OCS (or COS) and ECOSTRESS

ECOSTRESS Science Team Meeting

12 Feb 2020

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Elva Kuai *JPL*

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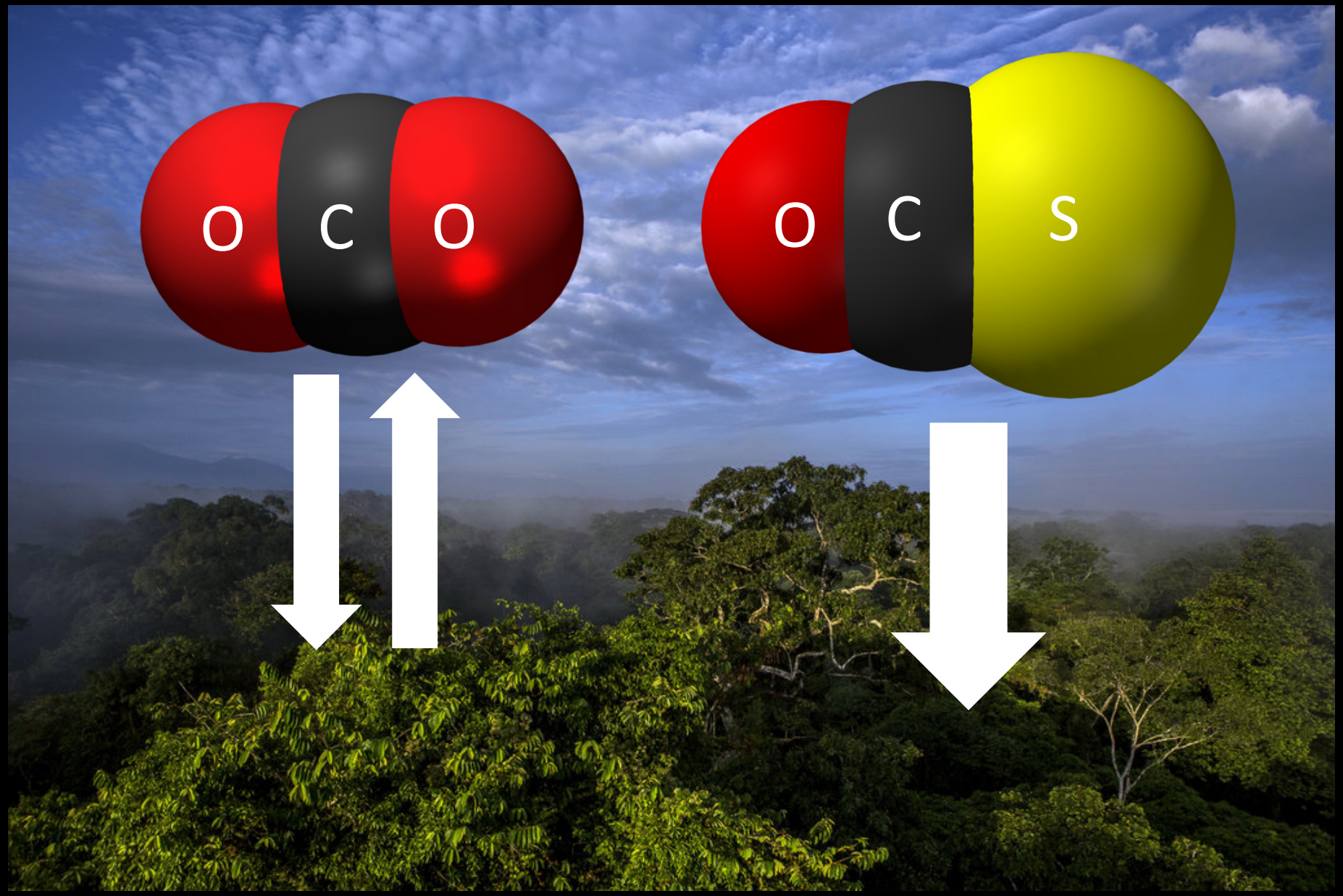
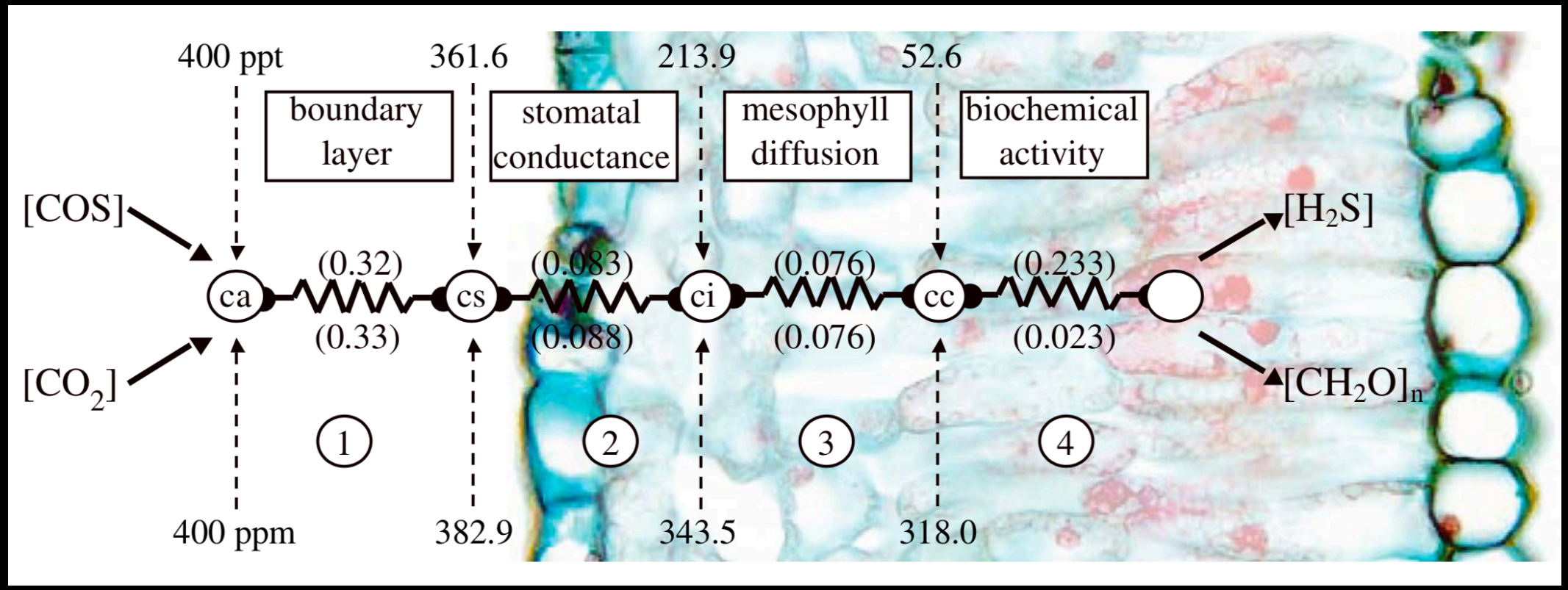
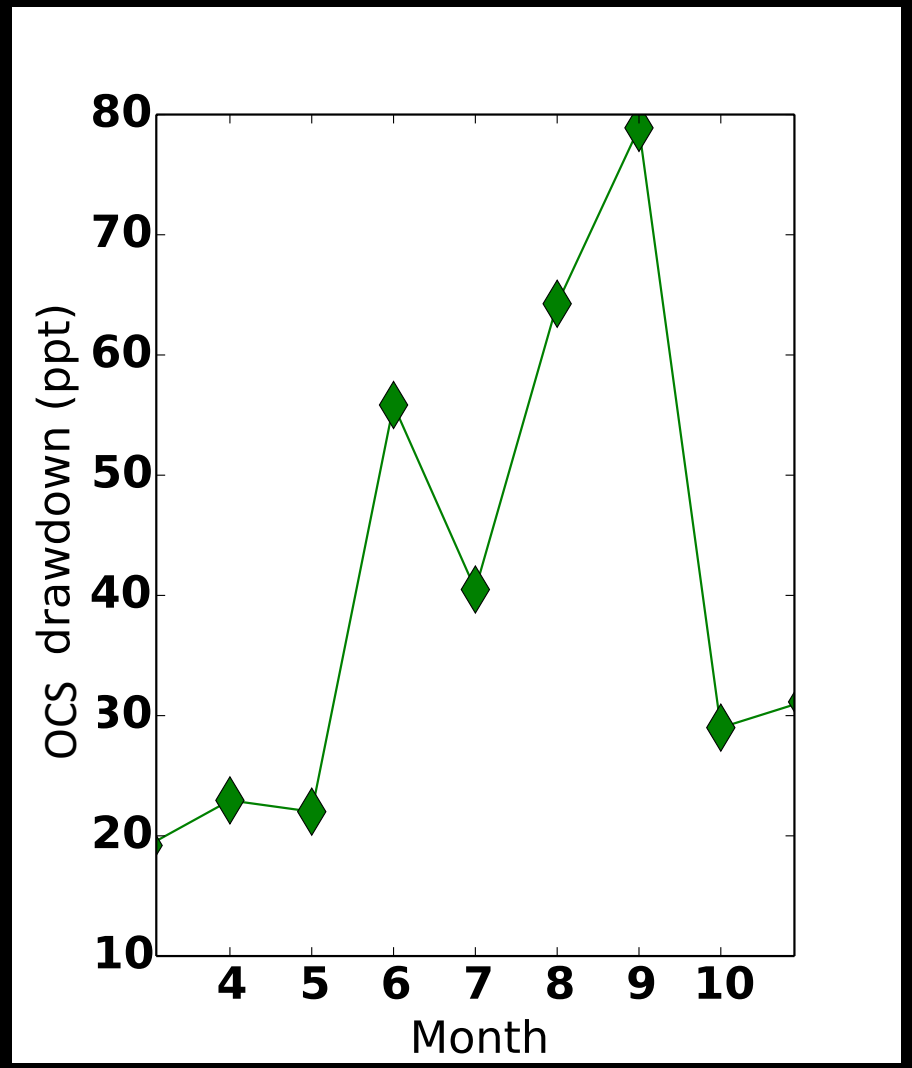
Carbonyl sulfide: COS or OCS



