Disentangling the effects of enhanced nitrogen deposition and temperature on community composition of ammonia-oxidizing Archaea?

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The oxidation of ammonia is the first and often rate-limiting step in nitrification. While the genetic potential for this catabolic pathway is well known in Bacteria, it was but recently discovered in Archaea. Their role for the regulation of soil nitrogen dynamics is still poorly understood and often questioned. We examined the discrete and combined effects of nitrogen deposition and warming on the ammonia-oxidizing Archaeal (AOA) community by sampling fertilized soils of an in situ temperature gradient in Icelandic grasslands and subsequent molecular analysis of the archaeal amoA gene present. The results clearly demonstrate an interaction between the effects of increased temperature and N-deposition on distribution and abundance of amoA gene assemblages, indicating that studying these factors separately leads to a biased view on the effects on AOA communities. Furthermore, we find temperature levels to select for distinct AOA phylotypes as well as a stronger response of the communities to increased temperature than to N-deposition, hence suggesting a greater impact of temperature to niche differentiation amongst AOA.