The Biomass and Biodiversity of the Continental Subsurface Biosphere

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We have compiled ~1,800 measurements of microbial cellular abundances from over 170 published and unplublished data sets ranging in depth from 1 to 4,800 meters and distributed across all continents and a wide range of surface environments and subsurface geohydrological settings. Although the total cellular concentrations diminish with depth in core studies, the cellular concentrations of the planktonic communities vary little with depth. Analysis of this dataset in conjunction with global heat flow, mean annual air temperature and hydrogeological maps suggests that the continental subsurface biomass is comprised of $\sim 10^{16\text{-}17}$ grams of carbon. We have also compiled 121 bacterial and 60 archaeal 16S amplicon data sets based upon next generation sequencing platforms that have been published for 24 and 12 different sites, respectively. Analysis of these data sets, which are mostly based upon the planktonic biomass, have revealed distinct differences in the alpha and beta distributions of microbial communities at the phyla level. Some of this variation in part reflects different 16S primers being utilized in different studies and in part geographical distances between subsurface sites.