REACCH
Regional Approaches to Climate Change – PACIFIC NORTHWEST AGRICULTURE

Annual Meeting 2013 *Speed* Science Presentations

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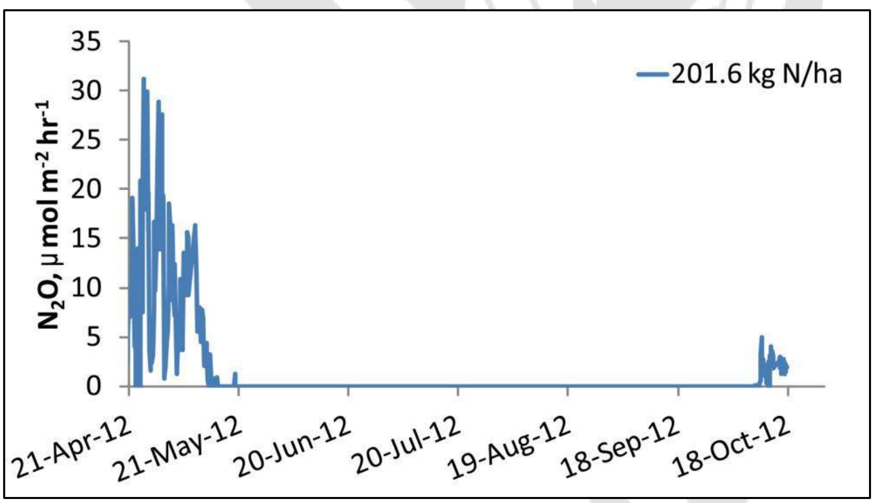
Monitoring green-house gas emissions with automated static chambers

Kirill Kostyanovsky, Washington State University

Pictures shown, from top to bottom, are:
•1) Precision application of N
2) Instrumented site with chambers
3) Irrigation and acetylene inhibition study in process

We implemented the Li-Cor 8100A designed to measure CO_2 emissions from soil with the Teledyne T320 infrared gas analyzer (IRGA) portable system to measure the N_2O fluxes from soil in the microplot experiment with contrasting N application rates in the wheat site. Following the fall application of aqua fertilizer at 100-202 kg N ha^{-1}, N_2O flux was highest during the months of April and May, and then decreased to non detectible levels between the months of June to September. The spikes in N_2Owere detected in October during initial rainfall following the drought period.
The acetylene inhibition experiment in the irrigated treatments and N fertilization in situ was also conducted to determine the site specific N_2O pools originating from nitrification and denitrification. The study demonstrates the capabilities of automated precision N_2O and CO_2 emissions measurements for the purposes of refining manually measured and modeled greenhouse gas emissions.



This presentation was given at REACCH 2013 Annual Meeting. This handout and supplemental video are available at reacchpna.org. Funded through Award # 2011-68002-30191 from the USDA National Institute for Food and Agriculture.

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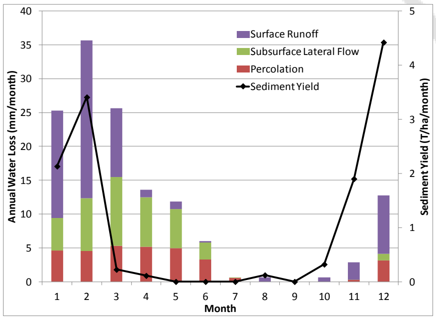
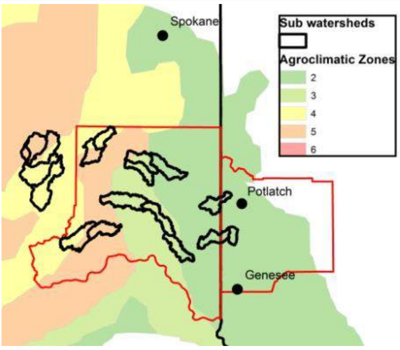
The Hydrologic Characterization Tool: Hillslope-scale transport of water, soil, and carbon across AEZs

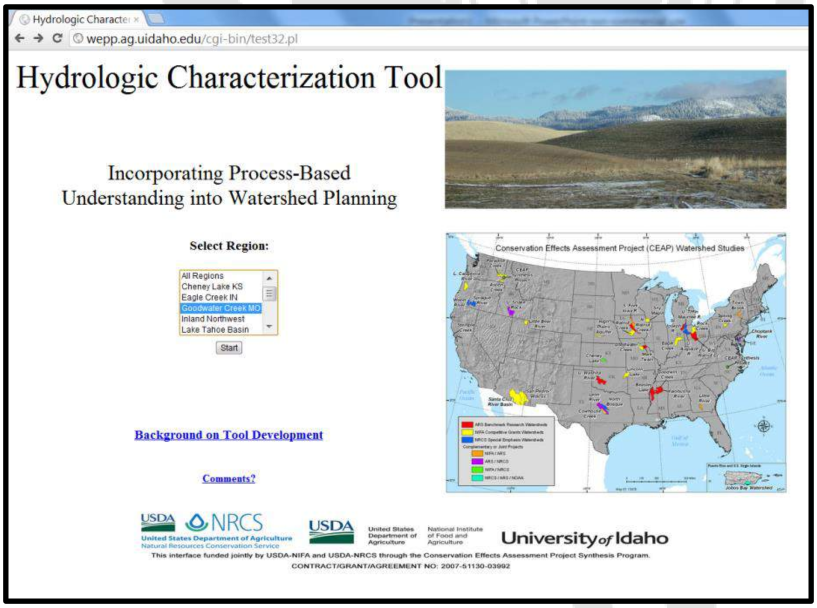
Erin Brooks and Ryan Boylan, University of Idaho





Top: A monitoring station measured soil carbon transport from a small catchment in Idaho
Middle: Simulated monthly water flux and sediment yield
Bottom: An AEZ map showing sub-watershed sampling points.