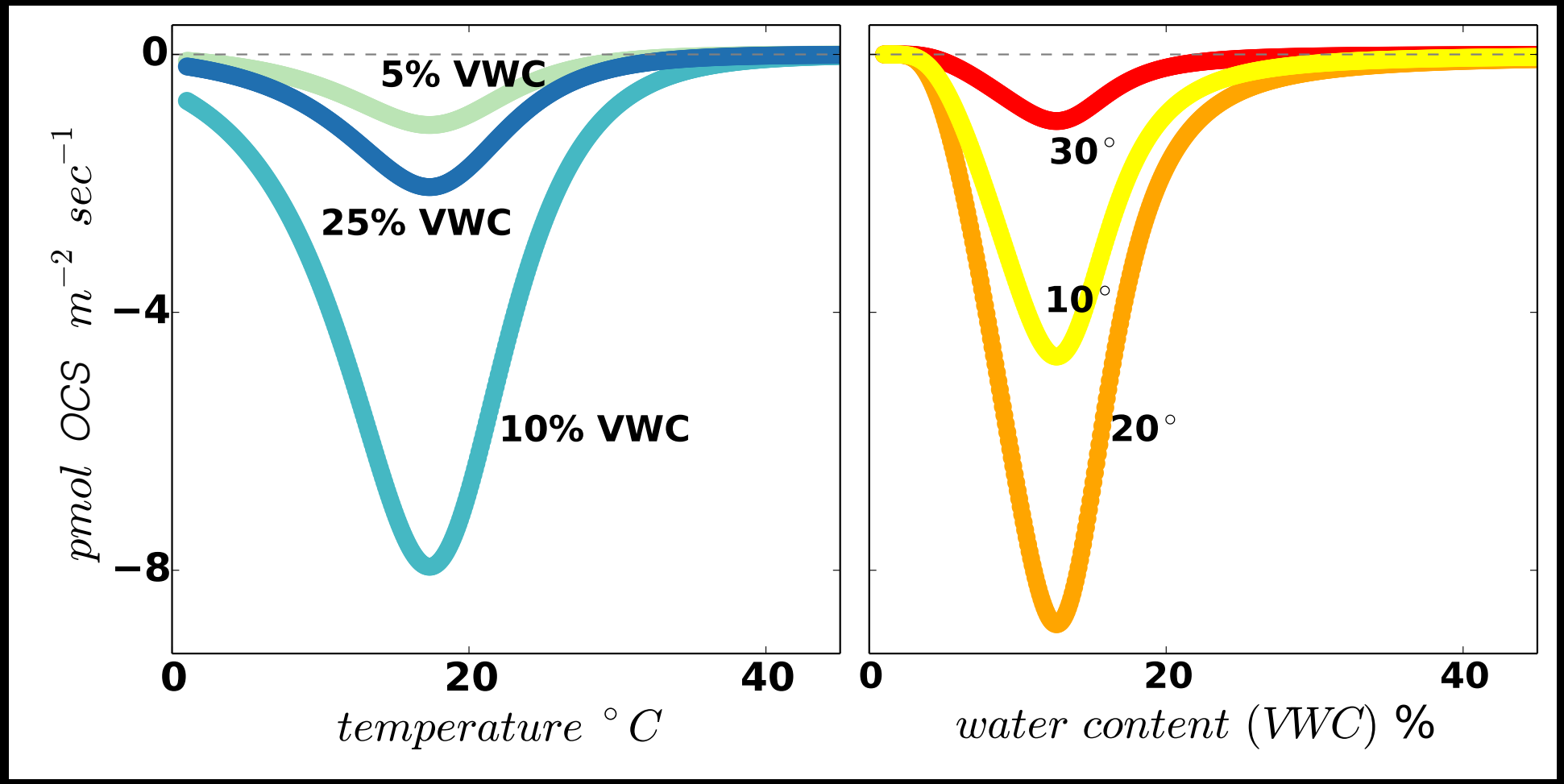
g_s and carbonyl sulfide



Mystery over Nebraska

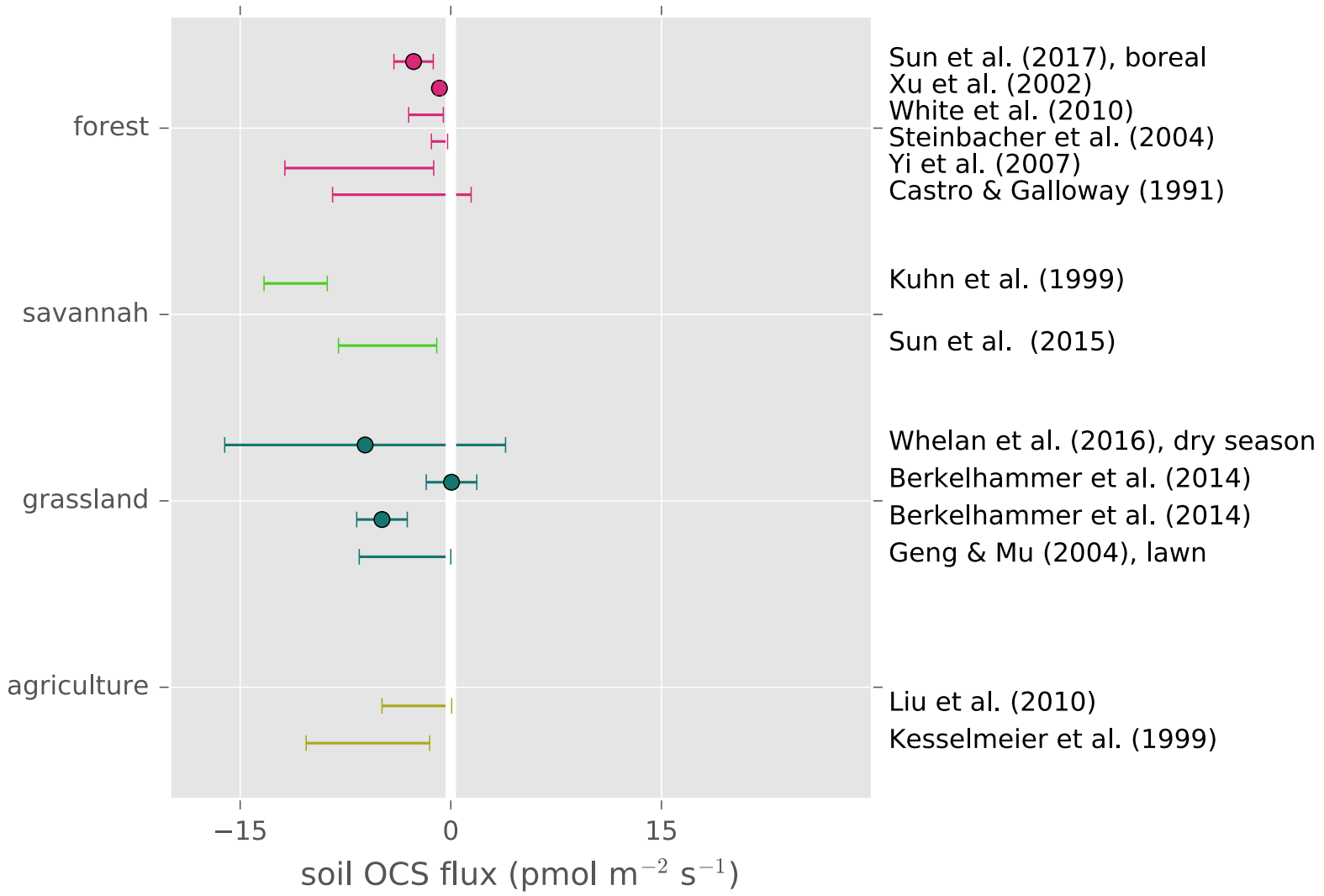


Soil OCS: previous framework

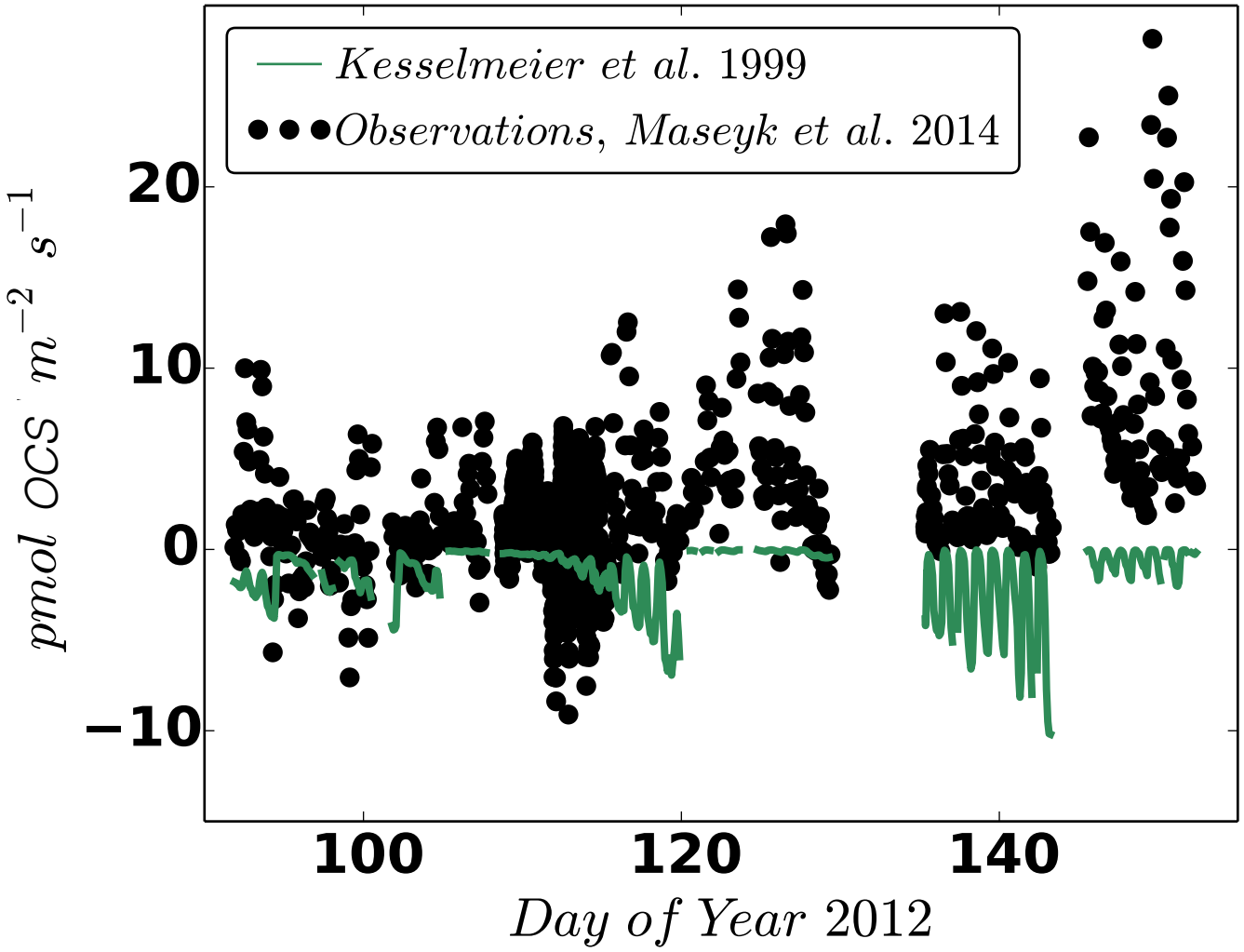


Kesselmeier et al., 1999

