Bowdoin College







Mark Battle, Diana Grandas ('20), Raine Raynor ('21)

Fluxes of O_2 between the atmosphere and…

- Forests
- Industrial materials
- Tropical oceans
- Polar firn

(as well as some other species)

Also, leaf-level measurements

Eric Sofen, Karina Graeter, Sam Seekins, Jayme Woogerd, Maria Perez-Mendoza, Jacob Scheckman













John Carpenter, Becca Perry, Ryan Hart, Sasha David, Zane Davis, Margaret Conley

Harvard Forest Exchange Ratio Measurements

Map: Google.com





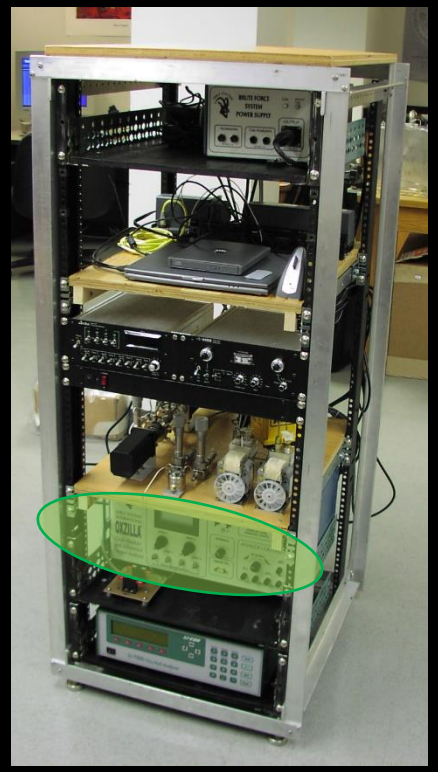






Harvard Forest Exchange Ratio Measurements





