

Research on N₂O Emissions from the Application of Fertilizers Supported by PIER

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Public Interest Energy Research (PIER)

Environmental Program Area

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Modesto, California

The RFP: 6 Topics, Total of \$2.9 M

- Research Topic 1: GHG Emission Reduction Strategies: In-depth Case Studies
- Research Topic 2: N²O Emissions from the Application of Fertilizers in Agricultural Soils
- Research Topic 3: Adaptation Studies: Local to Regional Scales
- Research Topic 4: Collection of Ecological Data for Climate Change Studies
- Research Topic 5: Options to Reduce GHG Emissions in California by 2050
- Research Topic 6: Contribution of Snowmelt to Underground Water Recharge

Research Project Timeline

- RFP Released Date - March 17, 2008
- RFP Due Date - May 20, 2008
- RFP Review process completed July 15th, 2008
- The RD&D Committee, formed by two Commissioners, issued a Notice of Proposed Awards (NOPA) on September 2nd
- Project requires approval at a business meeting in order for the contract to begin - December 2008.

Why N₂O Research

- PIER's 2004 roadmap of research on GHG inventory methods identified N₂O research as a priority
- A 2004 scoping study suggested validating models (e.g., DNDC) with existing data*
- A PIER study entitled "Integrated Assessment of the Biophysical & Economic Potential for GHG Mitigation in CA Agricultural Soils" attempted model validation but it became clear that additional field data was needed**
- PIER shared preliminary results with Cynthia Cory (Farm Bureau) and Steve Shaffer (CDFA). This is reflected in the report prepared by the Economic and Technology Advancement and Advisory Committee (ETAAC) for ARB

•Quantifying Carbon Dynamics and Greenhouse Gas Emissions in Agricultural Soils of California: A Scoping Study

•CEC 500-04-038, Li et al. 2004

** Under review. To be posted in the next three months.

Integrated Assessment of the Biophysical & Economic Potential for GHG Mitigation in CA Agricultural Soils