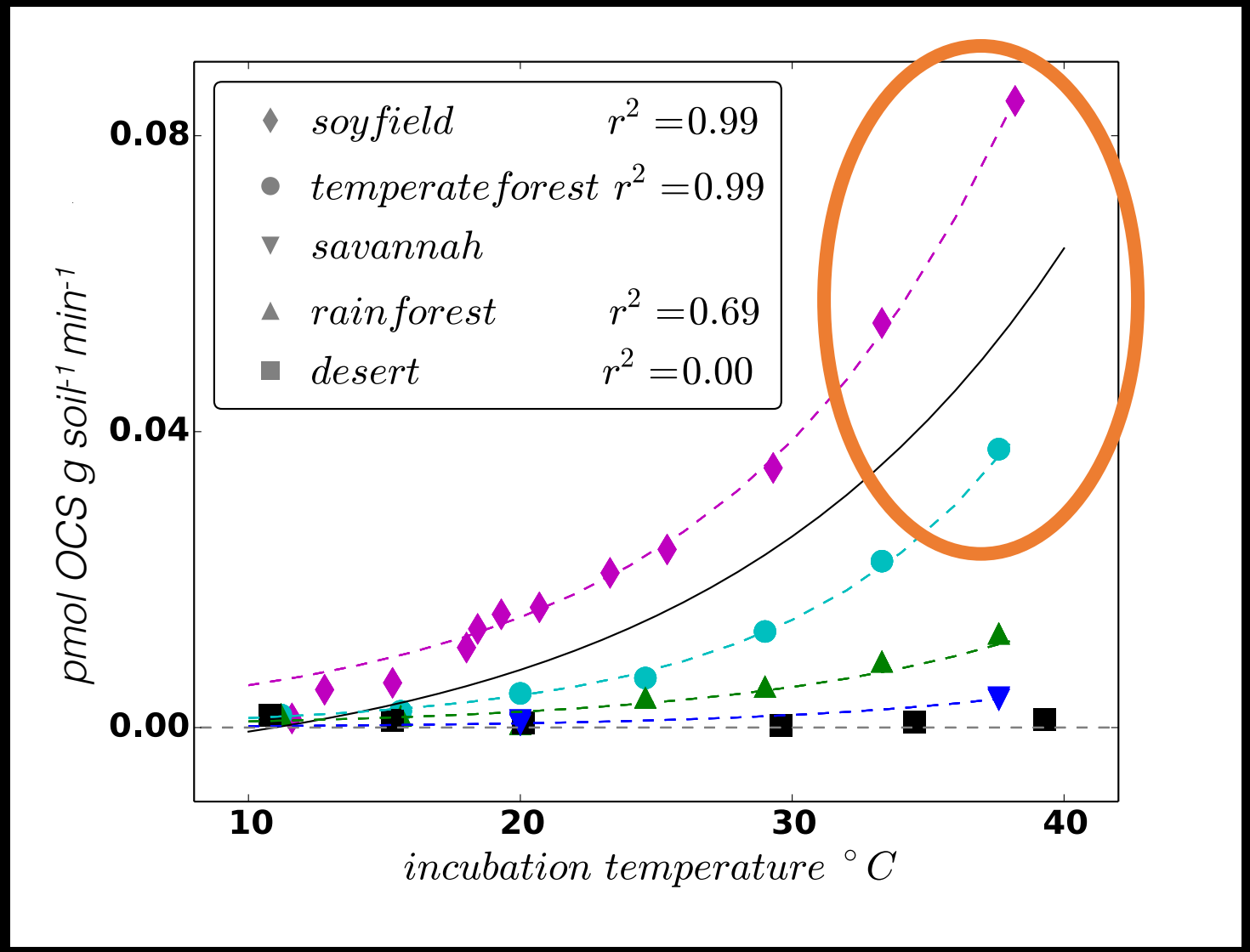
Soil OCS Fluxes



Needs more information



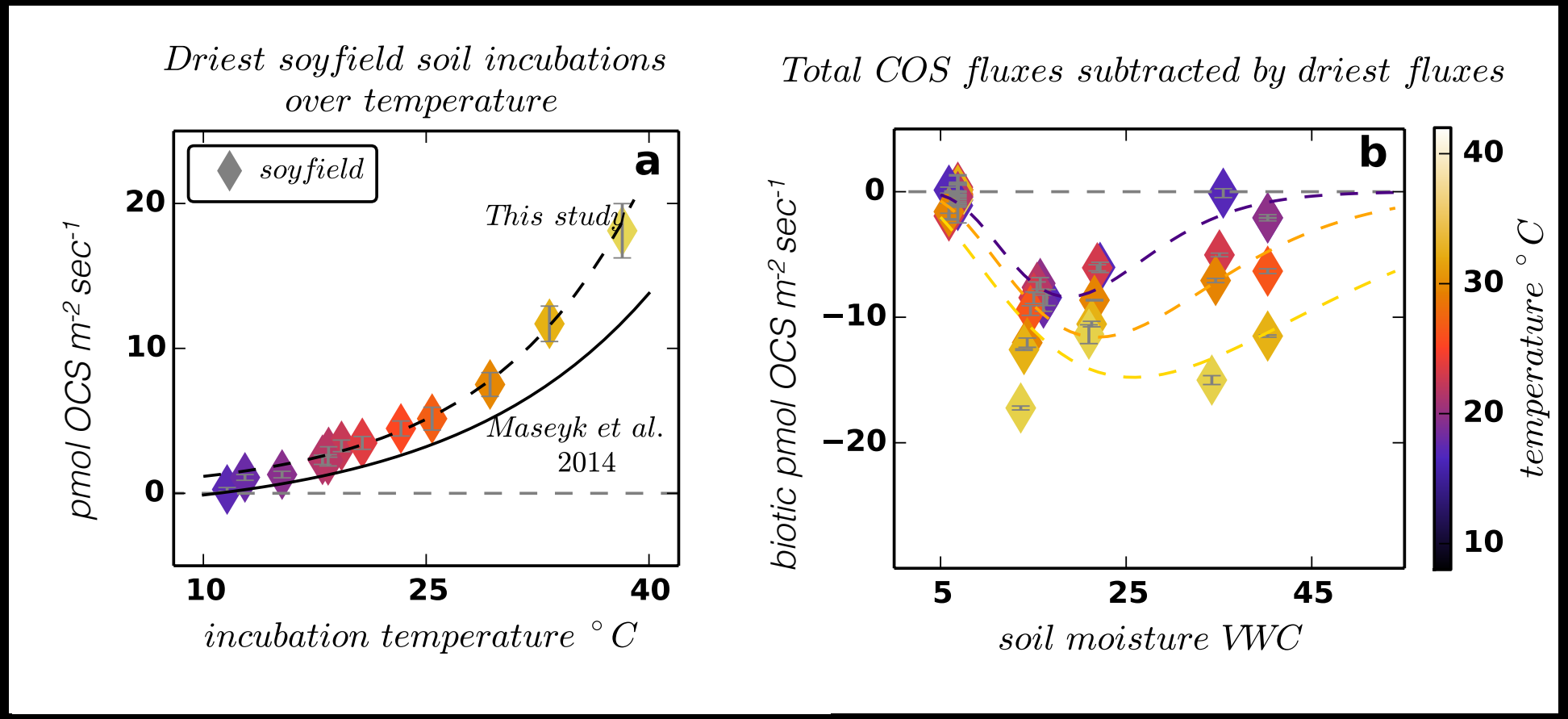
COS production from dry soils



Hot Spots
25% error in
g_s estimates

