Integrating biosphere modelling and field measurements of carbonyl sulfide and chlorophyll fluorescence to constrain photosynthesis.

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Wu Sun, Kukka-Maaria Erkkilä, Juho Aalto, Albert Porcar-Castel, Chao Zhang, Jon Atherton, Enpei Li, Antje Gaertner, Erik van Schaik, Kadmiel Maseyk, Ian Baker, Katherine Haynes, Ulli Seibt, Ivan Mammarella, Timo Vesala, Huilin Chen, Maarten Krol





COS as tracer for stomatal conductance and photosynthesis



COS as tracer for stomatal conductance and photosynthesis





COS as tracer for stomatal conductance



LRU varies with light



LRU varies with light and humidity



Modelling COS ecosystem uptake in SiB4



The COS-OCS project was funded through the ERC-advanced funding scheme (AdG 2016 Project Number: 742798, Project Acronym: COS-OCS).

SiB4 COS vegetation uptake

Hyytiälä, Finland Boreal, needle-leaf forest

Harvard Forest, US Temperate, deciduous forest



The COS-OCS project was funded through the ERC-advanced funding scheme (AdG 2016 Project Number: 742798, Project Acronym: COS-OCS).

Soil exchange of COS

Hyytiälä: soil COS uptake is 13 % of total ecosystem COS uptake Sun et al., 2018; Kooijmans et al., 2017



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COS soil exchange in SiB4

SiB4 COS soil uptake proportional to respiration (Berry et al. 2013)



COS soil exchange in SiB4

Mechanistic COS soil models capture uptake and emission of COS: Sun et al., '15; Ogee et al.,'16



Take home messages

COS as tracer for stomatal conductance

LRU varies with light *and humidity,* important when COS is used to interpret changes in photosynthesis



COS CO2

Outlook

COS model-observation comparison for different sites

Implementation of the soil COS exchange for different biomes

Drought summer 2018