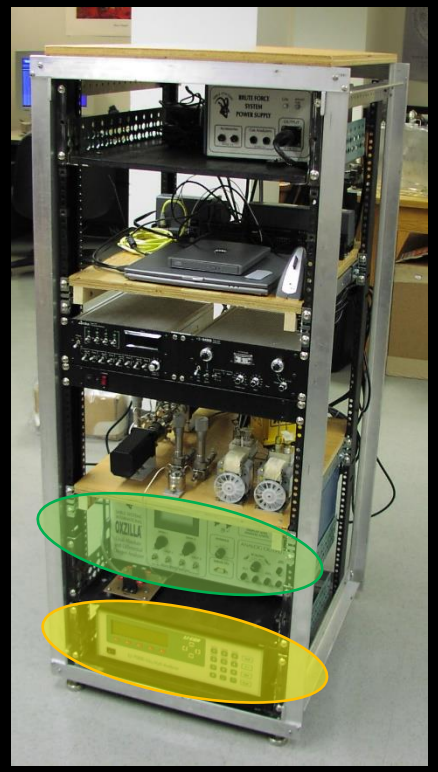






Harvard Forest Exchange Ratio Measurements





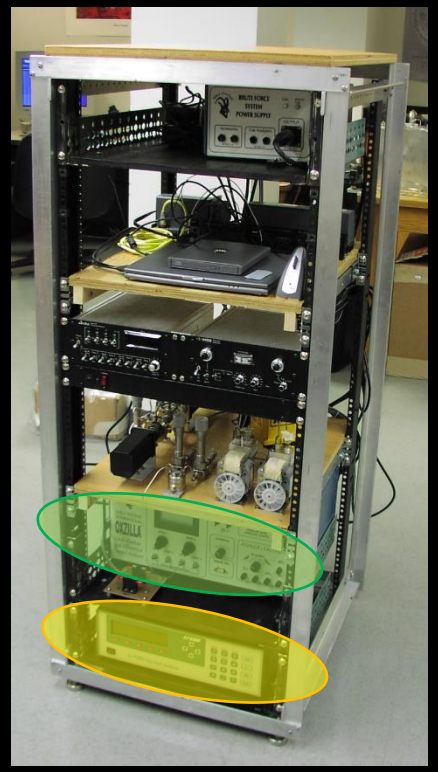






Harvard Forest Exchange Ratio Measurements











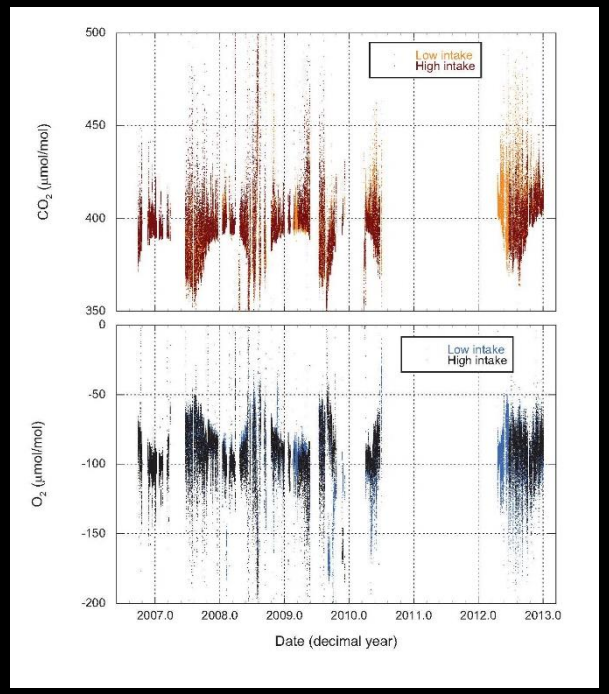
Atmos. Chem. Phys., 19, 8687–8701, 2019
https://doi.org/10.5194/acp-19-8687-2019
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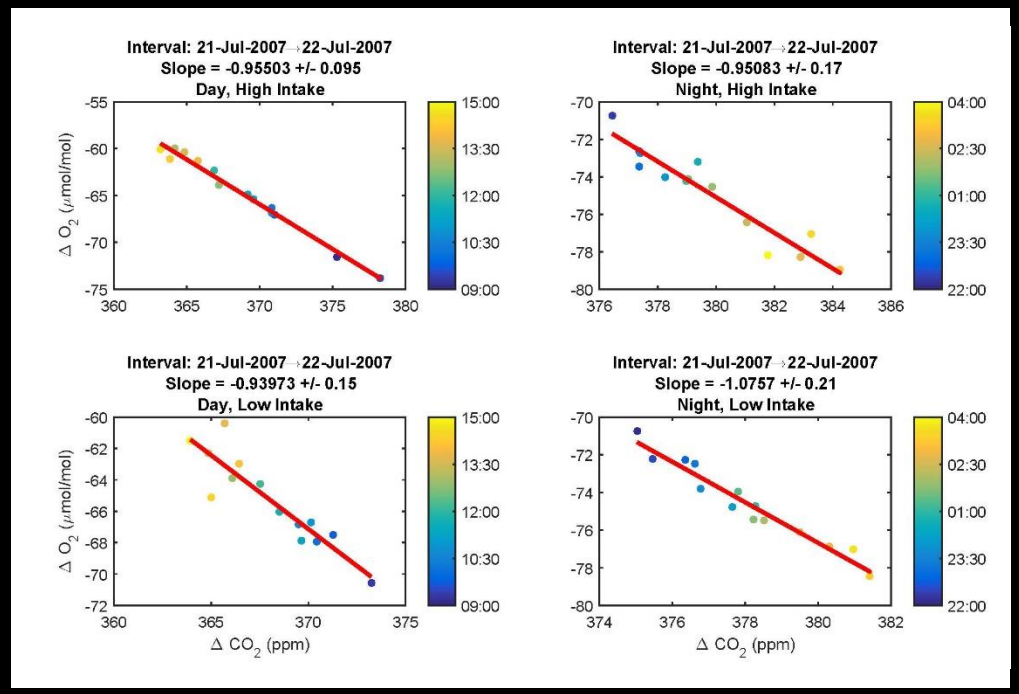
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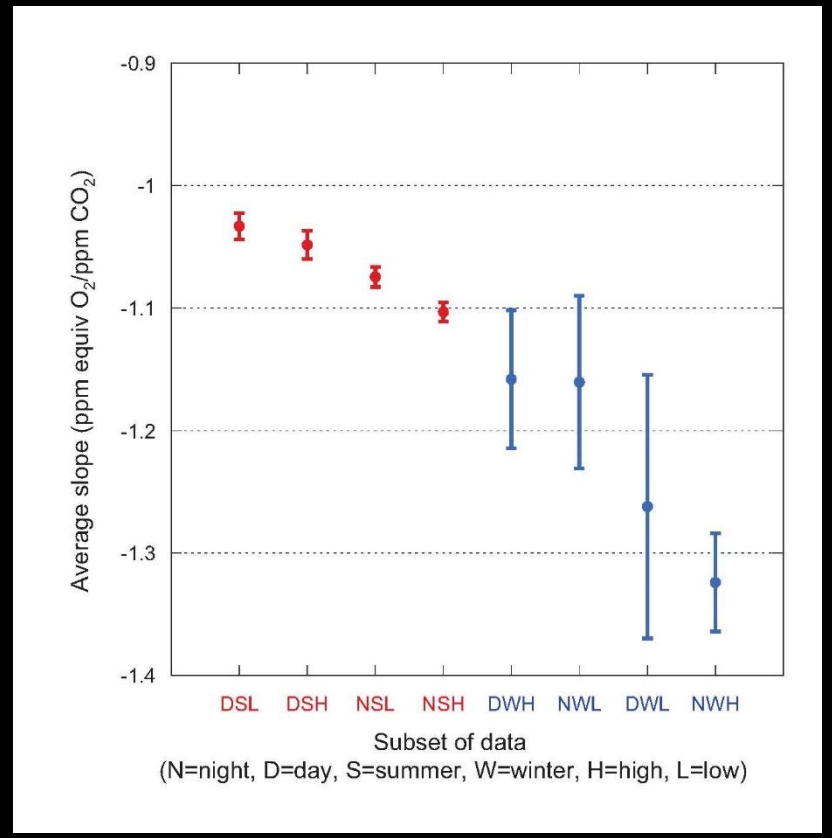
Atmospheric measurements of the terrestrial O_2 : CO_2 exchange ratio of a midlatitude forest