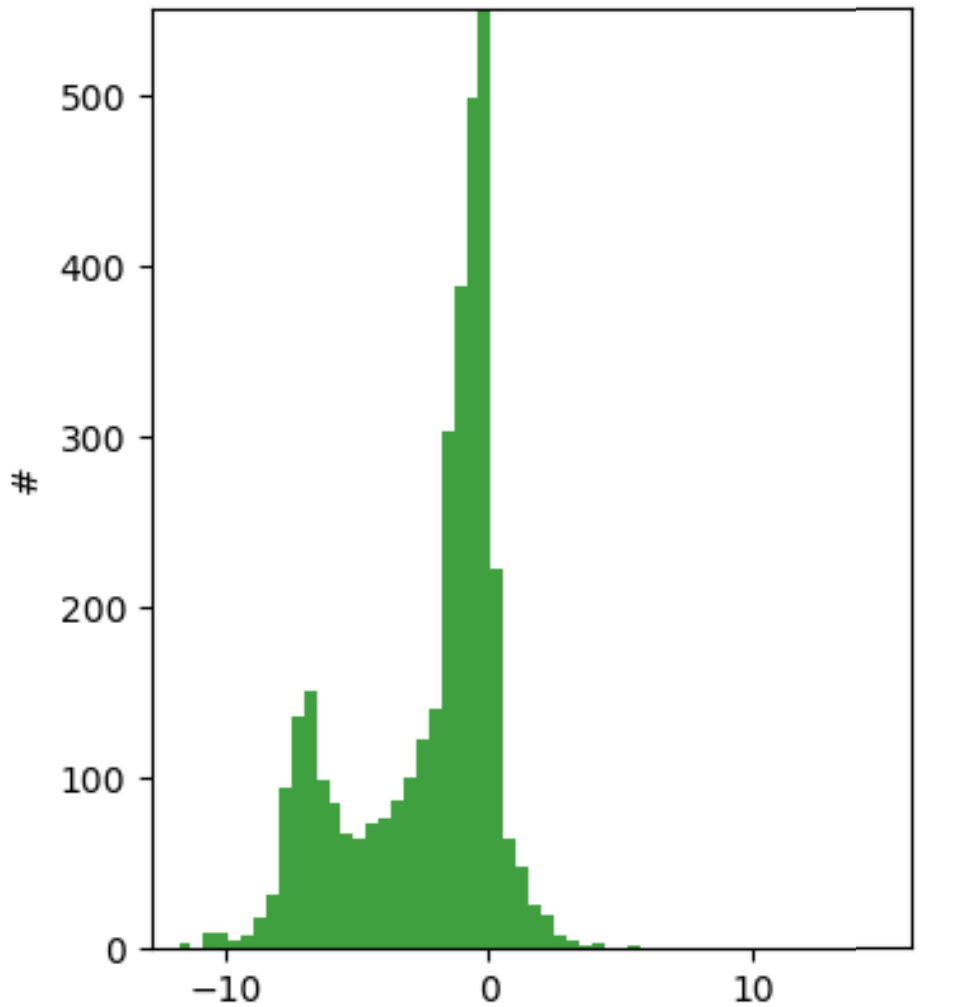
Re-graphed from Whelan et al., ACP, 2016

Soil OCS Production and Consumption



Whelan et al., ACP, 2016

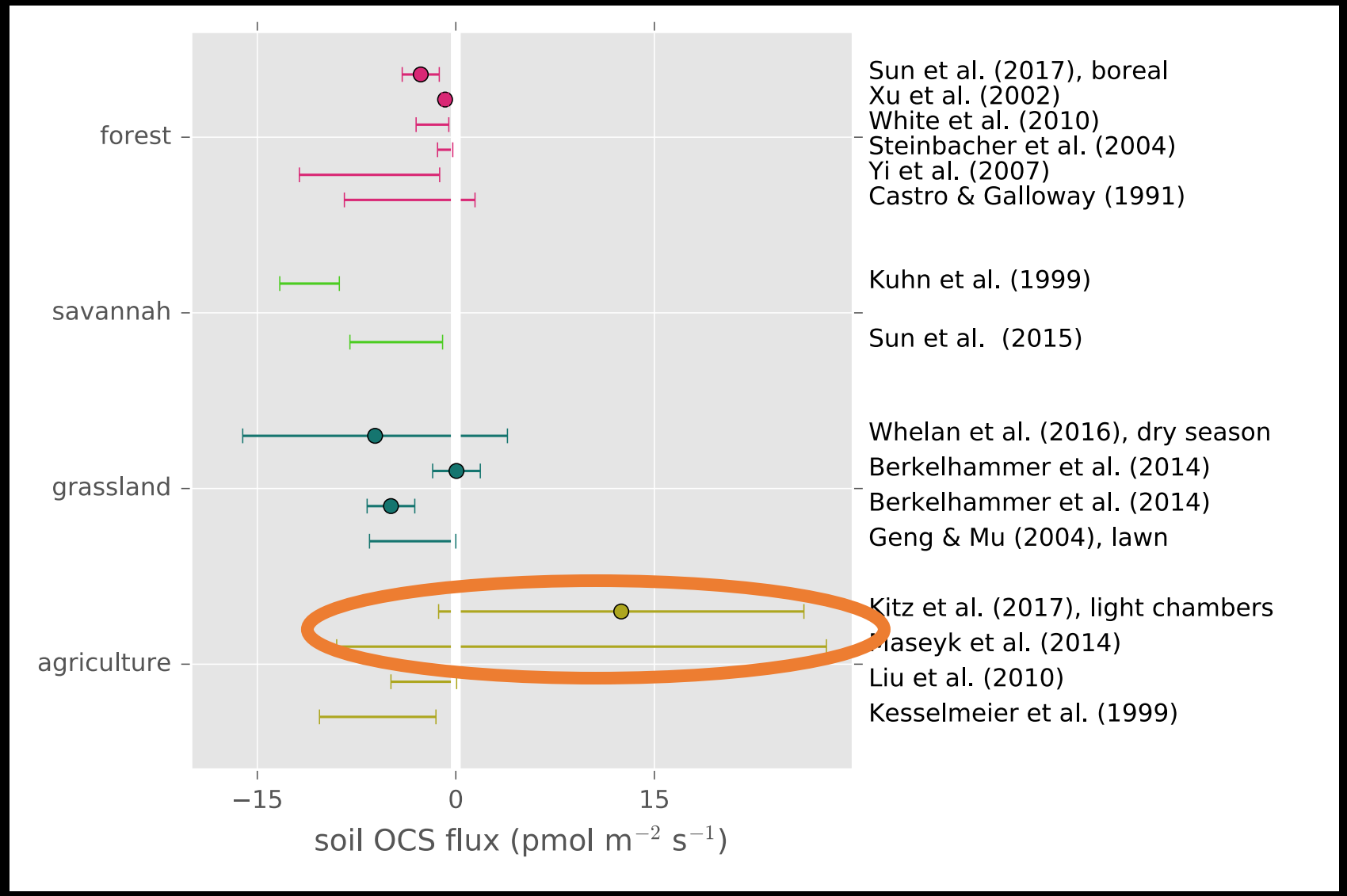
Global soil OCS flux at coarse resolution



