

## Supplementary Material

### Physiological controls of the isotopic time lag between leaf assimilation and soil CO<sub>2</sub> efflux

Yann Salmon<sup>A,B,C,E</sup>, Romain L. Barnard<sup>A,D</sup> and Nina Buchmann<sup>A</sup>

<sup>A</sup>Institute of Agricultural Sciences, ETH Zurich, Universitätstrasse 2, 8092 Zurich, Switzerland.

<sup>B</sup>Institute of Evolutionary Biology and Environmental Studies, University of Zurich, Winterthurerstrasse 190, 8057 Zurich, Switzerland.

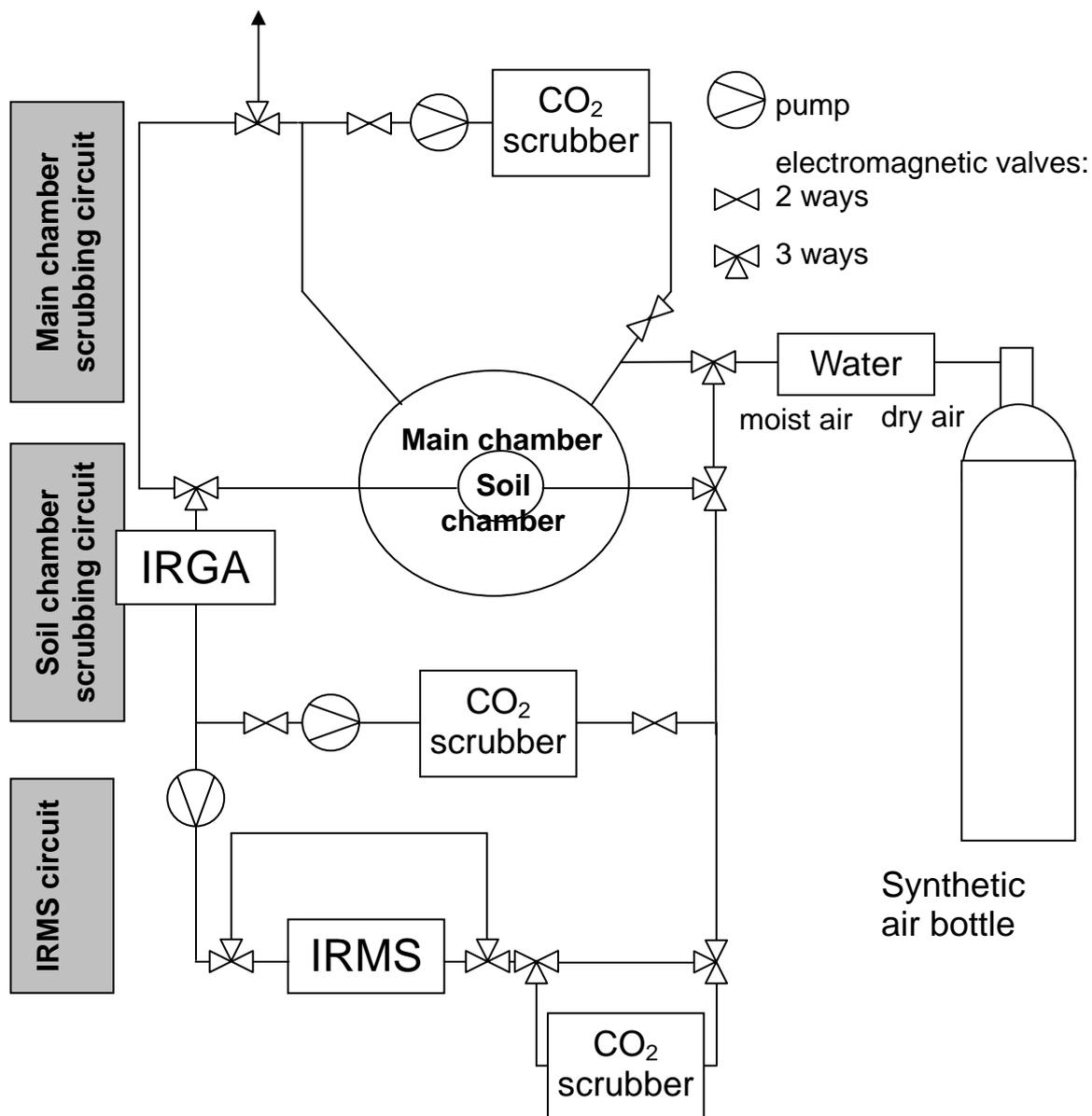
<sup>C</sup>Present address: Global Change Institute, The University of Edinburgh, Crew Building, The King's Buildings, West Mains Road, Edinburgh EH9 3JF, UK.

<sup>D</sup>Present address: INRA, UMR1347 Agroécologie, 17 rue Sully, BP 86510, Dijon, France.

<sup>E</sup>Corresponding author. Email: yann.salmon@ed.ac.uk

Custom-built setup for online IRMS measurements used to monitor  $\delta^{13}\text{C}$  of respired CO<sub>2</sub> in main and soil chambers.

Air flow through the setup was controlled by a computer and electro-valves. The IRMS air intake circuit was connected alternatively to the soil chamber circuit or to the main chamber circuit, which were independently equipped with a pump and a CO<sub>2</sub> scrubber (soda lime). The IRMS circuit featured a membrane pump (1 L min<sup>-1</sup> flow rate) and a scrubber, maintaining CO<sub>2</sub> concentrations below 1000  $\mu\text{mol mol}^{-1}$ . Before each measurement, CO<sub>2</sub> was scrubbed from all circuits and chambers. CO<sub>2</sub> concentrations were then left to increase due to respiration to at least 300  $\mu\text{mol CO}_2 \text{ mol}^{-1}$  before directing the air flow to the IRMS. The 300 and 1000  $\mu\text{mol CO}_2 \text{ mol}^{-1}$  thresholds ensured optimal CO<sub>2</sub> concentrations for  $\delta^{13}\text{C}$  measurements. CO<sub>2</sub> and H<sub>2</sub>O concentrations were measured with a CO<sub>2</sub>/H<sub>2</sub>O gas analyzer (Li-840, Li-Cor Inc.) placed in the part shared by both soil and main circuits.



Air flow for online measurements of  $\delta^{13}\text{C}$  in  $\text{CO}_2$ . EV, IRGA and IRMS indicate electrovalves, infra-red gas analyser and isotope ratio mass spectrometer, respectively. The soil chamber is located inside the main chamber; both are independently connected to the IRMS and IRGA circuits.