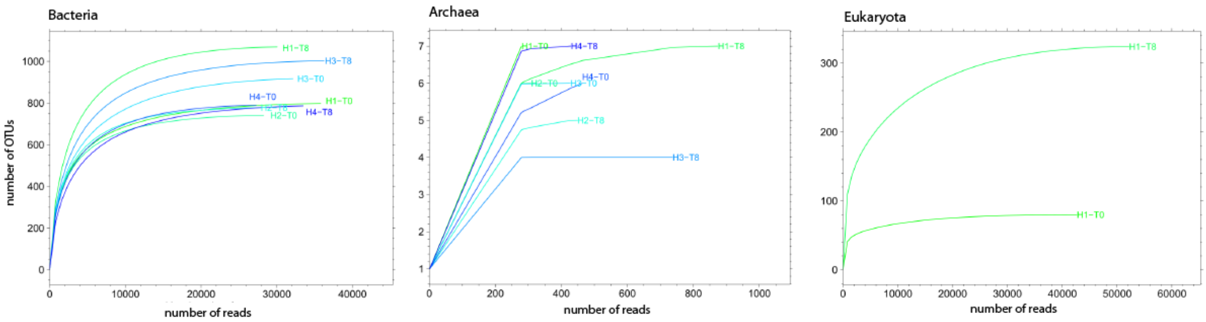
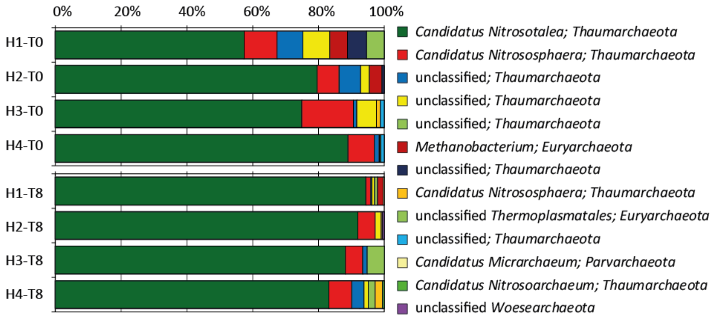
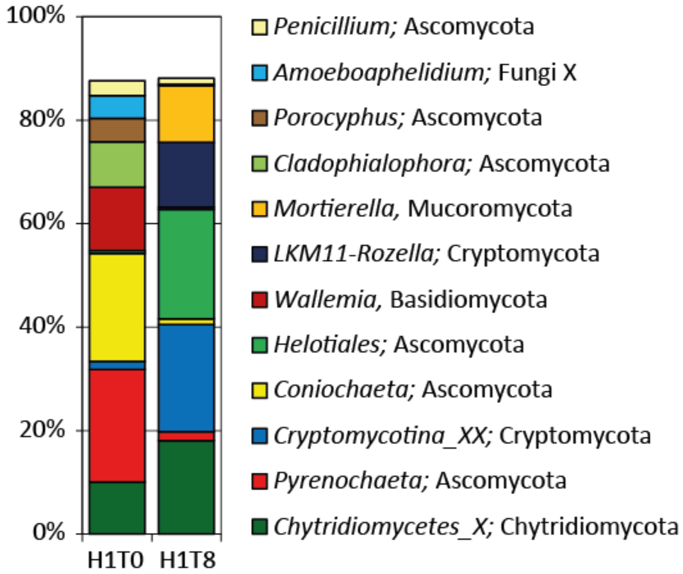
Supplementary material



