Two-dimensional microfluidic nutrient patches for direct visualization of microbial resource cycling

Hanbang Zou[1], Pelle Ohlsson[2], Edith Hammer[1]

[1] Department of Microbial Ecology, Lund University, Lund, Sweden [2] Department of Biomedical Engineering, Lund University, Lund, Sweden

Email: hanbang.zou@biol.lu.se Website: http://soilchip.wixsite.com/soilchip

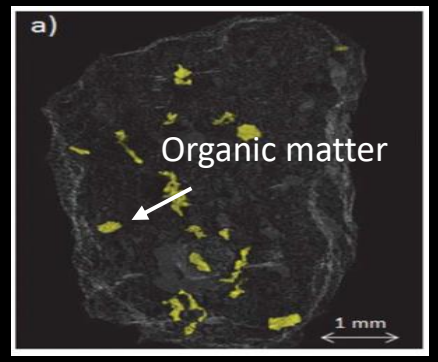
Soil carbon sequestration:

- A long term and safe solution to mitigate excessive atmospheric CO2
- The activities at numerous microhabitats cumulatively affect the dynamics of pools and fluxes.

Research questions:

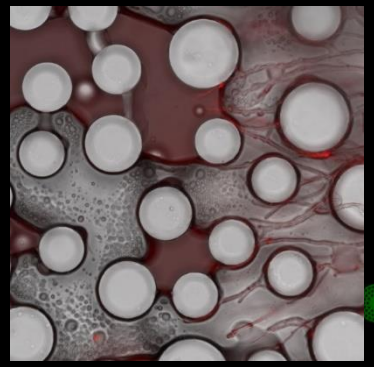
How does spatial distribution of resources affect carbon cycling at pore scale?

Soil aggregate



Distribution of larger particulate organic matter chunks in a soil aggregate. (Kravchenko 2014)

Soil chip



Prototype of the patch chip showing nutrient patches (red) and hyphae (red threads) from C.cinerea. The porous network consist of randomly distributed pillars.

PDMS pillars represent soil grain

Nutrient patches filled with green fluorescent dye

Nutrient patches with predefined distribution