Exchange of carbonyl sulfide (OCS) between soils and atmosphere under various CO₂ concentrations

[Author List, exactly following journal article]

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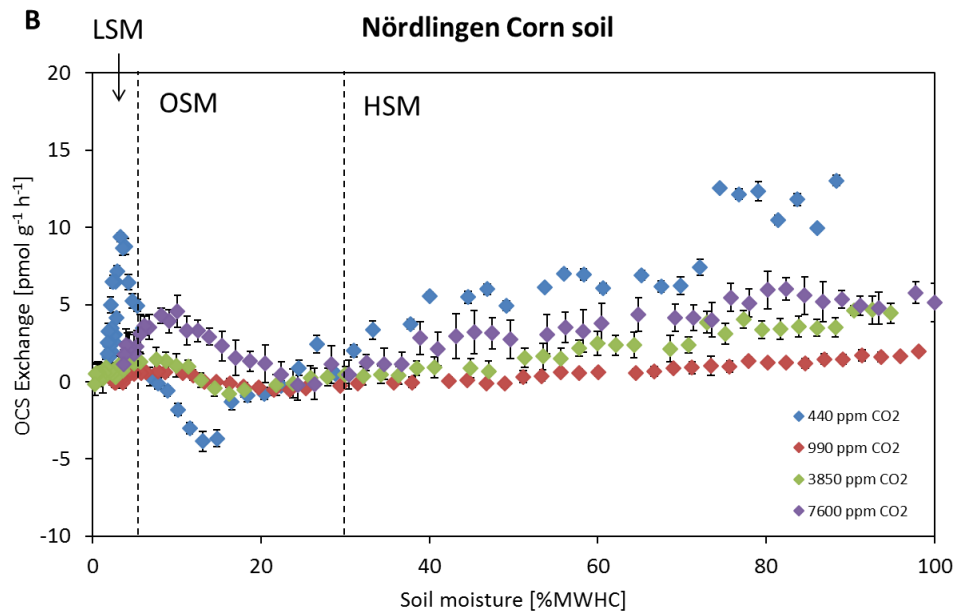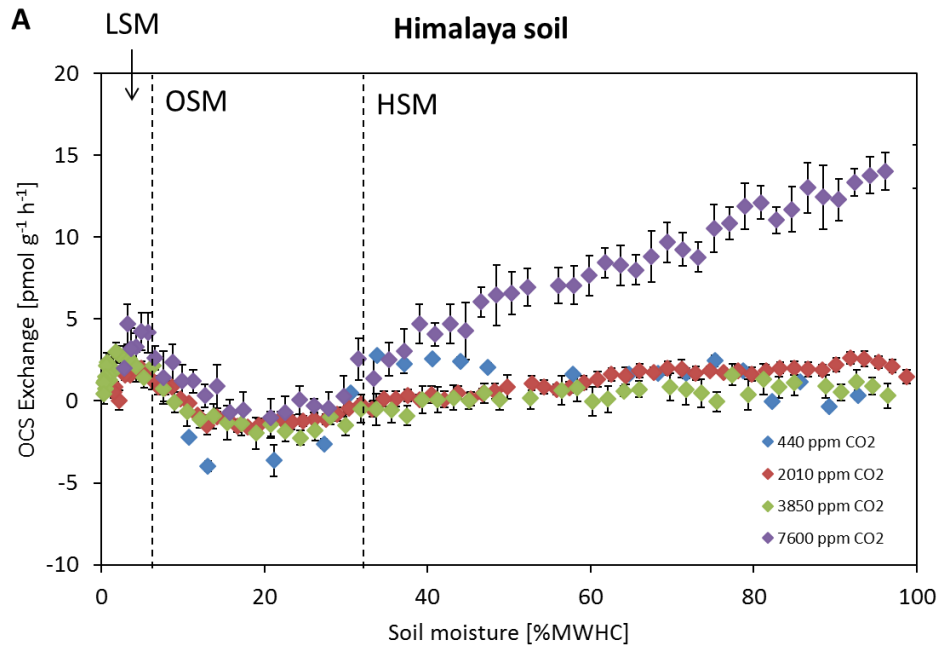## Contents of this file

Figures S1

Additional Supporting Information (Files uploaded separately)

Captions for Datasets S1. Filename: 2016JG003678R_ds02.xlsx.

Introduction

This supporting Information includes the same figure as figure 4, but for the Himalaya and the two Nördlingen soils, and the data used to make all figures in the manuscript and this supporting information.