Mark O. Battle[1], J. William Munger[2], Margaret Conley[1], Eric Sofen[1], Rebecca Perry[1], Ryan Hart[1], Zane Davis[1], Jacob Scheckman[1], Jayme Woogerd[1], Karina Graeter[1], Samuel Seekins[1], Sasha David[1], and John Carpenter[1]

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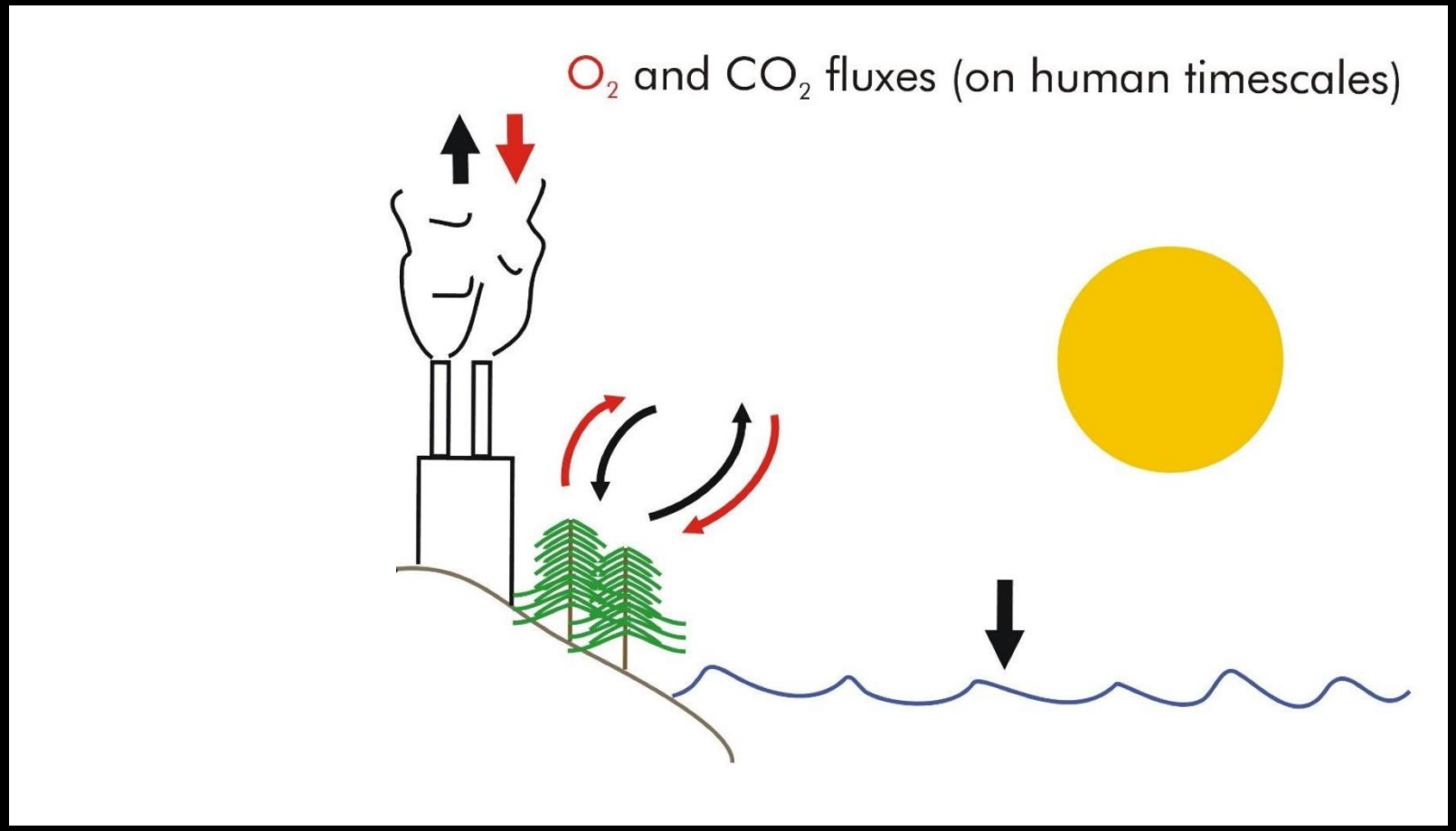






