is that there will likely be a yield reduction as farmers learn the new practice (referring primarily to drill seeding as the other practices are unlikely to have a large impact on yields). The project must make sure that the farmers are aware of this. Farmers may see that they have volunteered to do something that gives them lower yields and they do not get credits. Probably not going to be a happy farmer.	ACR requires that all project participants and stakeholders include a specific community and environmental impact assessment, which is very similar to the requirement of acquiring "Free and Prior Informed Consent" of all stakeholders. In other words, the education of farmers on the risks of these practices is an essential part of a carbon project per ACR rules. However, the requirement of informed consent is beyond the scope of an individual methodology, which is in essence a technical document that is not meant to be used directly by a farmer.	Accepted	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
			be lower due to mistakes made during this learning process. In some cases dry seeding may require a drill seeder. Most rice farmers do not have these and they are very expensive. How will the project handle this with the farmer? In some cases dry seeding can be done without a drill seeder but this also has additional risks.	through this program. The additional income from carbon would certainly not compensate the purchase of expensive equipment.				
2	1.: and on the same soil type.	This is not necessary as indicated before.	OK	n/a	n/a	n/a	n/a	
3	2.: What is the procedure to quantify GHG predicted values?	The procedure to quantify GHG values is discussed at length in the methodology.	OK	n/a	n/a	n/a	n/a	
4	5.: It might be easier to obtain yields from NRCS records.	This was included within the following footnote: "*Yields are first normalized relative to the county yields, obtained by the NASS or NRCS, before trends over time are investigated.*"	OK	n/a	n/a	n/a	n/a	

5.1 Geographic Boundary

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	The geographic boundary for the project area (five individual rice fields or 405 ha) appears somehow arbitrary, but still seems a reasonable figure. However, the statements regarding the distance between individual fields are unclear: *"This methodology encourages combining fields spread over a large geographic region within one GHG Project Plan to reduce costs."* What is meant with large geographic region? By the same token, the suggested 'stratification' procedure under non-homogeneous conditions needs more guidance in terms of scaling. At present, the text could be interpreted from aggregating entire counties in one project. Is that really intended?	We understand the ambiguity introduced by mentioning a "large geographic region". This specification was removed in the revised version. The stratification procedure was further clarified. It is technically possible to aggregate an entire county into one project. Note that the GHG emissions reductions and DNDC model runs must be executed for each individual field. Including an entire county would be a formidable task, therefore.	Accepted	n/a	n/a	n/a	n/a	n/a

5.2 Greenhouse Gas Boundary

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	Table 2 needs a thorough revision. How can fungi be a source of CH_4 and N_2O? Even the mentioning of 'soil bacteria' in this column appears rather meaningless because their	Table 2 was revised as following: "*Soil microorganisms metabolizing soil C, root exudates, and soil mineral N*"	Accepted	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	activity is determined by C and N inputs into the soil which – in my understanding -- should be specified as source in such a compilation.							
2	This section would need to include options related to rotation sequences where rice is rotated with other crops.	The methodology does not allow to rotate rice with other crops in its current version (apart from one fallow season for every 5-year period). This is specified in applicability criterion nr. 3.	OK but needs to be dealt with in the future as this current methodology has limited applicability in the south unless rotations are accounted for.	This requirement was relaxed given the importance of soybean seasons in the Mid-South. Applicability criterion 3 reads now: "*The individual rice fields included in the project area have been under semi-continuous rice cultivation for the five years preceding the start of the crediting period, with at least two rice growing seasons out of five years. During the rice growing seasons, the fields must have been flooded for a period of at least 90 days during the growing season*[5]*. The rice*	How did you arrive at the flooding period of 90 days? In the dry seeded systems the flood is applied at 2-3 weeks following planting and removed 2-3 weeks prior to harvest. Designating a time period such as 90 days will not allow for the adoption of short-duration varieties!!!	The duration of 90 days was set after consultation with farmers and farm advisers so that most rice growers would be eligible and to exclude people who flood their fields only temporarily. Based on the comment of the reviewer, it seems that there is a possibility that short-duration varieties will become ineligible with this requirement. Therefore, we have changed the 90 days duration requirement to	We are concerned that this will not allow farmers that row-water rice or intermittently flood rice into the program. Both methods are used and likely will have large impacts on GHG emissions. We would suggest a provision to include such practices once reliable data on their impact on GHG emissions is available.	This condition only applies to the baseline. There could still be an issue for an early adopter. What about changing this requirement to "Duration of the growing season (i.e., period between planting and

[5] In other words, this methodology is only applicable for growing rice under flooded conditions.

