

## pH dominates variation in tropical soil archaeal diversity and community structure

### ABSTRACT

Little is known of the factors influencing soil archaeal community diversity and composition in the tropics. We sampled soils across a range of forest and nonforest environments in the equatorial tropics of Malaysia, covering a wide range of pH values. DNA was PCR-amplified for the V1-V3 region of the 16S rRNA gene, and 454-pyrosequenced. Soil pH was the best predictor of diversity and community composition of Archaea, being a stronger predictor than land use. Archaeal OTU richness was highest in the most acidic soils. Overall archaeal abundance in tropical soils (determined by qPCR) also decreased at higher pH. This contrasts with the opposite trend previously found in temperate soils. Thaumarchaeota group 1.1b was more abundant in alkaline soils, whereas group 1.1c was only detected in acidic soils. These results parallel those found in previous studies in cooler climates, emphasizing niche conservatism among broad archaeal groups. Among the most abundant operational taxonomic units (OTUs), there was clear evidence of niche partitioning by pH. No individual OTU occurred across the entire range of pH values. Overall, the results of this study show that pH plays a major role in structuring tropical soil archaeal communities.

**Keyword:** Archaeal communities; Land use; Pyrosequencing; Soil pH; Thaumarchaeota; Tropics