Nitrogen 34 taxonomic groups and 211 distinct MAGs comammox nitrate reduction anammox oxidation nitrite oxidation fixation oxide oxide Thaumarchaeota Archaea Euryarchaeota Woesearchaeota **DPANN** Archaea CP Handelsmanbacteria CP Aminicemantes (OP8) Sericytochromatia, Tanganyikabacteria Firmicutes Chloroflexi Armatimonadetes Actinobacteria Gemmatimonadetes CP WOR-3 CP Zixibacteria Ignavibacteria Nb.of.genes Calditrichaeota Taxonmy Chlorobi 3 CP Eisenbacteria CP Ziwabacteria 2 **Bacteroidetes** Bacteria Kirimatiellaeota Verrucomicrobia Planctomycetes Planctomycetes (Phycisphaerae) CP Poribacteria Lentisphaerae Acidobacteria Nitrospirae **CP** Tectomicrobia CP Rokubacteria Deltaproteobacteria **CP** Hydrogenedentes Alphaproteobacteria non LD12 Betaproteobacteria Gammaproteobacteria nitrite_reductase_http amoA 7 hydrazine_oxidase_hzoA_hydrazine_synthase_hzsA_ Comammox nifa-Mo nitrite_oxidoreductase_nxrA_nitrite_oxidoreductase_nxrB nosD nosZ

Genes