



2019 PhD Proposal – China Scholarships Council and New Zealand – China Water Research Centre Joint PhD Programme Application

Information to be published on NZ – China Water Centre website if proposal is selected	
Project title	Importance of different ammonia oxidisers in soil in nitrate leaching and nitrous oxide emissions
Supervisors titles and names	Professor Hong J Di, ONZM, FRSNZ and Professor Keith Cameron, ONZM, FRSNZ
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Project outline Please outline the PhD project in 300 words (approx)	<p>The recent discovery of bacteria (known as comammox) that complete the nitrification process in a single step could transform our understanding of the nitrogen cycle in soils. Nitrification is a critical step in the terrestrial nitrogen cycle which affects two important environmentally sensitive nitrogen cycling processes: nitrate leaching and nitrous oxide emissions. Until recently, nitrification had been understood to involve a two-step process. We will use state-of-the-art molecular microbiological techniques to elucidate the distribution of comammox in soils; their community composition in different ecosystems; the niche environments that comammox bacteria prefer; and the sensitivity of the different ammonia oxidisers to nitrification inhibition. This systematic investigation of the importance, activity, and distribution of the newly discovered comammox microbes in relation to other ammonia oxidisers in the soil will uncover the relative importance of comammox relative to the canonical ammonia oxidising bacteria and archaea in the soil nitrogen cycle. The outcome of this research will advance understanding of the importance of comammox in nitrification in different ecosystems, ending a century-old oversight of comammox microbes. New knowledge about the significance of comammox to the nitrification process is urgently required to improve our understanding of the biogeochemical nitrogen cycle and for developing mitigating tools to reduce nitrate leaching and nitrous oxide emissions in terrestrial ecosystems.</p>

References for further reading (optional)	
Please indicate if research operational funding is available to support the project, and if so, the sources of funding.	The operational costs of this project will be funded by the New Zealand – China Water Research Centre.