Modeled soil OCS exchange pmol m^{-2} sec^{-1}

Whelan et al., submitted

Soil OCS Fluxes



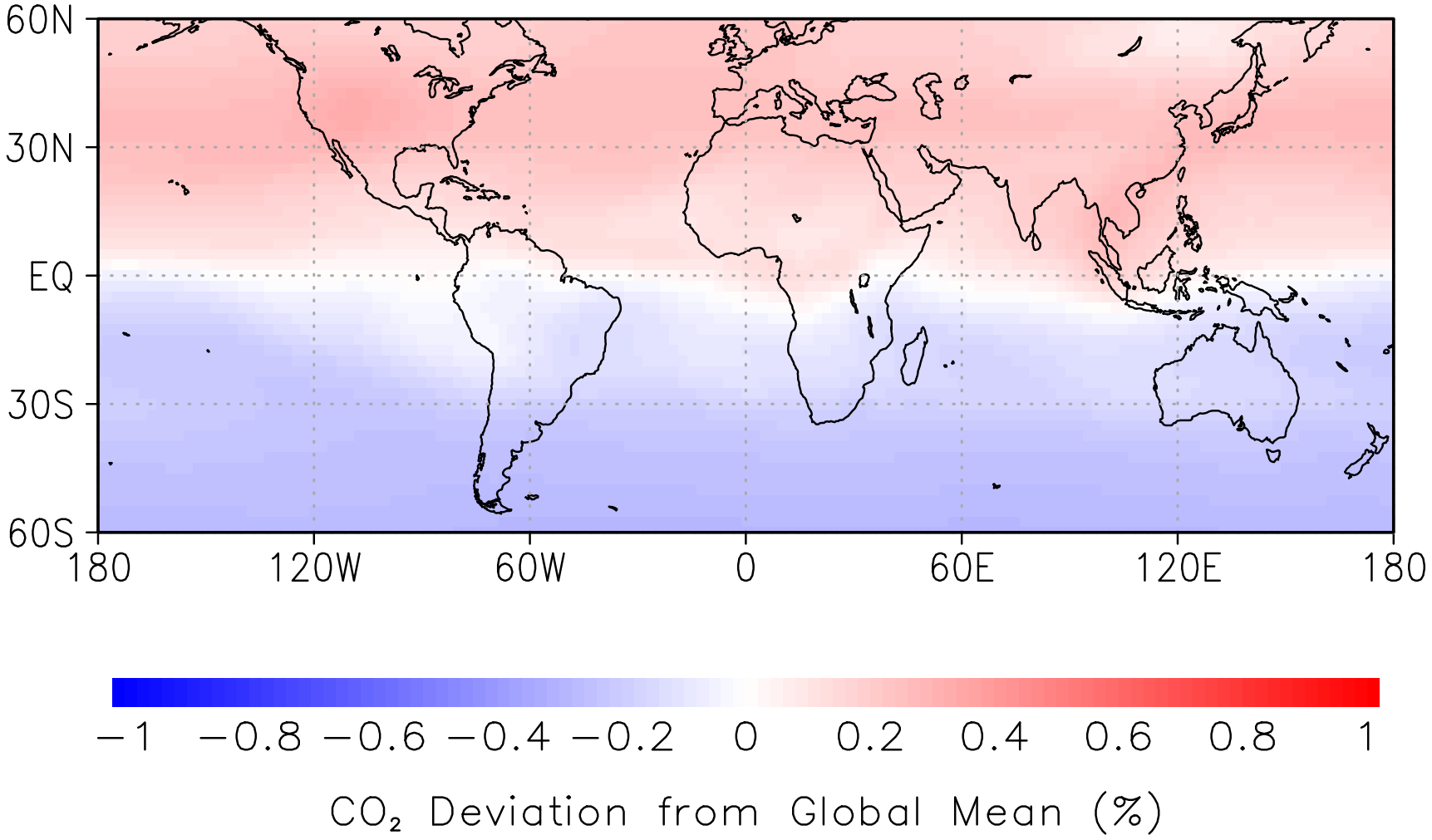
Hot Spots

Thank You

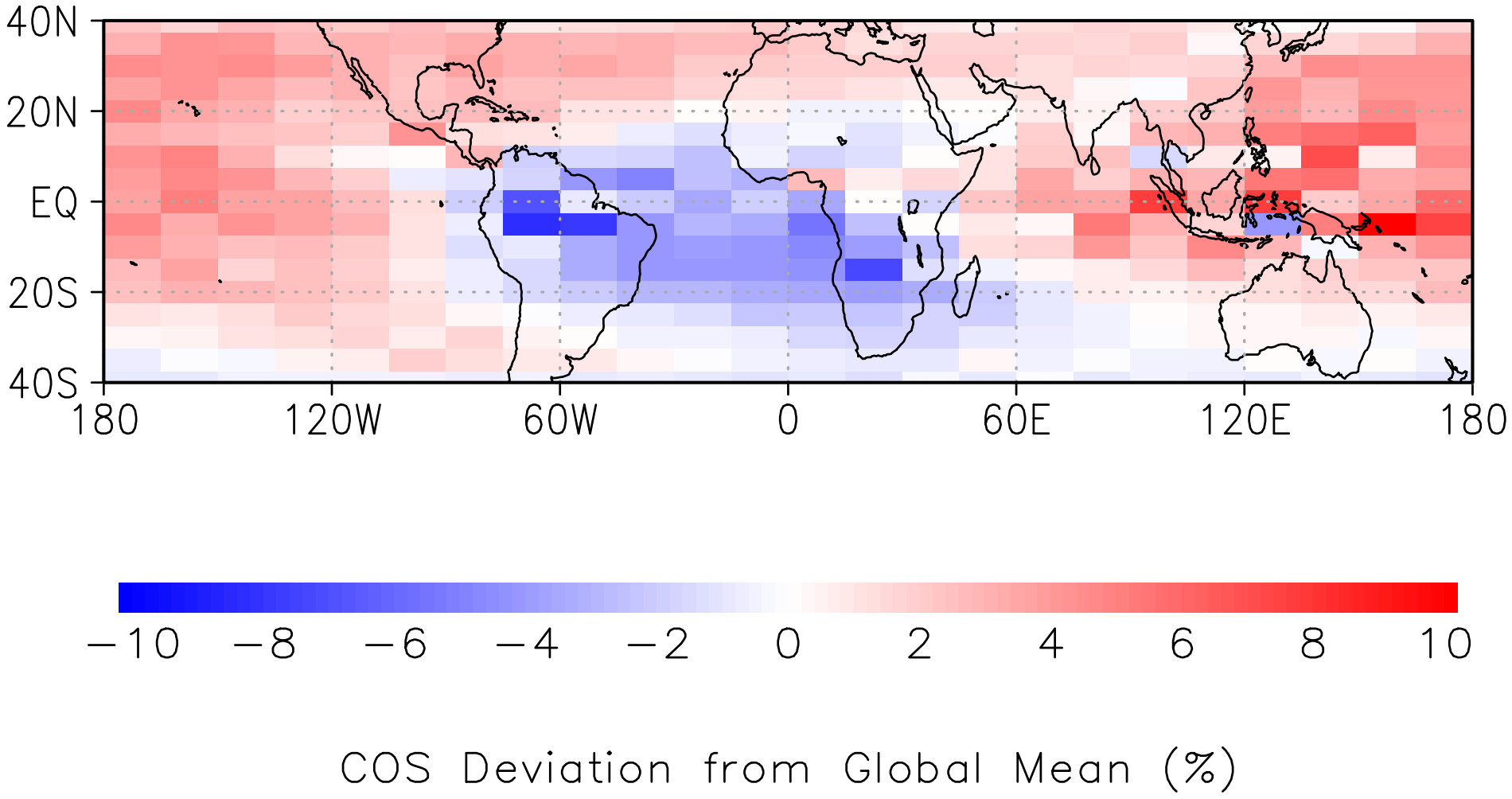
Bonus Slides

- Satellite Observations CO_2 and OCS
- Flask observations CO_2 and OCS
- Summary slide of all ecosystem OCS exchange field observations
- Oklahoma soil incubation study: Abiotic soil fluxes
- Stomatal conductance from OCS and heat methods
- Anthropogenic sources over time
- Schematic of uncertainties for N America scale GPP estimates
- Agricultural soil incubations (Illinois) and field data (Oklahoma)
- Climate of soil sites for OCS incubation studies