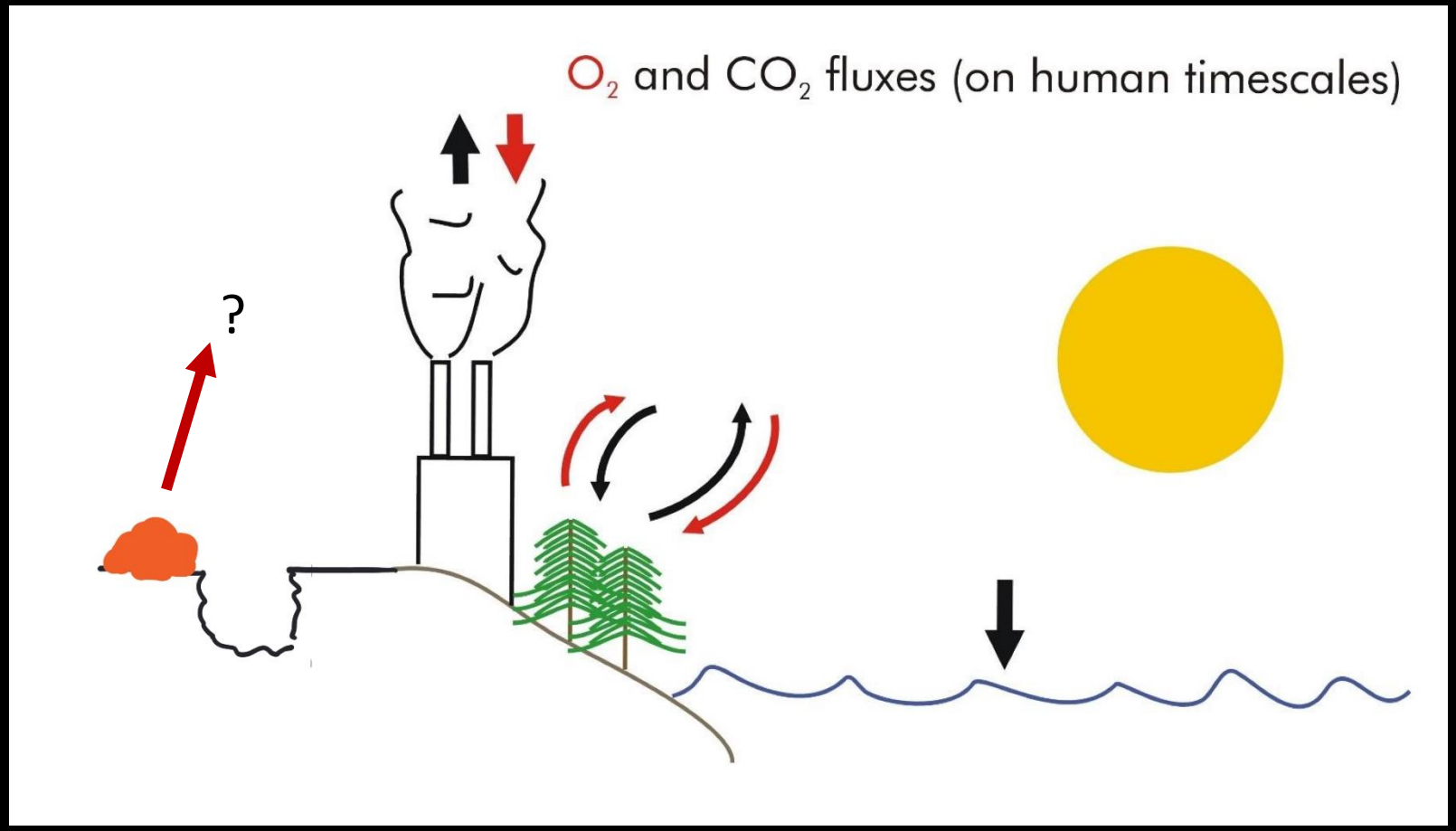
LBER best estimate:
1.03 ± 0.01

Fluxes of O_2 Associated with Industry



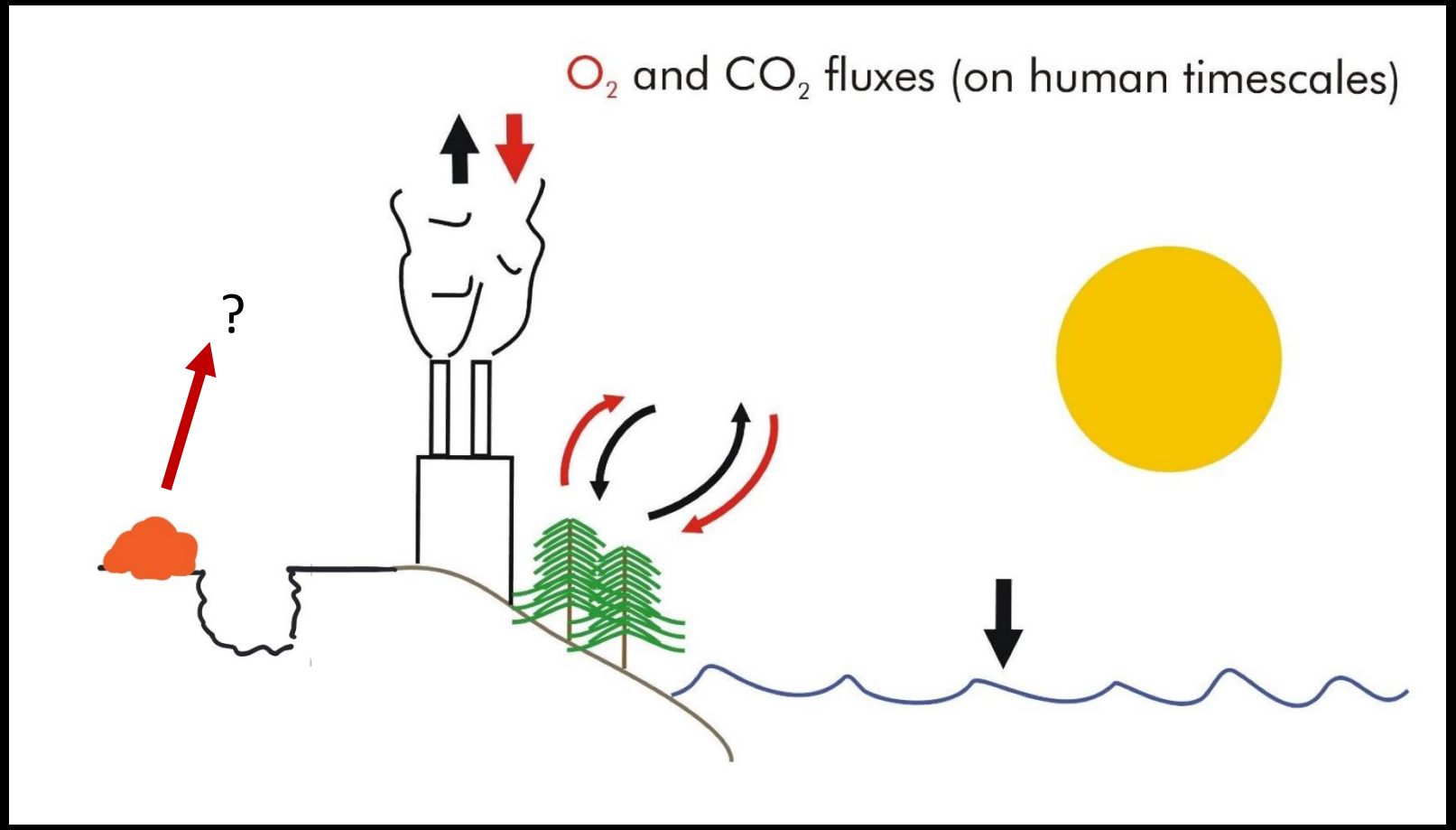