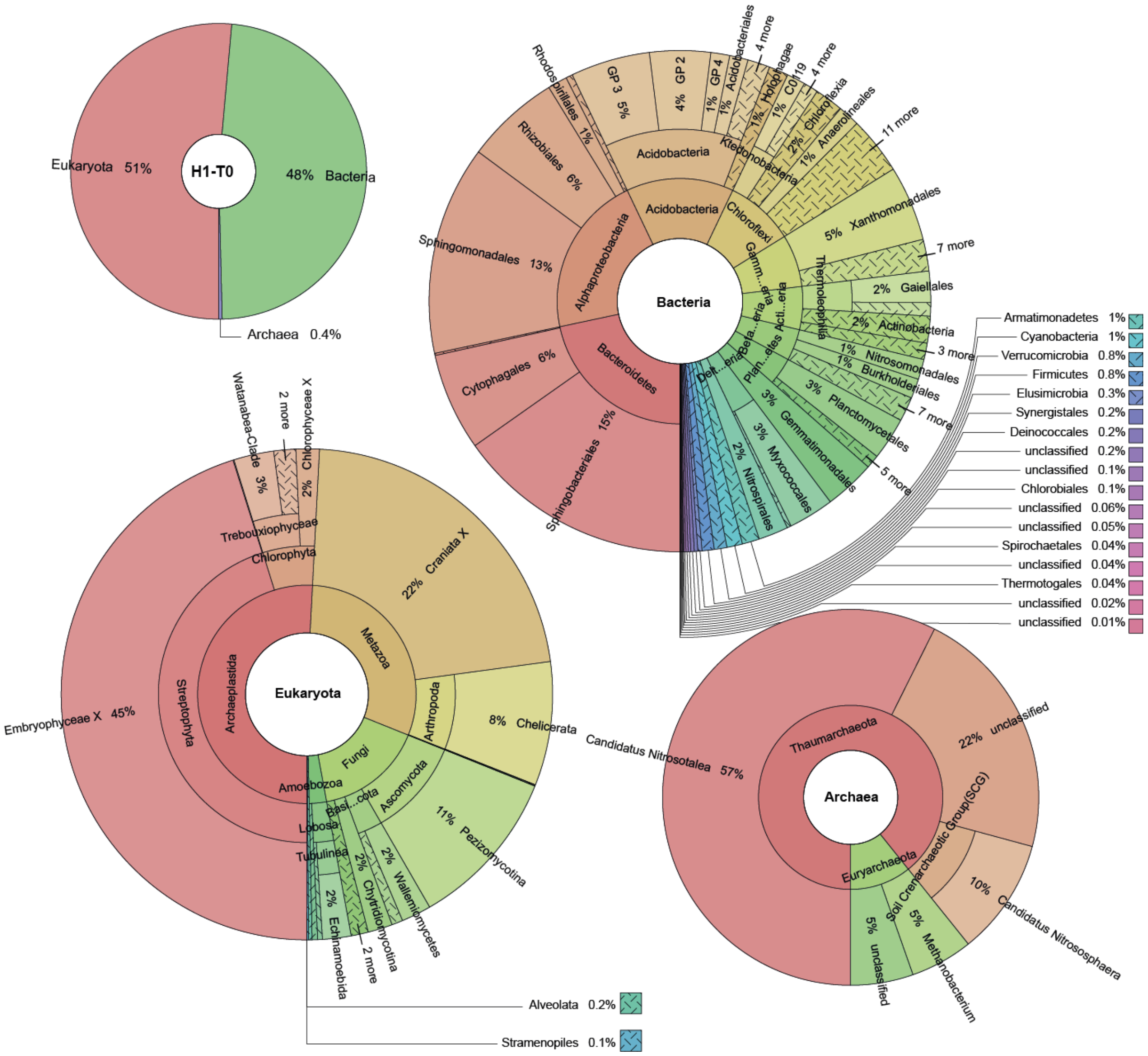
SM1: Rarefaction curves



SM2: Relative abundance of the archeae OTUs in the eight sample.



SM3: Relative abundance of the 12 dominant fungal OTUs in the H1 T0 and H1 T8 samples. Non saturated H1 0-12.5cm; T0 beginning of experiment; T8 after 8 months.



SM4: Community structure content in H1-T0 soil sample generated from Krona.

SM.5: Physiological characteristics of the identified genera among the 100 most abundant OTUs

	Metabolism	**respiration**	**Reference**	**Evolution in the mesocosm**
Leptospirillum	Lithoautotrophic, oxidize FeII Acidophile (optimum pH 1.5) Species can fix nitrogen	aerobic	Garcia-Moyano, 2008 ; Li et al., 2010 ;	Not in the surface layer, maintained, slight decrease in the saturated zone
Acidiferrobacter	Acidophile (optimum pH 2). Lithoautitrophic, oxidize FeII, sulfur Strictly autotrophic and facultative diazotroph.	Facultative anaerobe that can use either molecular oxygen or ferric iron as terminal electron acceptor isolated from coal spoil refuse in Missouri, US.	Hallberg et al., 2011	Not in the surface layer, decrease in the three bottom layers
Sphingomonas	Chemo-organotrophic, metabolically versatile, which means it can utilize a wide range of naturally occuring compounds as well as some types of environmental contaminants	strictly aerobic	Fredrickson et al., 1995 ; Zylstra and Kim, 1997; Macur et al., 2001 ; Kinegam et al., 2008 ; Escalante et al., 2009	Still the most abundant in all layers, increase in second non saturated level H2
Pseudolabrys	Chemo-organotrophic, degradation of organic acids, acido-tolerant (pH 4)	aerobic	Kämpfer et al., 2006	Increase in the saturated (permanently and alternatively) levels
Alkanibacter	Chemo-organotrophic, grows on pentane, hexane and decane	aerobic	Friedrich and Lipski, 2008	Strong decrease in all levels
Bryobacter	Chemo-organotrophic, acido-tolerant sugars, some heteropolysaccharides and galacturonic and glucuronic acids, Acidobacteria	strictly aerobic	Kulichevskaya et al., 2010	Increase or maintain of abundance in all levels
Bradyrhizobium	Chemo-organotrophic, acid tolerant	aerobic	Jordan 1982	Maintained or slight decrease
Gaiella	Nitrate	Strictly aerobic	Albuquerque et al., 2011	Decrease in all