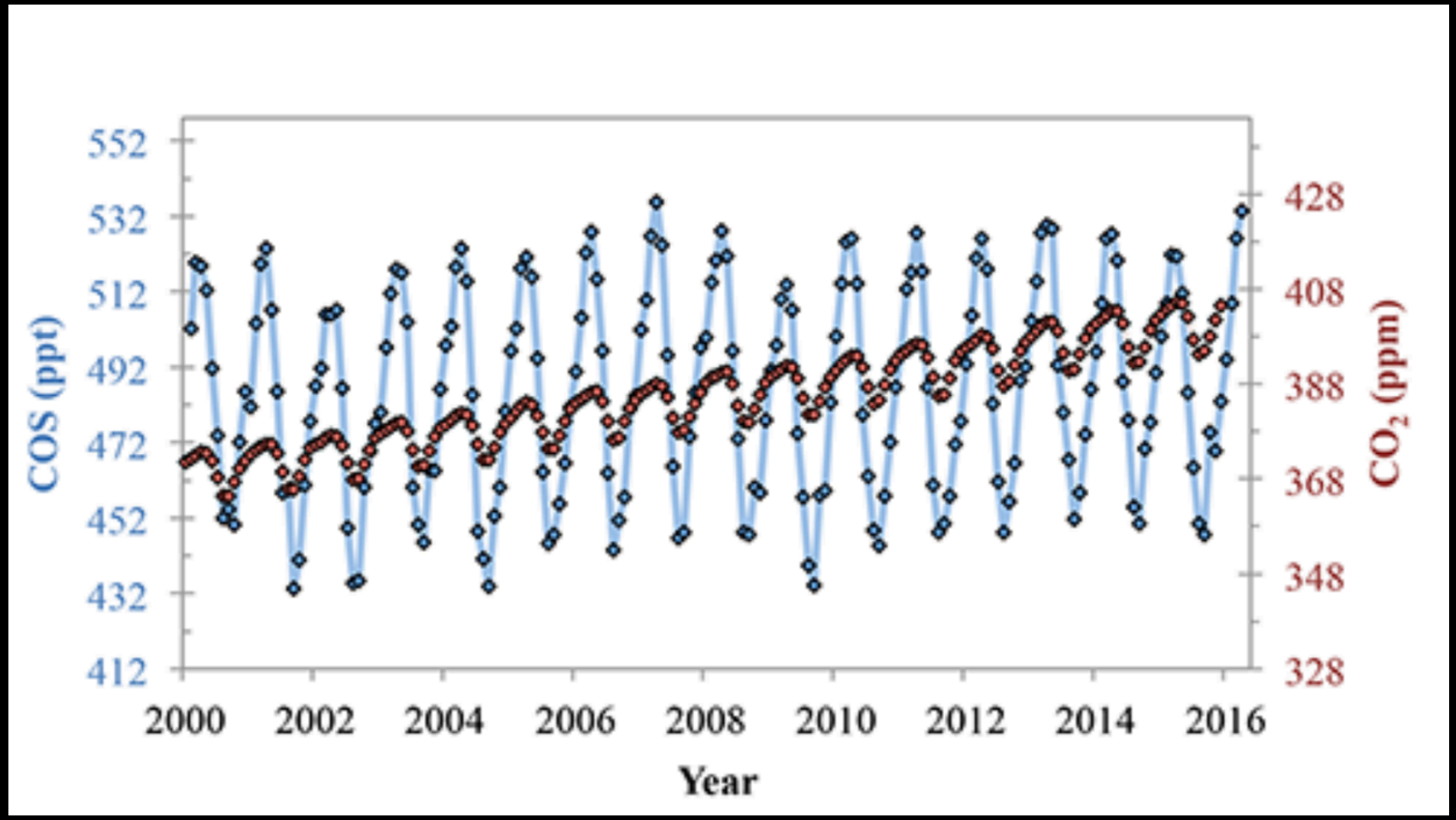
CO_2 average annual



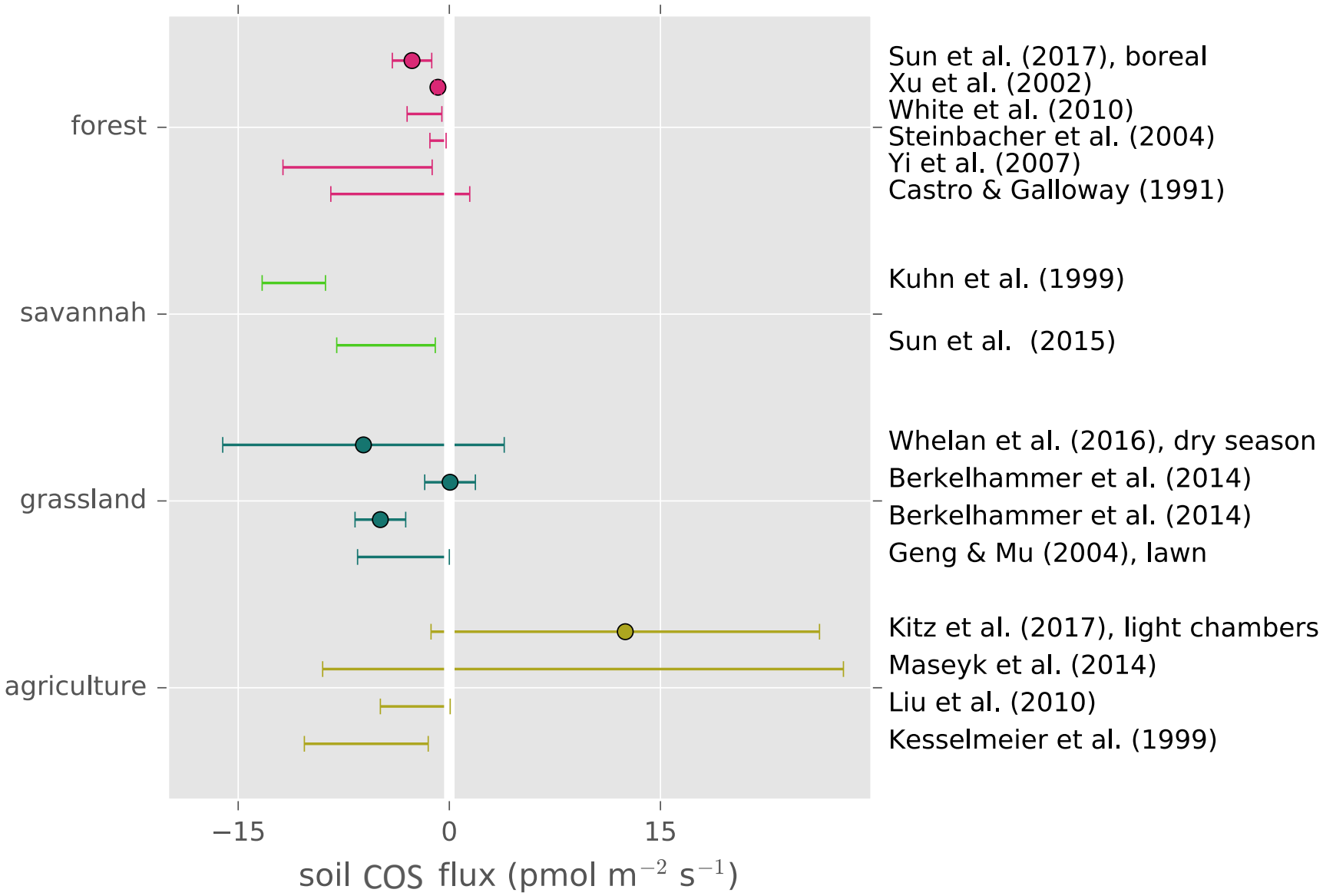
OCS average annual



Carbonyl sulfide

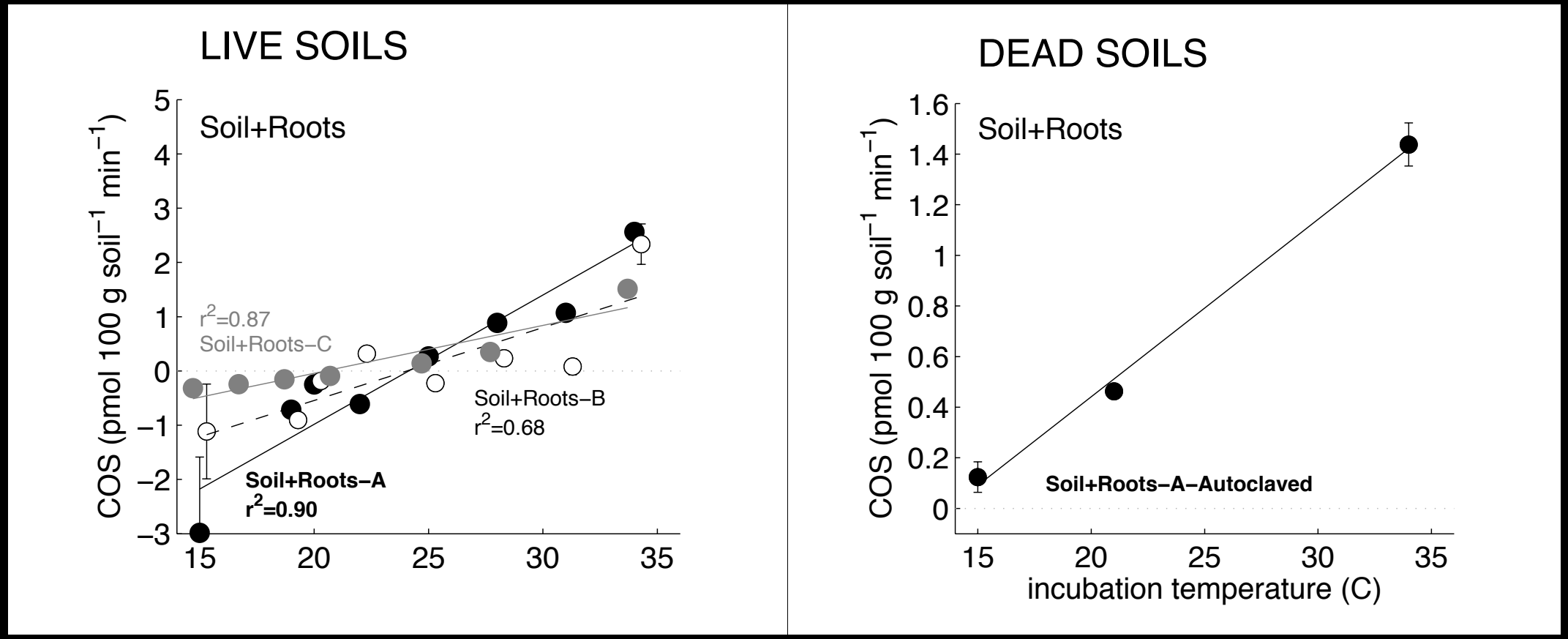


Campbell et al., EOS 2017



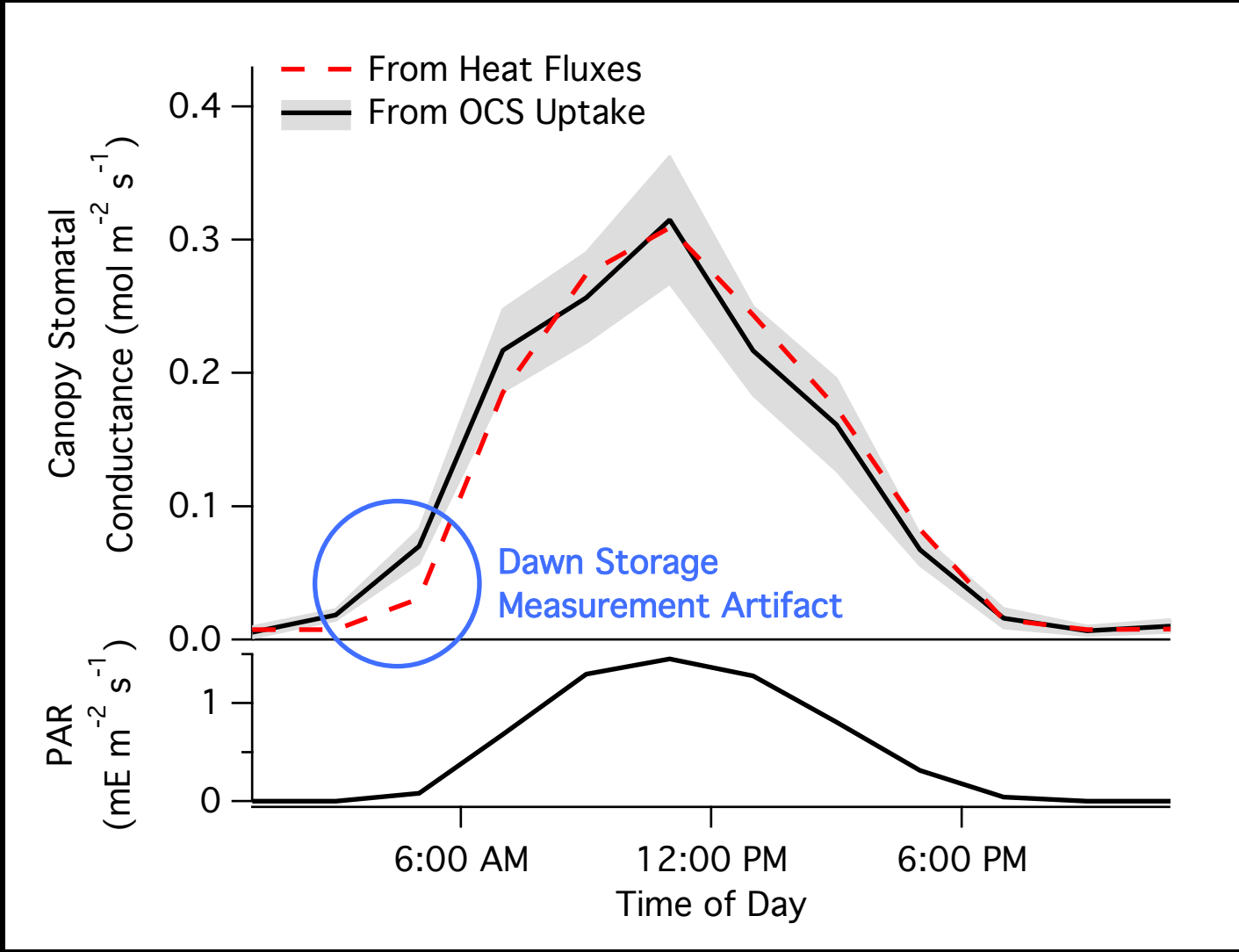
Whelan et al., ACP, 2018