Thanks to Ralph Keeling

Fluxes of O_2 Associated with Industry



Fluxes of O_2 Associated with Industry

Fe_2O_3
Fe_3O_4
Al_2O_3
$CuFeS_2$*
$Cu_2(CO_3)(OH)_2$
$Cu_3(CO_3)_2(OH)_2$
H_2S*

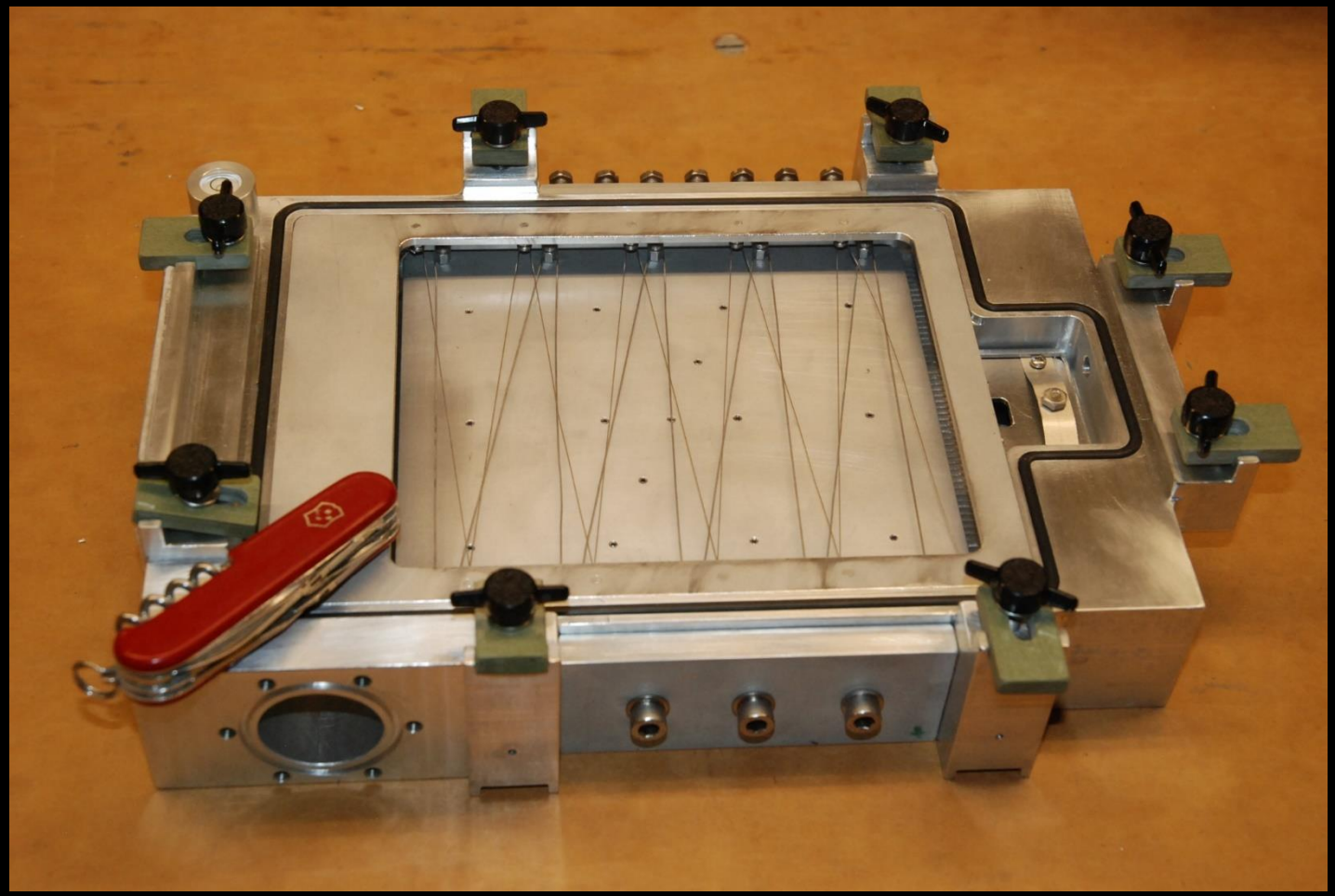


Leaf Level Gas Flux Measurements