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
				fields shall remain under semi-continuous rice cultivation after the start of the project with no more than three seasons for every five years in which no rice is grown (e.g., fallow or soybean)." The temporal boundary section further specifies: "*The crediting period can only start immediately after a harvest and only end immediately after a subsequent harvest during a year where rice is grown.* *No credits shall be generated for fallow seasons or during years where a different crop than rice is grown. The starting and ending points of a normal rice growing season shall be used as points in which crediting ends and*		only 60 days in the new version.		harvesting) should be at least 60 days; If rice crop is not harvested, the duration of the growing season must be counted as 0 days."

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
				starts during such years. ”				
3	Would be improved if you included a need for like soil types.	We did not include a requirement to have like soil types since model runs have to be done for every field (and soil type within a field) separately.	OK	n/a	n/a	n/a	n/a	n/a

5.3 Temporal Boundary

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	I think tillage (type) and time should be included here.	We do not understand the relevance for tillage type and time in the temporal boundary section. Perhaps this comment refers to a different section than the temporal boundary?	You are correct: this refers to 6 below	n/a	n/a	n/a	n/a	n/a

6 Procedure for Determining the Baseline Scenario[6]

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	Is the amount of soil C one of the baseline data needed?	Yes, this is specified in section 8.3.2.	OK	n/a	n/a	n/a	n/a	n/a

[6] See additional comments and responses on this section in the document *Voluntary Emission Reductions in Rice Management Systems – PEER REVIEW REPORT ROUNDS 5 6 7*, posted on the ACR rice methodology webpage. Also, note that in the final methodology, the chapters on Determining the Baseline Scenario and on Demonstrating Additionality have been merged.

7 Procedure for Demonstrating Additionality[7]

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	Is this legal language of limited significance for the reviewer to comment on?	[ACR response: the language in this section of the methodology simply duplicates generalized language on additionality from the *ACR Standard*, so may be considered outside the scope of the technical review. However the section 15.1.6 language on developing performance standard tests is certainly within the scope of the review.]	n/a	n/a	n/a	n/a	n/a	n/a

8 Baseline Emissions

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	The methodology encompasses a very static view of the DNDC model that does not reflect the enormous ramification of this model has undergone in the past and that will in all likelihood continue in the future. The methodology refers to the model version 9.4 whereas the actual version for download on the DNDC homepage – as of	See our response on issue 3 below.	Accepted; see above	n/a	n/a	n/a	n/a	n/a

[7] See additional comments and responses on this section in the document *Voluntary Emission Reductions in Rice Management Systems – PEER REVIEW REPORT ROUNDS 5 6 7*, posted on the ACR rice methodology webpage. Also, note that in the final methodology, the chapters on Determining the Baseline Scenario and on Demonstrating Additionality have been merged.