Authors: De Gryze, S., R. Catala, R.E. Howitt, and J. Six

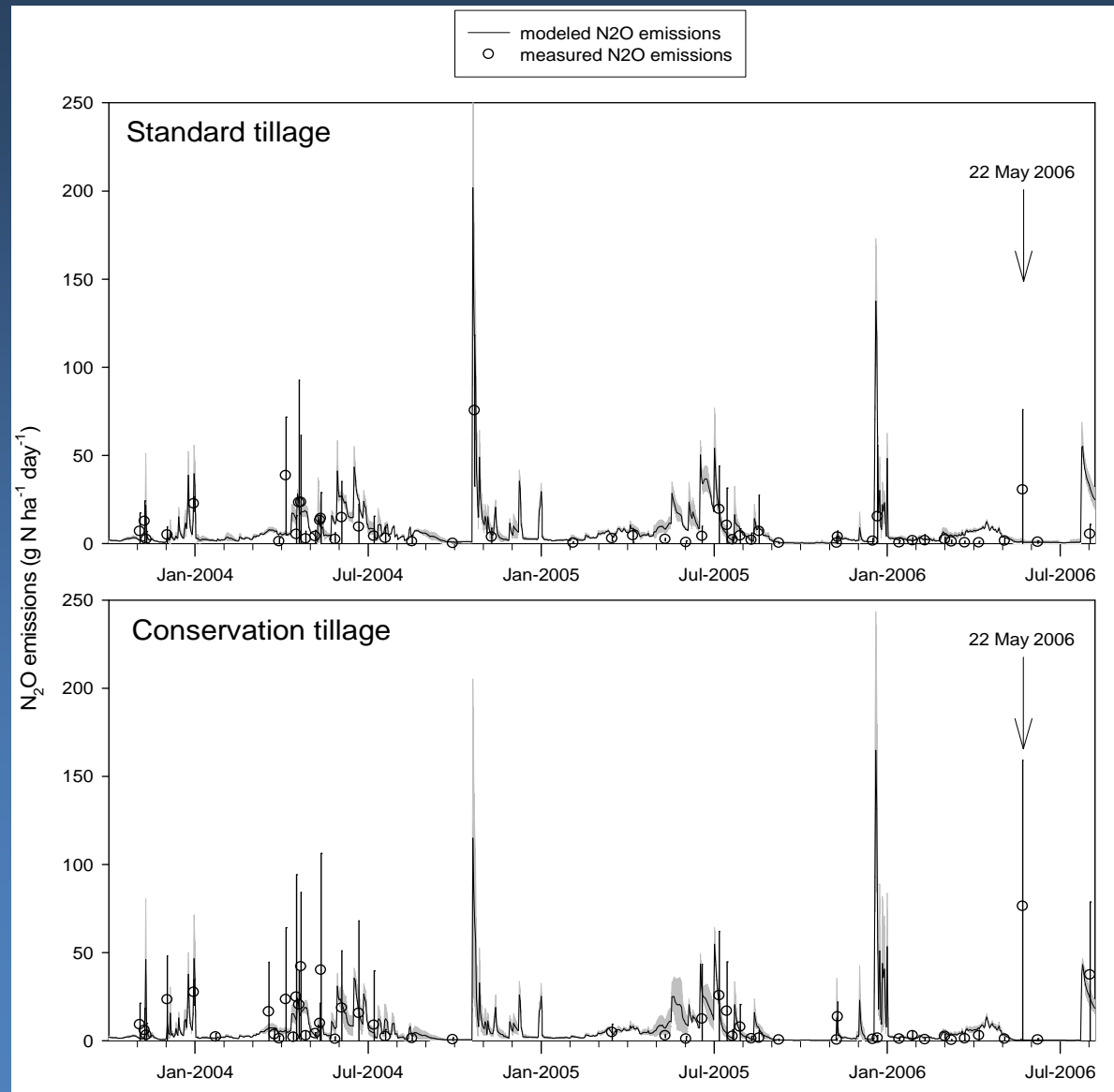
Objective

- DayCent used to estimate GHG emissions and mitigation in CA agriculture under alternative and conventional management

Results

- Daily N₂O fluxes were predicted fairly well. Variability of peak events inaccurate.

Modeled and measured N_2O emissions versus time for the standard and conservation tillage treatments at the Field 74 experiment (De Gryze et al. 2008)



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Recommendations

- Create a dataset of N₂O fluxes in CA agroecosystems
- Improve N₂O emission routines of existing models

N₂O Research Proposal

- Research Topic 2: N₂O Emissions from the Application of Fertilizers in Agricultural Soils (\$500,000, 3 yrs max)
- The request for proposals asked for suggested crops to tests, testing methods, and a description about the potential utility of the data.
- Received 3 proposals for Topic 2

Technical Review Team

- The review team consisted of staff from the CEC, ARB and Stanford
- Reviewers received the proposals and reviewing criteria by May 30th
- Reviewers had until July 3rd to submit their draft scores and nondisclosure agreements to the CEC
- Proposals were discussed via conference call on July 7th
- After the discussion, the review team had until July 15th to submit their final scores to the CEC

Proposal Evaluation Criteria

- Proposal overall scope of work (15%)
- Research objectives (15%)
- The project description, products, due dates, budget (20%)
- Qualification of principal investigator and research team (25%)
- Overall technical merit and likelihood of the project to succeed (25%)
- Consistent with ARB's evaluation criteria

N₂O Research Proposals

Project Title	Applicant Institution	PI	Requested PIER Funding	Match Funds	Score
N ₂ O Emissions from the Application of Fertilizers in Agricultural Soils	UC Davis	<u>Johan Six</u>	\$499,960	\$25,444	87.6
Agricultural Soil Greenhouse Gas Measurement and Modeling in the Salinas Valley, California	CSU Monterey Bay	<u>Marc Los Huertos</u> <u>Fred Watson</u>	\$499,797	\$0	71.1
N ₂ O Emissions from the Application of Fertilizers in Agricultural Soils	UC Riverside	<u>Dennis Fitz</u>	\$500,000	\$41,000	68.7

Agricultural soil GHG measurements & modeling in the Salinas Valley, CA

- Would provide much needed data on N₂O emissions from CA vegetable fields
- Scope reasonable but too limited in both region and crop selections
- Conducted only in grower's farms – no controls
- Many low priority measurements

N₂O emissions from the application of fertilizers in agricultural soils -UCR

- Did not show thorough survey of previous work
- Methodology requires pilot testing –unclear if pilot test successful
- Compare 3 N₂O measuring techniques at one location of only 9 weeks
- Did not specify crop type or management techniques being tested
- Would not meet research objective to improve DNDC model

N₂O emissions from the application of fertilizers in agricultural soils -UCD

- Address scope of research topic-goal to advance usefulness of models & improve CA N₂O inventory
- Measure emissions from fertilizer use and validate/calibrate DNDC model
- Covers most economically important crops (e.g. almonds, grapes, vegetables)
- Grower's and control farms
- Demonstrated in-depth knowledge of subject

Next Steps

- Request business meeting approval in order initiate the project with UC Davis (December)
- Schedule technical meetings with CDFR, ARB, all approved N₂O researchers, academia, stakeholders, private institutions and the public in order to:
 - Identify research gaps
 - Avoid duplicative research
 - Identify collaborative opportunities