Supplementary Table 1. BNR-capable organisms selected for targeted analysis

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| --- | --- | --- | --- | --- |
| AOB 1 | NOB 2 | AMX 3 | Chlorobi | Chloroflexi |
| *Nitrosomonas communis* | *Nitrobacter hamburgensis* | *Ca.* “Brocadia caroliniensis” 4 | *Chlorobi bacterium* NICIL-2 | *Chloroflexi bacterium* CSP1-4 |
| *Nitrosomonas cryotolerans* | *Nitrobacter sp.* Nb-311A | *Ca.* “Brocadia fulgida” | *Chlorobium chromatii* | *Chloroflexi bacterium* OLB13 |
| *Nitrosomonas eutropha* | *Nitrobacter winogradskyi* | *Ca.* “Brocadia sinica” | *Chlorobium ferroxidans* | *Chloroflexi bacterium* OLB14 |
| *Nitrosomonas sp.* AL212 | *Nitrospira bacterium* SG8\_3 | *Ca.* “Kuenenia stuttgartiensis” | *Chlorobium limicola* | *Chloroflexi bacterium* OLB15 |
| *Nitrosomonas sp.* Is79A3 | *Nitrospira bacterium* SG8\_35\_1 | *Ca.* “Jettenia caeni” | *Chlorobium phaeobacteroides* |  |
| *Nitrosomonas ureae* | *Nitrospira bacterium* SG8\_35\_4 | *Ca.* “Scalindua brodae” | *Chlorobium phaeovibrioides* |  |
| *Nitrosospira lacus* | *Nitrospira bacterium* SM23\_35 | *Ca. “*Scalindua profunda” 4 | *Chlorobium* *sp.* GBChlB |  |
| *Nitrosospira multiformis* | *Nitrospira defluvii* |  | *Ignavibacterium album* |  |
| *Nitrosospira sp.* NpAV | *Nitrospira moscoviensis* |  | *Melioribacter roseus* |  |
| *Nitrosococcus halophilus* | *Nitrospira* *sp*. OLB3 |  |  |  |
| *Nitrosococcus oceani* | *Ca. “*Nitrospira nitrosa” 4,5 |  |  |  |
| *Nitrosococcus watsonii* | *Ca.* “Nitrospira nitrificans” 4,5 |  |  |  |
| *Nitrosomonas europaea* | *Ca. “*Nitrospira inopinata” 4,5 |  |  |  |

1 AOB: (aerobic) ammonia oxidizing bacteria

2 NOB: nitrite oxidizing bacteria

3 AMX: anaerobic ammonia oxidizing bacteria

4 Manually added to custom expanded *nr* database

5 Complete ammonia oxidizers (CMX)