



January 29, 2014

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Submitted directly to TLang@climateactionreserve.org

Re: Environmental Defense Fund Comments on the Climate Action Reserve revised Minimum Data Standard

Dear Ms. Lang:

Please accept the following feedback from Environmental Defense Fund (EDF) in response to the public solicitation for comments on the revised Minimum Data Standard, the process for submitting data, and the New Data Submittal Form. Our comments are divided into two sections: (1.) general remarks regarding the process behind the MDS and (2.) an appendix with responses to the specific questions posed in the public solicitation. Our senior scientist, Dr. Joe Rudek, and our colleague at the University of Arkansas, Dr. Merle Anders, contributed their expertise when answering these questions.

EDF acknowledges the Reserve for its continual efforts to improve and simplify the data requirements for those submitting data to support the Nutrient Management Project Protocol (NMPP). Like the Reserve, EDF is committed to using the best available science to develop and expand greenhouse gas reducing protocols and projects. We also believe that it is important to provide comprehensive guidelines for field experiments to inform protocol development and ensure robustness.

Revised Minimum Data Standard

EDF believes that the revised MDS provides guidelines to ensure that reference data are sufficiently robust. The MDS is part of a process and as such EDF recommends that the Reserve documents the process and timeline for reviewing, responding to, and accepting new data sets for the NMPP. Additionally, EDF acknowledges that the Reserve “consider[s] other criteria, in addition to the relative strength of a submitted data set, before a management practice can be included as a project activity in the protocol” (Minimum Data Standard for Public Comment, page 2). These criteria should be described in detail and communicated to researchers and data managers, who may be able to submit supplementary support to this end. A clear process should be established for submitting this type of additional supporting documentation.

EDF would like to see the NMPP include additional crops and geographies and believes that revising the MDS is a good start to do so. The addition of these crops and geographies is, of course,

dependent upon the availability of scientifically vetted quantification approaches. EDF supports cost-effective market-based approaches grounded in sound science. For many projects the economics hinge on the volume of offsets which can be generated by the project. As such, EDF currently believes that Tier 3 models offer the best economic incentive to farmers and project developers. This approach needs to be coupled with sound aggregation policies which allow multiple landowners to come together to develop a project. Once a model has been thoroughly investigated, tested, calibrated, and validated through peer review, EDF feels that the model is part of the best available science. For the MDS, the burden of responsibility falls on the modeler to prove the adequacy of its methodology and the robustness of its data. The Reserve should develop an internal process for identifying, analyzing, comparing, and approving appropriate models proposed by interested parties.

Data Submission Process

To streamline the data submission process, EDF recommends continual outreach to potential researchers and data managers to directly communicate the data need to improve or expand existing models for existing and new crops and geographies. In order to acquire the most robust data, the Reserve should consider developing and executing a communications plan for engaging with academics, scientists, and statisticians working on climate issues. Modelers and quantification tool managers must also be informed of the Minimum Data Standard requirements. We would suggest a fast-track form for researchers and data managers who have previously submitted data that did or did not reach the Minimum Data Standard. With timely feedback, researchers could adapt and modify research to meet the Minimum Data Standard.

New Data Submittal Form

The new data submittal form provides a straightforward outline of the requirements for reference data. In order to facilitate smoother data submission, EDF recommends that this form be transformed into a Word Document or an online web entry form. That way, researchers and data managers could more easily submit the information contained in the new data submittal form. Additionally, it may be worthwhile discussing a checklist or worksheet format that mirrors the data submittal form.

We appreciate the effort the Reserve is making to strengthen and simplify the NMPP. Continued improvement of the protocol is important to develop and expand a robust offset market which delivers both economic and environmental benefits. We look forward to continuing to work with the Reserve to create the most robust carbon market possible. Thank you for your consideration of these comments on the revised Minimum Data Standard for the Nutrient Management Project Protocol.

If you have any questions regarding the comments made in this letter, please contact:



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APPENDIX

RESPONSES TO SPECIFIC QUESTIONS POSED IN *MINIMUM DATA STANDARD FOR PUBLIC COMMENT*

Are there recently published studies and/or methodologies which you believe the Reserve should consider? Are you aware of studies underway and/or methodologies under development that the Reserve should be tracking? (page 1)

Since 2012, EDF has been working with the Buffet Foundation to calibrate and validate the DNDC model for multiple nutrient management practices throughout the Land Resource Region M (LRR-M), which includes parts of Iowa, Illinois, Missouri, Minnesota, Indiana, Kansas, Nebraska, Ohio, Wisconsin, South Dakota, Oklahoma, and Michigan. This work should meet the minimum data standards and could be submitted as a supporting dataset in the future.