OK Soil incubations



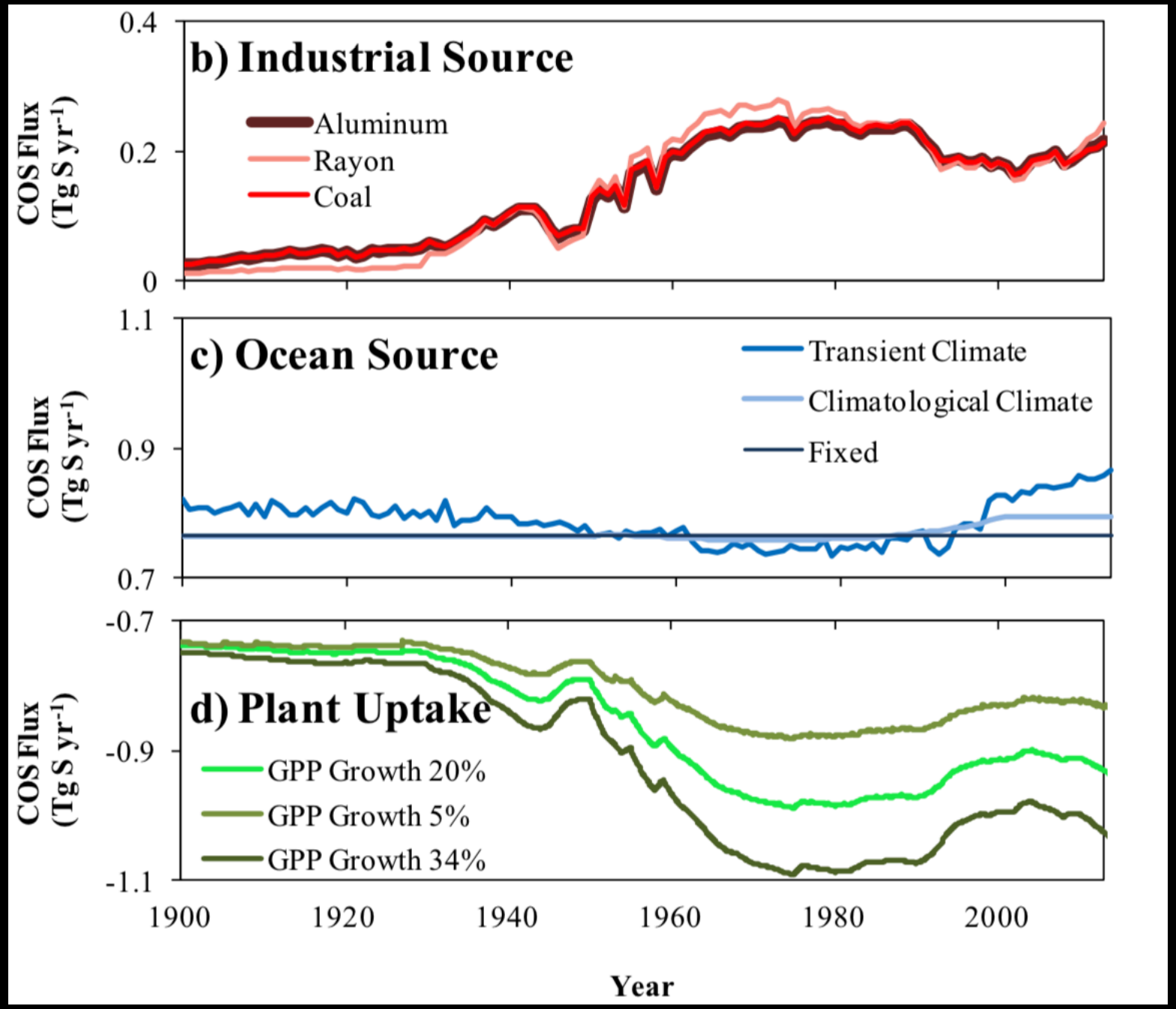
Whelan and Rhew, 2015

Harvard Forest



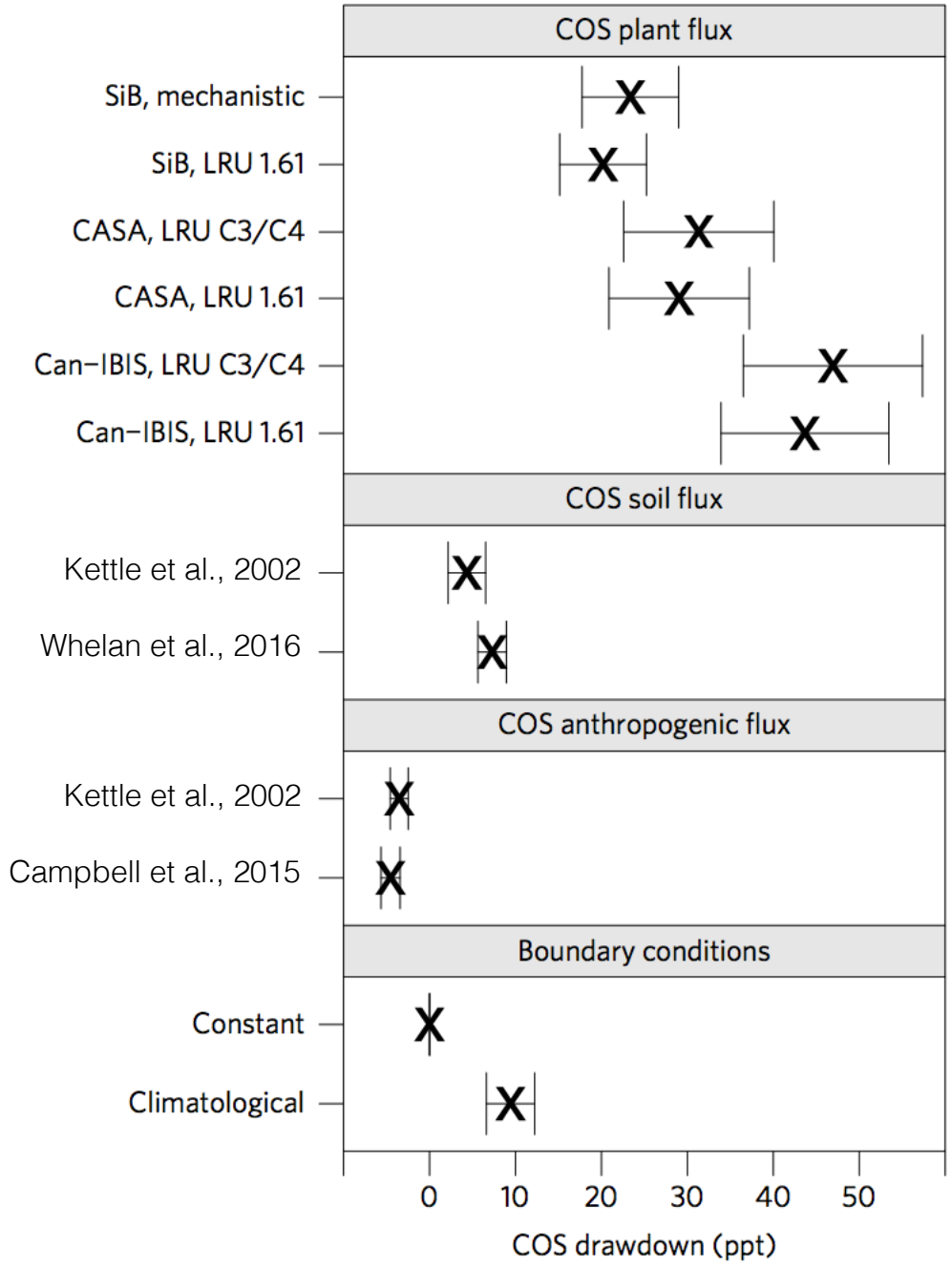
Whelan et al., 2018

Carbonyl sulfide: ice core records



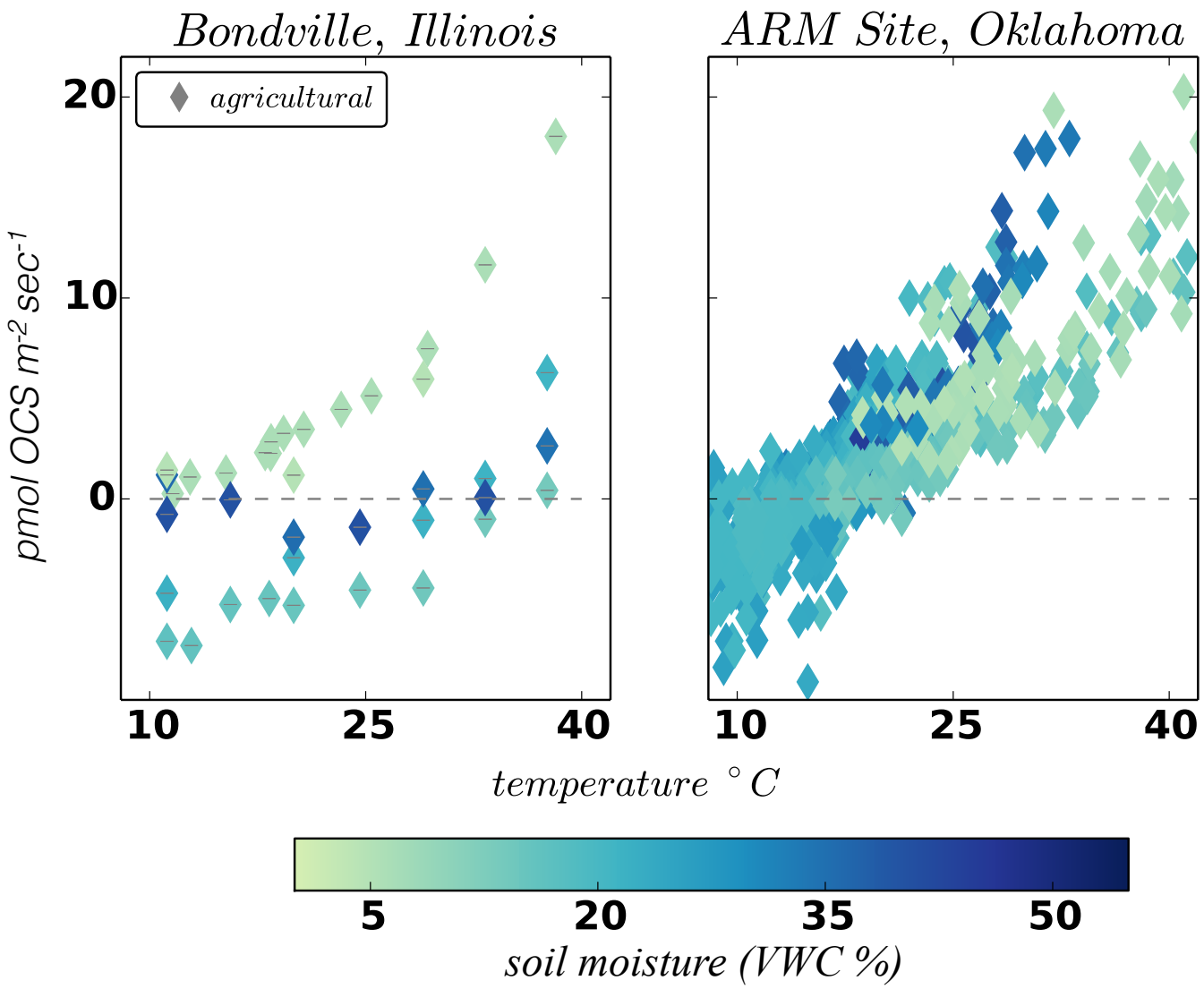
Campbell et al., 2017 Nature