A site specific web-based decision support tool originally to evaluate the effect of management practices in the Conservation Effects Assessment Program is being developed to help managers understand the relationship between cropping practices, topography, soil characteristics, and climate in each of the major AEZs in the REACCH project. The tool will help visualize and quantify the effects of management in each region on hydrologic, soil, and particulate organic carbon transport by water. The tool allows educators to understand the dominant hydrologic and sediment fluxes both at the outlet of a hillslope and within up-slope, mid-slope, and toe-slope sections of a hillslope. The tool will be parameterized through an extensive regional sampling program to establish linkages between soil organic matter and delivered soil carbon.



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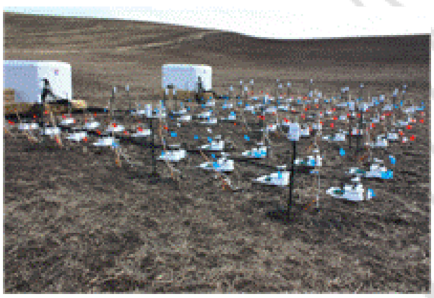
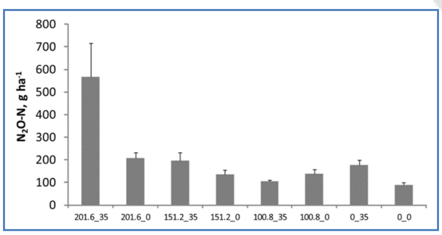
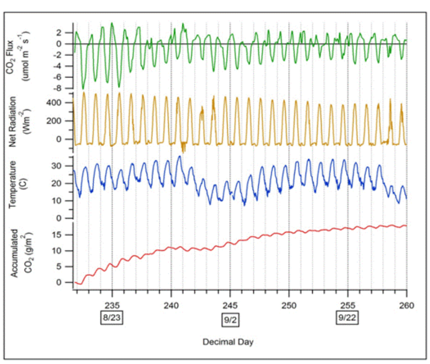
Integration of Chamber, Tower and Modeling Methods to Determine Greenhouse Gas Baselines for REACCH AEZs

Sarah Waldo, WSU & the Objective 2 Monitoring Team





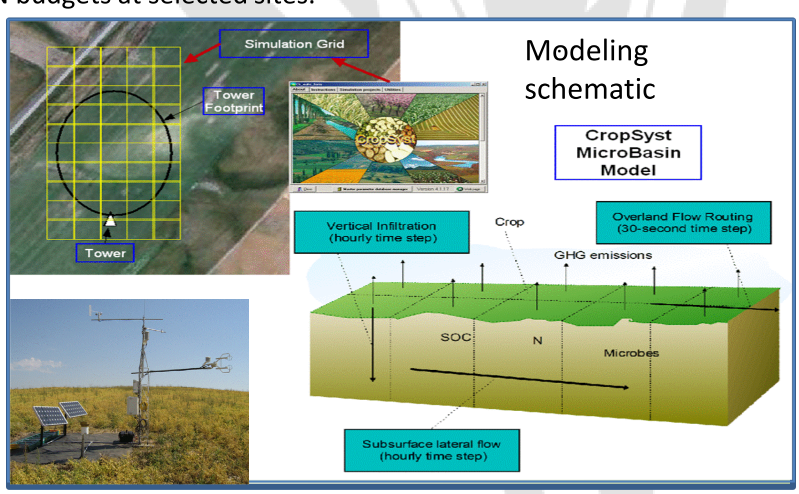


Top: Large array of 64 enclosure chambers deployed at the Cook Agronomy Farm. **Middle:** Total N2O-N loss between the period of April-Oct. 2012 in a microplot chamber study. **Bottom:** Flux tower results (green line: CO2 flux, yellow line: solar radiation, blue line: temperature, red line: accumulated C uptake.)

Objective 2 has a goal of determining current baselines for N2O emissions and carbon dioxide uptake across the AEZs in the Northwest. We have adopted a multi-scale approach that employs arrays of surface enclosure chambers at the plot scale and instrumented flux towers at the field scale for several locations across the region. These long term measurements will be used to evaluate and improve the CROPSYST model, and then, the model will be used to provide AEZ estimates of long term N and C fluxes.

Measurements from chamber experiments and from paired tower flux sites will also be used to determine the effects of different crop management systems upon GHG baselines. These results will be used with the model to assess effective ways to mitigate GHG emissions and to enhance C sequestration within the Northwest cereal cropping systems.

The integration of measurements and modeling will take advantage of wind and water erosion measurements and remote sensing to construct C and N budgets at selected sites.



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