Additionally, Dr. Bruce Linquist is undertaking research in California to investigate sample frequencies necessary to determine varietal differences in methane and nitrous oxide emissions in rice. This may help to define correct sample numbers and times for further studies. Although Dr. Linquist's research is rice-focused, the Reserve should consider how the NMPP revised MDS relates to crop-specific protocol requirements and how to streamline the process for accepting data specific to new crops and geographies.

Should the Reserve accept datasets published in both peer-reviewed and non-peer reviewed research? Do you think allowing non-peer reviewed studies maintains an appropriately high bar for high quality data? Other than the criteria in the minimum data standard, are there other additional criteria that the Reserve should consider a minimum filter for judging data quality in a case like this? (page 3)

The Reserve should accept models that use peer reviewed datasets. It is important that the data used in Nutrient Management models are from peer reviewed studies in reputable journals to ensure robustness.

Previously, the Reserve required the use of the GRACEnet Chamber-based Trace Gas Flux Measurement Protocol. Now, it proposes the Soil Science Society of America Methods of Soil Analysis, the Canadian Society of Soil Science Soil Sampling and methods of Analysis, the Long-Term Ecological Research Standard Soil Methods, or Methods in Ecosystem Science. Are these protocols sufficiently robust for inclusion? Are there any additional protocols that are equally robust that the Reserve should consider for inclusion? (page 4)

The trace gas sampling techniques named were relatively hard to access via internet searches with the exception of the *Long-Term Ecological Research Standard Soil Methods* (Holland et al.) and therefore, it is difficult to make any comments on robustness. *Long-Term Ecological Research Standard Soil Methods* seems to cover much of the same ground as GRACEnet and can be considered for inclusion (answer continued on next page).

It is important to clarify the characteristics that one wishes to measure and in this case, distinguish between sampling methods for soils and trace gases. For instance, are these protocols meant to capture a sampling procedure for soil organic carbon (sequestration) or for greenhouse gases, including nitrous oxide, carbon dioxide and methane (mitigation and or/avoided emissions)?

At present, the term “region” is not defined. Is it important for the Reserve to define region within the MDS? Or is a more flexible interpretation preferable (allowing regions to be defined as methodologies are developed)? One proposed definition of region would allow the data submitter to propose the region, based on how far they believe a reference data set could be applied. Would this be an appropriate definition? Or should the Reserve consider USDA regional definitions, Land Resource Regions or some other well recognized definition? (page 4)

While we believe that the flexible region and overall criteria make sense if a data submitter must defend its boundaries in its application to the Reserve. However, defined regions must be clear enough to avoid gerrymandering, duplication of efforts, or inaccurate data collection. The Reserve should consider using the Land Resource Regions defined by USDA.

Dr. Anders mentions how a general term could be used initially, but that the definition should be narrowed as more data are available. The definition of a “region” may differ for crops, and therefore, it may be easy to define locally (such as in the U.S. for rice) and more difficult to define globally.

Currently, there is no strict requirement on minimum or maximum chamber size/surface area. If this range was made a requirement, would this be a reasonable range of acceptable chamber sizes? What are the sizes of a typical chamber used for these experiments? (page 5)

Dr. Anders suggests having a size range. In his work with rice, they are currently using a round PVC pipe 0.304-m diameter and he feels it should not go much smaller. Again, EDF recommends that the Reserve keeps in mind how the NMPP may include other crops and geographies and if or how the chamber size would need to change depending on these variables.

Currently the Minimum Data Standard requires at least 3 replicate plots and 2 chambers per functional location, but the Reserve is considering revising these minimum standards, as proposed at left. (refer to revised MDS, page 5)

1) *Would you recommend that the Reserve revise these standards as proposed?*

For rice, Dr. Anders proposes two (2) chambers per treatment for plot design and more for side-by-side comparisons. Keeping this in mind, the Reserve may want to generalize the Minimum Data Standards in a way that provides guidance, while allowing flexibility for a variety of crops.

- 2) *Would you recommend that the Reserve require a minimum of 2 chambers per replicate plot or 2 chambers per functional location (i.e. furrow, side dress, beam) within each replicate plot, which would then potentially require many more chambers per replicate plot, field or treatment?*

No comment.

- 3) *Would you recommend that the Reserve adjust current or recommended requirements based on the size of the chambers being used within the experiment, with different requirements for studies using large (~3,000 cm²) vs. smaller (~300 cm²) chambers? What would be the advantages and disadvantages of establishing minimum acceptable cumulative surface area under chambers (within a plot)? If so, what would be an appropriate value?*

Dr. Anders does not believe that there is a large body of work on spatial variation across plots and fields.