Remaining Uncertainty

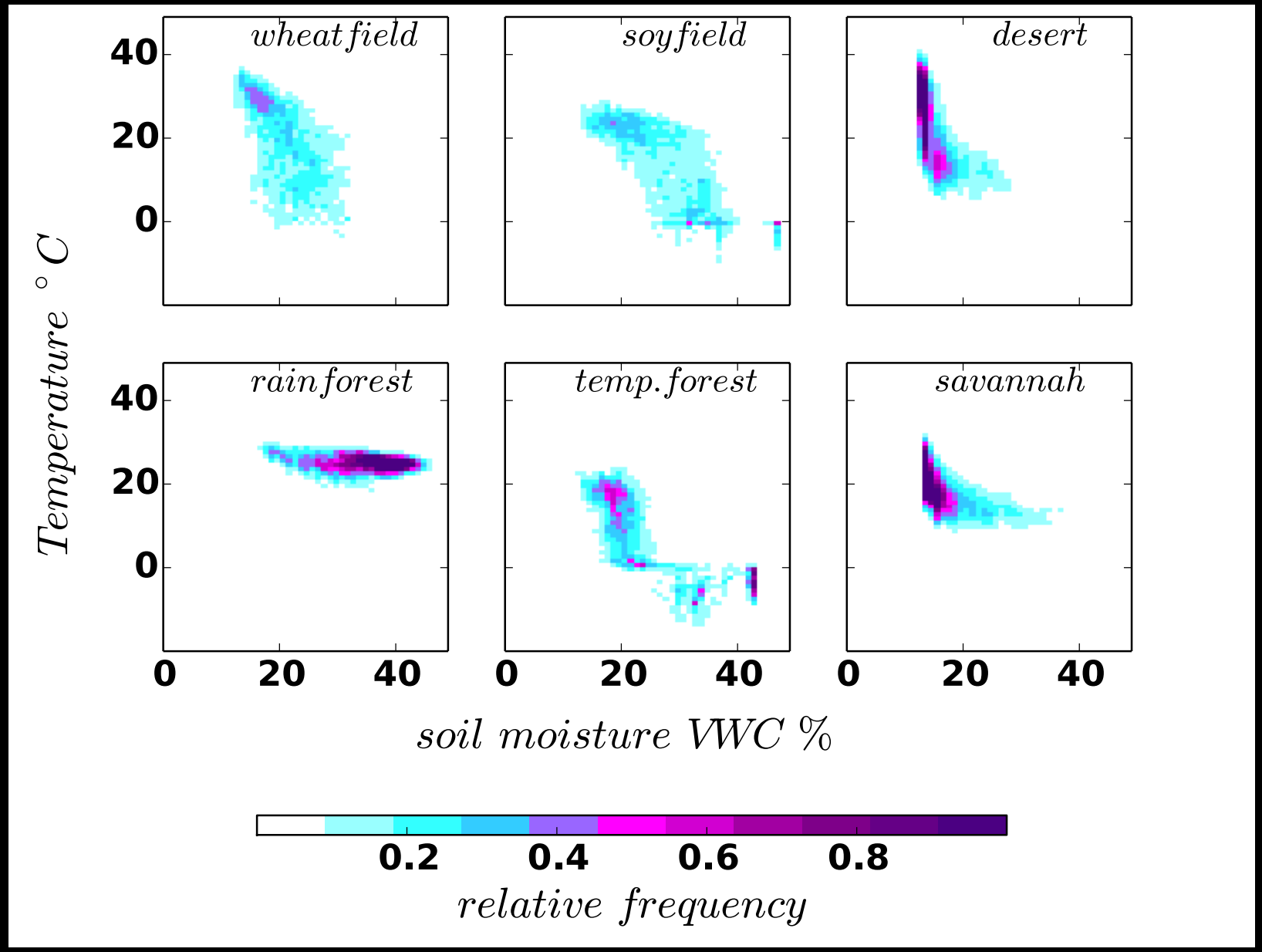


Hilton, Whelan et al., Nature CC, 2017

Agricultural Soil incubations



Climate


wheat field
soy field
desert
rain forest
temp. forest
savannah
Temperature °C
40
20
0
0
20
40
soil moisture VWC %
0.2
0.4
0.6
0.8
relative frequency