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	today – is version 9.2.							
2	This distinction of different model versions is more than just academic. As this reviewer has experienced in the past, new model versions of DNDC did not only improve the intended modification but also entailed 'collateral' (= unintended) changes – e.g. a better simulation of the N cycle also affected indirectly the simulated C cycle. These changes have often remained unnoticed (or have only been noticed with considerable delay) for 'exotic' land use types, such as such as flooded rice production systems.	The uncertainty deduction and regional calibration has to be done with one model version 9.4, to avoid these model-specific deviations.	Accepted; see above	n/a	n/a	n/a	n/a	n/a
3	What will happen to the methodology after a new version of the DNDC will be released? In fact, the model version used in this methodology may soon be replaced on the DNDC home page and may not be available through that source any more.	The following statement was added: "*Future updates of this methodology may include newer versions of the DNDC methodology and quantification procedures, reflecting advances in the science of predicting GHG emissions.*" The model author was asked and agreed to keep 9.4 publically available on DNDC's website by December 2011. In	Accepted; see above	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
		the meantime, the methodology developer can provide the correct model version to the peer reviewer, if this were necessary						
4	It is unclear how well DNDC works for N_2O in rice systems. Are there references that can be cited? The N_2O may be the weak link as the proposed ACT will lead to a reduction in CH_4 but likely to an increase in N_2O.	See our response on General / Overall Comments issue nr. 9.	OK	n/a	n/a	n/a	n/a	n/a
5	I am concerned that there has not been sufficient calibration for local conditions in the mid-south.	A calibration effort and a specific module including the calibration and parameterization procedures for project actions in the Mid-South is underway under a Conservation Innovation Grant, led by EDF with Winrock International, Terra Global Capital and other partners, entitled *Demonstrating GHG Emission Reductions in California and Midsouth Rice Production.*	Will this effort actually calibrate the model or identify potential management changes for the region?	Both.	n/a	n/a	n/a	n/a
6	Tillage should be included as an input.	Tillage is definitely included as an input variable.	OK	n/a	n/a	n/a	n/a	n/a
7	8.3.1: There will be a number of locations in the mid-south where reliable historic weather data within	This condition was relaxed to 50 miles.	Good	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	20-miles will not be attainable.							
8	8.3.2: Burning straw is common in the mid-south and occurs in most fields when weather conditions are favorable at harvest.	The methodology is robust against greater burning frequency in the mid-south compared to California.	Good	n/a	n/a	n/a	n/a	n/a
9	8.4: Parameters for tall and semi-dwarf along with long and medium grain and hybrid or cultivar would be needed to accurately determine total biomass.	This is correct. It is up to project proponents to conduct this parameterization. This is clarified in the following sentence: "*The specific rice variety used strongly impacts CH_4 emissions (Lindau et al., 1995). The DNDC model includes a calibrated parameter set that is sufficient for most short-to-medium grain japonica rice varieties as long as the "maximum biomass" parameter is manually tuned to reflect variations in yield due to local soils and climates that are not yet incorporated in the model (see further in this section). However, if other varieties are used, an appropriate parameter set for such varieties must be used*."	Good if it exists. This is a costly venture and new varieties will continue to emerge. What varieties are included in the calibration data set? There should be a table with these varieties listed. My guess is that most of these varieties are no longer in use as varieties change frequently and most studies on GHG emissions in the US were done in the 1990s. What are these parameters that need to be reset and how will the parameters be set for the new	We do not want to prescribe any specific varieties except for the indication of "most short-to-medium grain japonica rice varieties". Since it is up to the project proponents to demonstrate that the parameterization is correct. We have added the following provision to ensure that crop parameterization efforts can be used as widely as possible: "*Crop parameterization values for other varieties may be published as an addendum to this methodology as they*	Refer to General 16 comment	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
			varieties? In the south, they use mostly long grain varieties most likely with less japonica in them and more indica.	*become available.*"				
			8.3.1: the exact planting date is dependent on temperature and rainfall and how many fields a farmer has. Really if soil conditions are dry enough farmers will plant as soon as they can- even if it is a bit cool.	This is now acknowledged in the following sentence in 8.3.1: "*the exact planting date is dependent on the average temperature and rainfall in April-May and how many fields a farmer has.*"	Accepted	n/a	n/a	n/a
			8.4.1: the frequency of sampling is too low to get an accurate estimate of annual fluxes. Both CH_4 (particularly at the end of the season following the drain) and especially N_2O fluxes are characterized by short duration	Since only CH_4 is required to be measured, the frequency of sampling was revised to twice a week during critical periods and twice a month during more stable periods. The revised sentence reads: "*Methane fluxes must be measured at least*	From page 4 I read "This methodology uses the biogeochemical process model DNDC to quantify soil carbon dynamics…." I thought the purpose was to	N2O is still included in the accounting, but it is not required to include in the regional calibration. We are convinced that the expense of N2O measurements cannot be	In many cases there is an inverse relationship between CH4 and N2O. We also know a lot less about N2O in rice systems than we do for CH4 and thus it is much more	I agree there is not that much additional cost for experiments that are planned in the future. But most of the experiments that we rely on for CH4

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
			spikes. During critical periods (flowing drains and irrigation events) sampling should occur 3 times a week and relaxed to 2-4 times a month during more stable periods. In drill seeded systems, especially in the south, rainfall during the first month after planting will necessitate more frequent sampling.	*twice a week during periods with rainfall and around draining and wetting events ("critical periods"), every two weeks during non-critical periods of the growing season and at least every 6 weeks outside of the rice growing season.*"	account for both gases. If so, then why is N2O not being measured? N2O will likely be greater in dry seeded systems and in rice fields that remain unflooded.	justified by the potential increase in accuracy. Even though the expense of analytical equipment has decreased over the years, N2O flux measurements are labor intensive, and therefore expensive.	difficult to account for accurately. To our knowledge the DNDC model does not do a great job at determining N2O in rice systems. We really feel that N2O values need to be determined. We are not sure why the concern for cost as N2O is measured in the same gas sample as the CH4 (it does not require additional sampling) but will require a detector on the GC. We also realize that N2O emissions occur in discrete peaks	measurements do not have N2O measurements, so we cannot go back and get those measurements. I can ask Bill what the reduction in N2O was according to the model for all of the project activities in the methodology. Based on this, we can provide an estimate of the contribution of N2O to the total credits, and hopefully demonstrate that the changes in N2O are *de minimis*

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
							and the sampling protocol might not pick these up. May require more frequent gas sampling during critical periods.	compared to the changes in CH4.

