Agricultural Protocol Development: American Carbon Registry Update

C-AGG Meeting
Chicago, Illinois
July 20, 2011

WINROCK INTERNATIONAL

American Carbon Registry®

Winrock International Institute for Agricultural Development

Nonprofit that works in the U.S. and around the world

- Build expertise, train leaders
- Apply sound science and economics
- Mobilize markets
- Promote innovation
- Help the disadvantaged

Winrock International Livestock Research and Training Center

- Established in 1973
- Merged into Winrock in 1985
- First work on methane emissions from ruminant livestock began in 1993
  - Improve genetics
  - Improve diet
  - Supplements
- First international methane mitigation conference in Kiev in 1997

Winrock Enteric Fermentation Study for EPA in 1995

- Highlighted strategies for reducing methane emissions from cattle in Ukraine (primarily dairy)
- Used CSU model to analyze feed options
- Led to pilot activities using WSU methane measurement methodology

Developed by K.A. Johnson and H.H.Westberg at Washington State University, Pullman, Washington

ACR agricultural methodologies

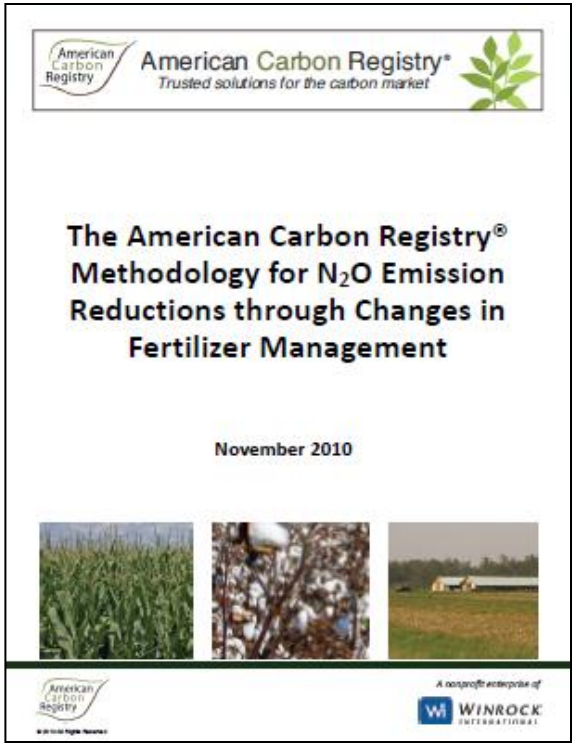
- N_2O emission reductions through changes in fertilizer management *(published Nov 2010)*
- Afforestation and reforestation of degraded lands *(published Mar 2011)*
- N_2O emission reductions through fertilizer rate reduction *(public comment closed)*
- Voluntary emission reductions in rice management systems *(public comment open)*
- Modification of Alberta livestock protocols for ACR approval
- Improved grazing management / rotational grazing

Methodology approval process

- Methodology drafting (internal / external author)
- Submission to ACR → *draft #1*
- ACR internal review: feedback to author on technical issues and consistency with requirements → *draft #2*
- Posting for public comment; author must respond to all comments → *draft #3*
- Blind scientific peer review by leading experts in field; author must respond and incorporate revisions → *final methodology for ACR approval*
- ACR AFOLU Technical Committee
- All process documentation posted for full transparency
- Time required: 4-6 months; cost: $20-30k

N_2O from fertilizer management

- Applicable to any modified fertilizer practice
  - Change fertilizer type, timing, placement, rate, use of timed-release fertilizers, nitrification inhibitors, other advanced technologies
- Uses peer-reviewed, highly parameterized DNDC model
- No geographic or crop constraints
  - DNDC must be calibrated and validated
- Calculates direct N_2O emissions from fertilizer, and indirect N_2O from leaching and ammonia volatilization, for baseline and project



N_2O from fertilizer management

- Aggregators currently recruiting farmers
  - Sun One, Delta Institute, EDF/Western Growers, etc.
- Under review by Air Resources Board as basis for compliance and/or early action offset protocol
- Being tested in three CIG GHG grants
  - Delta Institute (IL, OK, MI)
  - Chesapeake Bay Foundation (MD, VA)
  - The Fertilizer Institute (IL, IA – corn/soy)

N_2O from fertilizer management

- 22 crops already calibrated and validated in DNDC
  - Corn, winter wheat, spring wheat, soybean, sugarcane, barley, oats, alfalfa, sorghum, cotton, rye, papaya, potato, beets, paddy rice, upland rice, peanut, rapeseed, tobacco, millet, sunflower, beans
- 19 vegetable, 3 fruit, and 4 other crops calibrated for specific cultivars
- Calibration/validation studies underway in California for:
  - Corn, wheat, cotton, tomatoes, rice, alfalfa, lettuce, almonds, grapes, broccoli
  - ARB using DNDC for agricultural GHG inventory and calibrating for 6 vegetable, 8 fruit/nut, and 6 field/seed crops
- Several crops calibrated by Agriculture Canada

N_2O from fertilizer rate reduction (MSU/EPRI)

- On-farm reductions in (synthetic and organic) fertilizer rate vs. baseline
- N_2O only; CH_4, CO_2 and soil C changes excluded
- Baseline = BAU fertilizer rate, calculated from producer-specific records or back-calculation from NASS crop yields and recommended yield goal rates
- Additionality (for U.S.): regulatory surplus and performance standard = any reduction from BAU (common practice)
- Direct N_2O emissions in baseline and project: Tier 2 equation for projects in 12-state U.S. North Central Region; IPCC Tier 1 default factors elsewhere
- Indirect emissions from volatilization and leaching: IPCC defaults
- No leakage or reversal risk deductions

Rice Emission Reductions (EDF/Terra Global Capital/Applied Geosolutions/CA Rice Commission)

- DNDC to model soil C dynamics, CH_4 and N_2O emissions in baseline and project
- Pre-approved practices (CA only) → DNDC cal/val already done
  - Reduce duration/frequency of winter flooding
  - Removal of rice straw after harvest
  - Dry seeding
  - Methodology allows for modular expansion (Midsouth U.S., Asia)
- Minimum 5 fields / 1,000 acres to reduce structural uncertainty
- Baseline: 5 year history of actual management on participating fields – subject to barrier analysis
  - Sets critical input parameters *ex ante*; re-calculated every 5 years
- Additionality: three-prong test
- *Ex post* calculation of baseline and project emissions in DNDC
- Uncertainty deduction and leakage adjustment; no reversals

Adapting Alberta SGER beef and dairy protocols

- Beef feeding: including 4-6% edible oils in cattle feeding regimes to suppress methanogenesis
- Beef days-on-feed: reducing days on feed of cattle during finishing to reduce enteric and manure emissions
- Beef lifecycle: reducing culling age of cattle to reduce enteric and manure emissions
- Dairy cattle: various practices (throughout production chain) to reduce GHG emissions per unit milk produced

Further information

Nicholas Martin

Chief Technical Officer, American Carbon Registry

nmartin@winrock.org

www.americancarbonregistry.org

(703) 842-9500