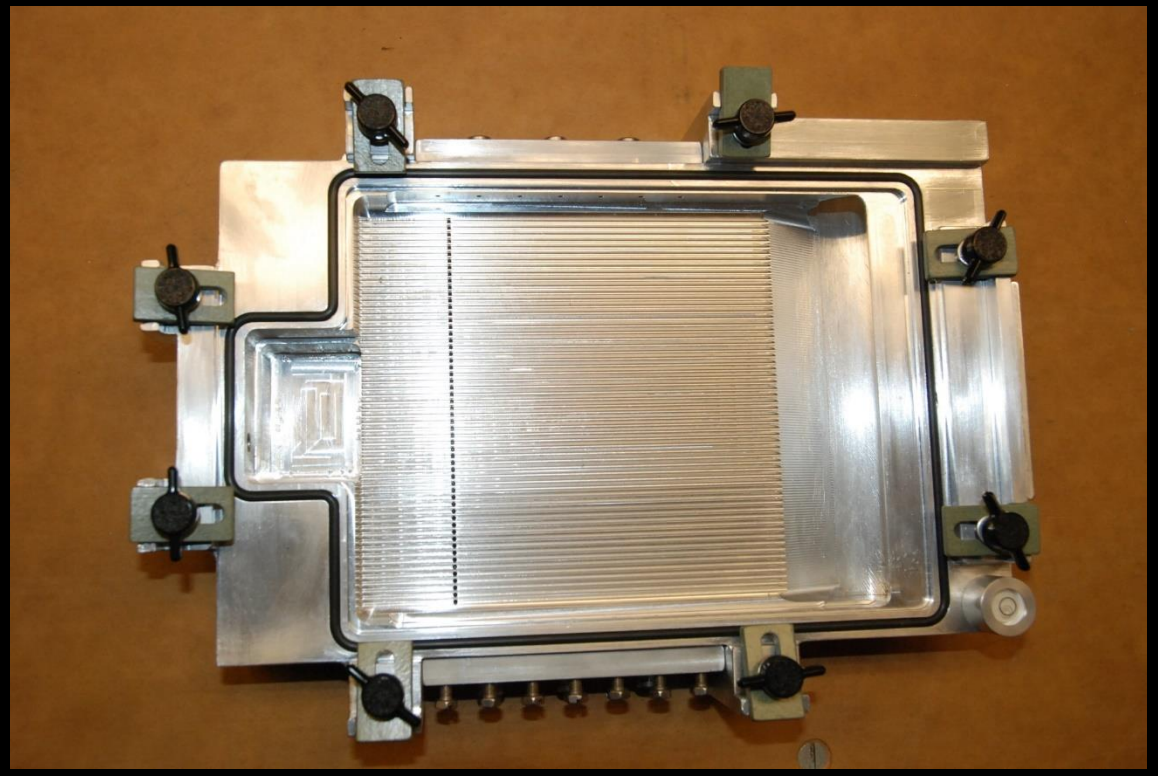
Measuring fluxes of gases and isotopes to/from leaves under controlled temperature and light levels.

