April 1, 2014

General comments for the draft of the Rice Cultivation Compliance Offset Protocol

Addressed to the CA Air Resources Board

Overall, I think this protocol is more scientifically rigorous compared to previously certified GHG protocols on the voluntary market. The use of process-based modeling is a good strategy and a step in the right direction.

One weakness of the protocol concerns the use of non-replicated non-continuous chamber measurements to infer annual GHG budgets. The protocol states that linearly interpolating between chamber measurements that are collected infrequently (2x per week or 1x per 2 weeks) is broadly accepted in the peer-reviewed literature. However, this practice is not straight forward as CH4 and N2O emissions are episodic in nature and annual budgets are therefore difficult to infer without continuous data. In addition, there are multiple examples from the literature indicating that spatial replication of chamber measurements is critical for assessing CH4 and N2O budgets ([Griffis *et al.*, 2013](#_ENREF_1), [Schrier-Uijl *et al.*, 2010](#_ENREF_2), [Teh *et al.*, 2011](#_ENREF_4)). The protocol does not outline requirements for replication of chambers within a field, which would be necessary for regional model calibration and validation. Finally, the protocol does not outline how the DNDC model will be regionally calibrated and validated for N2O emissions. This needs to be explicitly addressed (e.g. section 7.4.1 needs to be expanded to include N2O).

Finally, I highly recommend requiring multiple years of continuous GHG emission data in order to sufficiently parameterize and validate the DNDC model. This is due to interannual variability, which has been shown to have a strong effect on GHG budgets ([Song *et al.*, 2009](#_ENREF_3)).

Sincerely,

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