How much additional confidence is gained as each additional site location (i.e. a different geographic region not an additional field at an existing study location) is added in an experimental design? Would you recommend that the Reserve consider a minimum number of replicate study sites at different locations? If the Reserve were to allow for data submittals that did not include multiple study sites, what is the potential for the experiment to overestimate emission reductions? (page 5)

Dr. Anders' studies have found that soil type, rotation, nitrogen management, and water management have significant effects on N₂O fluxes. Thus, he would recommend a minimum of 2-3 replicate sites. There is a large potential of incorrect estimates in emissions if submissions single years and sites. If multiple sites are not in the data submission, it would still be possible to utilize the data if factors such as soil type, rotation, nitrogen management and water management were the same.

There are a number of possible approaches, and the Reserve would appreciate consideration of whether the proposed (or other) approaches are more appropriate as Best Practice. An alternative approach would be to use 1 chamber per functional area and use more plots. Another would be to use 3 chambers per functional area in some plots, and 1 per functional location in other plots. Please comment on the relative advantages and disadvantages of these approaches. Further, please comment on how the size of the plot and/or the size of a chamber might be taken into account when determining the size of a plot. (page 6)

If chambers are used to collect samples through an entire season there will be considerable disruption of the plants within the chamber. Therefore, it is important to have a minimum of two (2) chambers per treatment. If results are expected to be scaled up to farm size fields, it would be preferable to have sufficient chambers to measure field (plot) variability. EDF and others are unsure how a set number would work. Instead, we believe there could be some guidelines as to the area a single chamber can represent.

Would you recommend that the Reserve retain this newly proposed best practice in the MDS (Preliminary data and power analysis for variability between functional locations)? Would a more explicit recommendation be helpful? For example, the Reserve might "encourage investigators to collect preliminary data from at least 4 chambers per functional location in a test plot and from at least 10 chambers deployed at random across the field at one point in time." Aside from providing funds, what could the Reserve do to make it easier for submitters to follow this recommendation? (page 6)

The Reserve should provide the recommended number of measurement points for a given area (ie. how many chambers are needed in a 100 acre field?).

Do you think this is a reasonable minimum standard, recognizing that the Reserve will also encourage more frequent sampling as best practice (Flux measurement frequency of once per week and twice per week after fertilization and first irrigation)? Is this too stringent, such that it will leave quality data sets out of the running? (page 6)

EDF suggests that the Reserve identify standard sampling methodologies or review standards that could be used or referenced by this MDS (i.e. a sampling/review standard through ISO, ANSI, or ASTM).

If no such standards exist, EDF suggests that general guidance is provided in the MDS, recognizing that additional sampling requirements exist for certain crops and situations. For example, Dr. Anders notes that in rice, it should be required to take daily measurements post-drain of a field that has been flooded for most of the growing season.

Is it reasonable to require year-round measurement in these regions (with a freeze/thaw cycle)? Is one full year of "typical" weather conditions sufficient to get a sense of the non-growing season flux? If so, how should "typical" be defined (e.g. average temperatures +/- a certain percent?) For studies that did not collect year-round data, can comparable experiments within the region (with similar climates and soil types) that did collect non-growing season data be used to supplement the growing season data of the primary study of interest? (page 7)

EDF experts believe that non-growing season flux is needed. Dr. Anders would not recommend using studies that *did* collect non-growing season data as a proxy for studies that *did not* collect these data unless there is clear evidence that the two studies are similar in all accounts.

Other general comments (page 7)

Dr. Rudek suggest that the best practice for flux frequency regarding N₂O flux measurements after agronomic or environmental event known to be associated with N₂O fluxes, should instead be listed as a requirement.

Do you recommend any changes in this general approach to responding to submittals from which outliers have been removed? How large a change in N₂O flux estimates, resulting from removal of outliers, would you consider significant? Is +/- 10% appropriate? (page 8)

The general approach is acceptable.

The Reserve is seeking comment on which attributes (that can be easily estimated across large landscapes) have the most influence on N₂O emission fluxes. What type of analyses might the Reserve recommend to extrapolate from a single site (or very few sites) to the larger region? What level of error is introduced as one extrapolates data further away from a core research site? Do Tier 3 models offer a sound method that the Reserve could use to evaluate the distance across which a data set could be extrapolated with confidence? (page 8)

EDF suggests that the MDS not be too strict so as to prevent new crops or geographies from being added to the NMPP. The MDS must allow for a variety of attributes that may differ across crop management systems. For rice, soil type, rotation, nitrogen source and application schedule, and water management are all important. The Reserve should investigate how these compare to other crops and choose the most appropriate set of attributes.

New data submissions must show that soil properties are representative of “typical conditions” in the region, by discussing attributes such as soil type, soil texture, soil water holding capacity, soil organic carbon levels, etc.... Are there any other attributes that should be considered to ensure that soils at the study site represent generally-occurring soils in the region? (page 9)

The above-mentioned attributes are sufficient.