Data is given as a separate file (2016JG003678R_ds02.xls). Data is grouped by figure, with one tab per figure (figure 5 and 6 share one tab). All calculations and experimental conditions figure 1-7 data are described in section 2 of the main manuscript. The K_M values for figure 8 are cited from the BRENDA database (www.brenda-enzymes.org; *Schomburg et al.*, 2002) and all pore water CO2 calculations and the constants are from Sanders 2015. Data selection and calculation for figure 8 are explained in section 4.3.
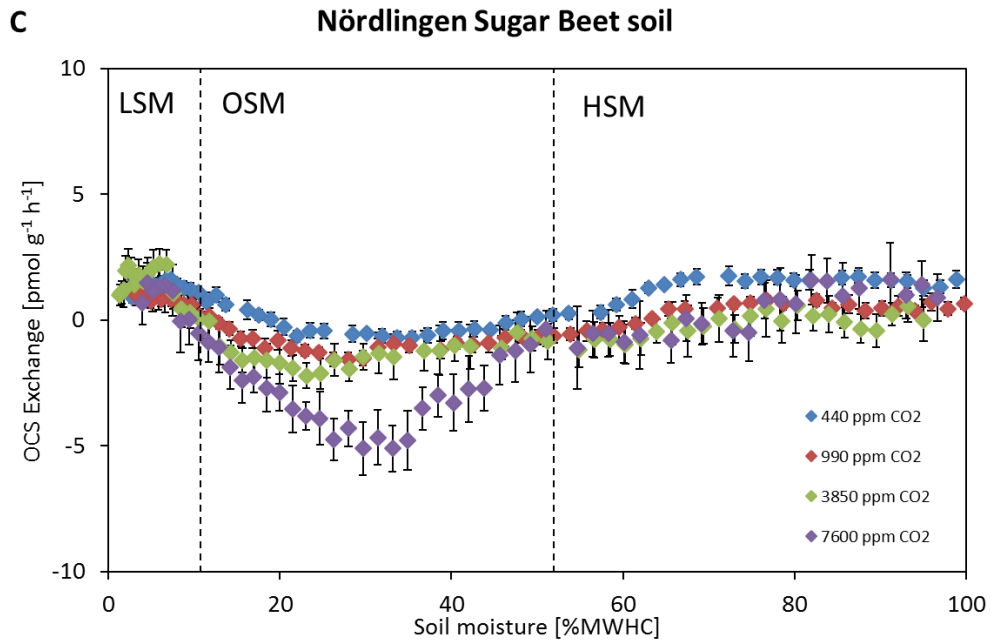
A LSM Himalaya soil

OSM   HSM

OCS Exchange [pmol g⁻¹ h⁻¹] vs Soil moisture [%MWHC]

440 ppm CO2
2010 ppm CO2
3850 ppm CO2
7600 ppm CO2

B LSM Nördlingen Corn soil

OSM   HSM

OCS Exchange [pmol g⁻¹ h⁻¹] vs Soil moisture [%MWHC]

440 ppm CO2
990 ppm CO2
3850 ppm CO2
7600 ppm CO2

C

Nördlingen Sugar Beet soil

Figure S1. OCS exchange rates for the Himalaya (A), Nördlingen Corn (B) and Nördlingen Sugar Beet (C) soils related to dry weight in pmol g^{-1} h^{-1} as a function of the soil moisture given as % MWHC. Negative exchange rates indicate OCS uptake. Dotted lines indicate the areas defined for the integration of exchange rates as given in Table 3. LSM, OSM, HSM = low, optimum and high moisture range. Most error bars are smaller than individual points.

Data Set S1. Data corresponding to all figures in the manuscript and supplement is given as a single .xlsx file named 2016JG003678R_ds02.xlsx. Details of data processing and calculations

are covered in section 2 (section 4.3 for figure 8) of the main manuscript. Data is sorted into different tabs corresponding to the figure they represent:

Figure 1: OCS exchange rates and corresponding soil moisture for multiple measurements of the Mainz soil under similar conditions.

Figure 2: Measured OCS concentration of the same gas mixture with different amounts of water vapor added using a Nafion dryer in reverse mode.

Figure 3: Measured OCS concentration of a dry sample gas mixture with and without passing through a Nafion dryer.

Figure 4: OCS exchange rates of the Mainz soil as a function of soil moisture under various CO_2 concentrations and the corresponding soil moistures.

Figure 5 and 6: Integrated OCS exchange (following the trapezium method described in section 2) after exchange rates have been fitted with the multi peak fit tool of Origin Pro 9 (to allow for finer integration steps).

Figure 7: OCS exchange rates as a function of soil moisture under 3 different soil treatments (untreated, treated with Nystatin or treated with Streptomycin) and the corresponding soil moistures for the Mainz and Suriname soils.

Figure 8: Calculation of approximate pore water CO2 concentration at 440, 990, 2010, 3850 and 7600 ppm atmospheric CO2 concentration plus median K_M values for microorganisms reported in the BRENDA database. Please see section 4.3 of the main manuscript for details.

Figure S1: OCS exchange rates of the Nördlingen Corn, Nördlingen Sugar Beet and Himalaya soils as a function of soil moisture under various CO_2 concentrations and the corresponding soil moistures.