9 Project Emissions

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	See comments on 8 Baseline emissions.	Addressed above.	n/a	n/a	n/a	n/a	n/a	n/a
2	Where is the value of 250 kg CO_2-eq.t-1 based on for non-CO_2 emissions during decomposition of straw near the farm?	A footnote was added: "*Using the average CH_4 Emission Factor for composting of 10 g CH_4 kg^{-1} waste (2006 IPCC Guidelines for National Greenhouse Gas Inventories Vol. 5, Table 4.1)*"	OK	n/a	n/a	n/a	n/a	n/a

10 Leakage

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
		n/a	n/a	n/a	n/a	n/a	n/a	n/a

11 Quantification of Net GHG Emission Reduction and/or Removals

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	11.1.2: I would state earlier in the boundary section that this is the base for determining field numbers and land area.	The following sentence was added to applicability criterion 1 and the boundary section: "*The minimal number of project parcels is imposed to reduce the impact of the model's structural uncertainty (see Section 11.1.2).*"	OK	n/a	n/a	n/a	n/a	n/a

12 Data and Parameters Not Monitored

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	All states are not uniform on how they determine some of these parameters thus it would be good to indicate procedure reference.	We are unsure how to add this flexibility while maintaining environmental integrity and consistency across states.	If these parameters are important for model calibration then authors should state the methodology required. For example there are many ways to determine soil pH which give different values.	Agreed. The protocol now refers to Head (2006) and NRCS (2004), two standard texts on soil measurements. It is outside the scope of the protocol to completely prescribe the full operation procedures for all measurements. Note that individual projects still have to be approved based on a GHG project plan. The GHG project plan should contain details on how measurements were made and at that point auditors can verify the exact methodology used. References for the citations: Head (2006). Manual of soil	Accepted	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
				laboratory testing 3rd edition. Vol. 1: Soil classification and compaction tests. CRC Press. Natural Resources Conservation Service [NRCS]. 2004. Soil Survey Laboratory Methods Manual. Soil Survey Laboratory Investigations Report No. 42. Available online at http://soils.usda.gov/technical/lmm/				

13 Monitoring Description

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	No comments	n/a	n/a	n/a	n/a	n/a	n/a	n/a

14 Data and Parameters Monitored

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	You may need to lengthen the distance from a weather station in the mid-south in order to get all data required.	The 20-mile requirement was relaxed to 50 miles.	Good	n/a	n/a	n/a	n/a	n/a
2	For tillage you will need to separate fall and spring tillage operations.	The following comment was added to the "tillage" parameter: "*All tillage operations must be*	OK	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
		included, whether they occur during the fall or springtime."						

15.1 Derivation of Structural Uncertainty Deduction Factor

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	The biogeochemical cycles of flooded rice comprise a number of features as compared to cycles in typical upland systems such as wheat and maize. It should be noted that DNDC has been developed for non-flooded systems in the first place whereas the modifications related to flooding have been 'add-ons' with often pragmatic assumptions (e.g. irrigation is treated like excessive rainfall).	While it is true that methanogenesis is a more recent addition to the DNDC model than nitrification or denitrification, we do not see the practical relevance of stating this for users of this methodology. If some of the assumptions made by the model are incorrect or simplistic, the uncertainty deduction mechanics will discount the credits that are quantified.	Accepted – the previous comment was more a general remark rather than a criticism of the methodology.	n/a	n/a	n/a	n/a	n/a
2	In turn, it seems somehow premature to define DNDC as the ultimate solution for simulating GHG emissions from rice fields. At this point, possible emission reduction in agricultural systems is receiving a lot of attention as can be seen in a recently approved CDM methodology for rice production (http://cdm.unfccc.int/methodologies/DB/	The following sentence was added to section 8 to reflect this: "*Future updates of this methodology may include newer versions of the DNDC methodology and quantification procedures, reflecting*	Accepted; see above	n/a	n/a	n/a	n/a	n/a

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
	DCKKMKZR2AVU9BUSFQLRT3L8C3QUPD). Thus, it can be expected that more specific modeling approaches for GHG emissions from rice fields may be available in due time.	*advances in the science of predicting GHG emissions.*"						
3	Is there any provision for updating the methodology? Ideally, such a methodology should incorporate consequently best simulation approach available at a given time. I recognize that such a continuously updated methodology may not be practical within a legal framework. However, that does not speak against a clear statement of the time-bound validity in the description of the methodology -- given the existing limitations in knowledge regarding element cycles in rice fields as well as ongoing research in that field.	The methodology may be updated according to the provisions set forward by the *ACR Standard*. However, the uncertainty deduction procedures make the methodology robust and conservative, even if the modeling procedures become outdated.	Accepted; see above	n/a	n/a	n/a	n/a	n/a

15.2 Requirements for Regional Calibration Modules (new in v5-0)

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	N/a (new section in v5-0)	N/a	n/a	n/a	n/a	n/a	n/a	n/a

15.3 Regional Calibration Module for Certain Project Activities in California (new in v5-0)

	1st review	Response	2nd review	Response	3rd review	Response	4th review	Response
1	N/a (new section in v5-0)	N/a	n/a	n/a	n/a	n/a	n/a	n/a