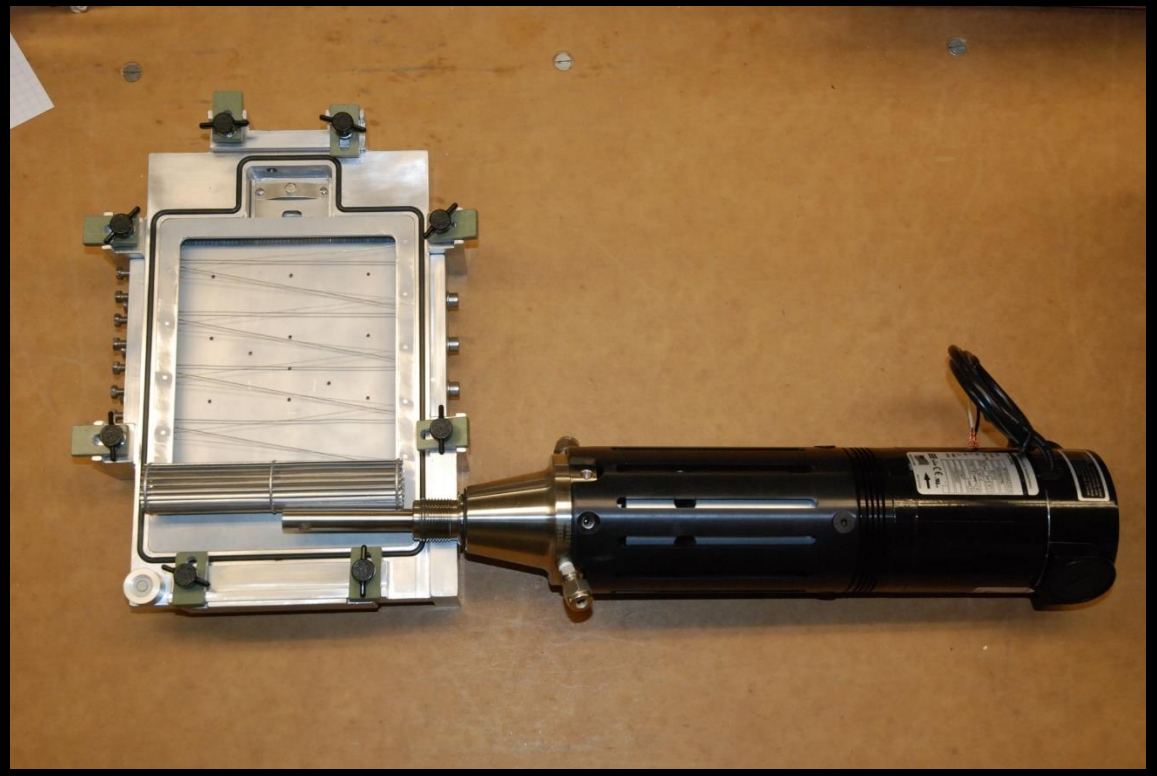
Labelled water capabilities.

SIPPE, Princeton, Columbia, Bowdoin



Leaf Level Gas Flux Measurements





Breakthrough Technologies

Measurement of Gross Photosynthesis, Respiration in the Light, and Mesophyll Conductance Using $H_2{}^{18}O$ Labeling[1][OPEN]

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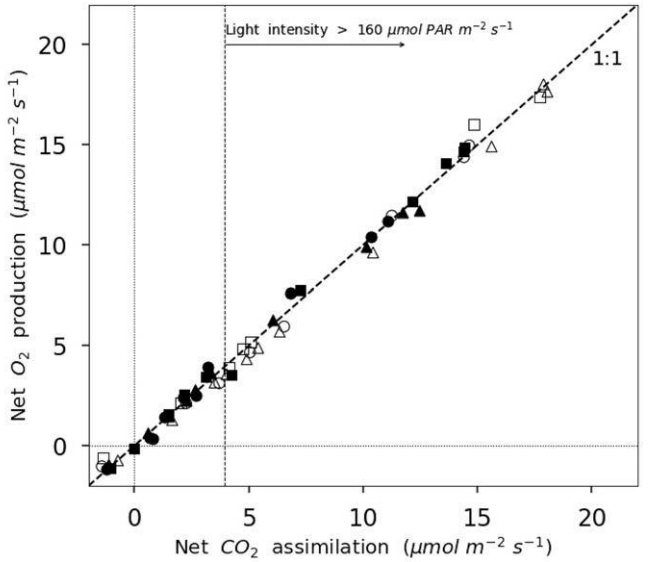


Figure 2. Correlation between NOP and net CO_2 assimilation for leaves exposed to 21% O_2 (black symbols) or 2% O_2 (white symbols). The dashed line represents a 1:1 relation.

Cuvette 2.0 nearing completion