	is reduced to nitrite. Chemo-organotrophic			levels
Geothrix	Respire FeIII with acetate or other organic acids as electron donors, chemo-organotrophic	Strict anaerobe	Coates et al., 1999	Increase in the saturated levels
Lacibacter	Chemo-organotrophic	aerobic	Qu et al., 2009	Increase in the surface (slight) and in the saturated levels (strong)
Sediminibacterium	Chemo-organotrophic	strictly aerobic	Qu and Yuan, 2008	Increase in the saturated levels
Opitutus	Nitrate is reduced to nitrite, fermentation of mono and polysaccharides	obligate anaerobe	Chin et al., 2001	Increase in the saturated levels
Polaromonas	Chemoorganotrophic, some strains degrade PAHs	aerobic	Jeon et al., 2004	Increase in the saturated levels
Gemmatimonas	Chemo-organotrophic	aerobic	Zhang et al., 2003	Decrease in the three lower levels
Varriibacter	Chemo-organotrophic	strictly aerobic	Kim et al., 2014	Decrease in all levels
Holophaga	Degrade aromatic compounds into acetate, homoacetogenesis	Strictly anaerobic	Liesack et al., 1994	Increase in the surface (strong) and lower levels
Rhizomicrobium	Ferric iron, nitrate, oxygen and fumarate served as electron acceptors	Facultative anaerobic	Kodama and Watanabe, 2011	Increase upper levels and in the transientlty saturated level
Blastocatella	Chemo-organotrophic growth on very few complex substrate, acido-tolerant	aerobic	Foesel et al., 2013	Decrease in the upper levels
Mucilaginibacter	Chemo-organotrophic, degrading pectin, xylan, laminarin and some other polysaccharides, acido-tolerant	facultatively aerobic (fermentation des sucres possible)	Pankratov et al., 2007	Decrease in the upper levels
Parafilimonas	Chemo-organotrophic	aerobic	Kim et al., 2014	Decrease in surface and in saturated levels
Flavisolibacter	Chemo-organotrophic	aerobic	Yoon and Im, 2007	Decrease in all

				levels
Chryseolinea	Chemo-organotrophic	Strict aerobic	Kim et al., 2013	Decrease in all levels
Cytophaga	Chemo-organotrophic, degrading a large range of organic compounds	Facultatively aerobic	Manz et al., 1996	Decrease in all levels
Pirellula	Chemo-organotrophic, degradation of complex macromolecules	aerobic	Schlesner 1994	Increase in the always saturated level, decrease in the surface level
Undibacterium	Chemo-organotrophic	aerobic	Kampfer et al., 2007	Decrease in all levels
Nitrospira	Obligate chemolithotrophs that oxidize nitrite to nitrate and use carbon dioxide as sole carbon source, no organotrophic growth	aerobic	Ehrich et al., 1995	Decrease in the bottom saturated layer, increase in the 2 top layers
Roseiflexus	Grows photoheterotrophically under anaerobic light conditions and also Chemo-heterotrophically under aerobic dark conditions	Facultative anaerobic	Hanada et al., 2002	Decrease in the surface layer, increase in the 3 bottom layers
Steroidobacter	Reduces nitrate, growth on only a limited number of organic substrates.	Facultative anaerobic	Fahrbach et al., 2008	Increase in the 3 top layers
Devosia	Chemo-organotrophic	aerobic	Kumar et al., 2008	More in the surface level, decrease in the 3 bottom levels
Ohtaekwangia	Chemo-organotrophic	strictly aerobic	Yoon et al., 2011	More in the surface level, narrow decrease
Taibaiella	Chemo-organotrophic	strictly aerobic	Son et al., 2014	Decrease in all levels except the surface
Solibacter	Chemo-organotrophic, acid-tolerant nitrate and nitrite reduction Biofilm production by this species acts as an ecosystem engineer in the soil by enabling this species to adhere to its environment while also reducing	aerobic	GOLD CARD: Gc00446. Candidatus Solibacter usitatus Ellin6076. The Regents of the University of California. 2011	Increase in all levels of the mesocosm

	moisture and nutrient fluxuations in the soil environment under stressful environmental conditions			
Arthrobacter	Chemolithoautotrophic, oxidizes arsenite to arsenate (Prasad et al 2009) or chemoorganotrophic , degrading PAH (Kallimanis et al. 2009)versatile genus	aerobic	Prasad et al 2009, Kallimanis et al., 2009	Decrease in all the mesocosm
Haliangium	usually living in the surface layers of the soil, additionally inhabit decaying plant material, including rotting wood and bark, chemoorganotrophic, needs NaCl	strictly aerobic	Fudou et al 2002	Increase in all levels except the bottom saturated

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