Maize-based Agricultural Ecosystems US-Ne1, US-Ne2, US-Ne3

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Funding Agencies:

DOE OBER

NASA

UNL
US-Ne1 (Site 1)  
49 ha  
Irrigated  
Continuous Maize

US-Ne2 (Site 2)  
52 ha  
Irrigated  
Maize-Soybean

US-Ne3 (Site 3)  
65 ha  
Rainfed  
Maize-Soybean

Google Earth 3/7/2012
Fluxes:
F<sub>c</sub> - CO<sub>2</sub> flux
ET – evapotranspiration
H – sensible heat flux

Environmental parameters:
CO<sub>2</sub> conc. profile
Precipitation
Windspeed
Air temperature
Humidity
Soil heat flux
Soil temperature
Soil moisture
Radiative Fluxes:
Net Radiation
Incident/reflected PAR
Incident/ reflected solar PAR
Diffuse PAR
Absorbed PAR
Multispectral band reflectance
Biological Parameters

Data collected from intensive measurement zones (IMZ)’s representative of soil classes distributed across the field

Total/green leaf area (destructive)
Above ground biomass (dry and fresh)
Grain/cob/husk biomass
Surface Residue removed

Other Parameters
Leaf gas exchange
$\text{N}_2\text{O}$ and $\text{CH}_4$ and soil surface $\text{CO}_2$ flux (chambers)
Decomposition studies
Research Components

Tower eddy covariance fluxes of CO$_2$, water vapor and energy: Shashi Verma, Andy Suyker

Monitoring and mapping soil C stocks: Dan Walters
Litter decomposition: Jean Knops
Above biomass and leaf area index: Timothy Arkebauer
Leaf gas exchange: Timothy Arkebauer
Soil surface fluxes of CO$_2$, N$_2$O and CH$_4$: Timothy Arkebauer
Belowground processes: Dan Walters
Monitoring soil water: Ken Hubbard
Ecosystem modeling: Haishun Yang, Ken Cassman
Remote sensing: Anatoly Gitelson, Betty Walter-Shea
Life Cycle Analyses: Adam Liska
## Management Practices

<table>
<thead>
<tr>
<th>Planting density (plants/ha)</th>
<th>Fertilization</th>
<th>Tillage</th>
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</thead>
<tbody>
<tr>
<td><strong>Site 1</strong></td>
<td></td>
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<tr>
<td>~80,000 maize</td>
<td>Spring UAN</td>
<td>Conservation tillage after 2005</td>
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<tr>
<td></td>
<td>Fertigation</td>
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<tr>
<td><strong>Site 2</strong></td>
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<td></td>
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<tr>
<td>~80,000 maize (odd years)</td>
<td>Spring UAN</td>
<td>Conservation tillage after 2010</td>
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<tr>
<td></td>
<td>Fertigation</td>
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<tr>
<td>Continuous maize beginning 2010 w biomass removal</td>
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<td></td>
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<tr>
<td>~300,000 soybean (even years)</td>
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<tr>
<td><strong>Site 3</strong></td>
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<td></td>
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<tr>
<td>~55,000 maize (odd years)</td>
<td>Spring UAN</td>
<td>Strictly no till</td>
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<tr>
<td>~300,000 soybean (even years)</td>
<td></td>
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</tbody>
</table>
2nd Generation Biofuel Biomass Removal Project from 2010-2013 at Site 2
Irrigated maize-soybean converted to irrigated continuous maize (with conservation tillage)
Severe Hailstorm September 15, 2010

Site 1:
Yield was 16% of estimated value

Site 2:
Yield was 50% of estimated value
Site 1  Irrigated Continuous Maize

NBP = NEP – \( C_g \)

\[ = 43.1 - 52.5 \]

\[ = -9.4 \text{ t C ha}^{-1} \]
Site 2  Irrigated Maize-Soybean

\[ \text{NBP} = \text{NEP} - C_g - R_s \]

\[ = 37.3 - 44.3 - 5.5 \]

\[ = -12.5 \text{ t C ha}^{-1} \]
Site 3  Rainfed Maize-Soybean

\[ \text{NBP} = \text{NEP} - C_g \]

\[ = 29.7 - 31.0 \]

\[ = -1.3 \text{ t C ha}^{-1} \]
Data Processing:
Hour long block averaging periods
Frequency response corrections including tube attenuation (Moore, 1986; Massman, 1991)
Angle of Attack (Nakai et al., 2006)
Stationarity (Foken et al., 2004) and other quality control flags (skewness, kurtosis, standard deviation)
Grain Harvest 2012 - 4.93 (SOYBEANS)

Grower: University of Nebraska
Farm: Farm Operations
Field: 4.93
Year: 2012
Operation: Grain Harvest
Crop/Product: SOYBEANS
Op. Instance: Harvest 1
Area: 161.95 ac
Avg. Yield: 31.83 bu/ac
Avg. Moisture: 8.607 %

Estimated Volume (Dry) (bu/ac)
- 41.76 - 64.67 (22.98 ac)
- 36.75 - 41.76 (23.17 ac)
- 33.29 - 36.75 (23.20 ac)
- 30.23 - 33.29 (23.21 ac)
- 26.87 - 30.23 (23.19 ac)
- 21.87 - 26.87 (23.15 ac)
- 5.07 - 21.87 (23.06 ac)