Understanding the Effect of Coastal Water Conditions on Bio-Based Ground Improvement Strategies for Mitigating Earthquake Hazards
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Background & Motivation
- Structures are at risk of bearing failure and flow slides by earthquake-induced liquefaction
- Our goal is to develop a cost-effective, sustainable solution for existing facilities

Microbially induced desaturation and precipitation (MIDP) via denitrification (dissimilatory nitrate reduction) has shown potential for liquefaction mitigation in the lab. How might the MIDP product and by-product formation change in the field?

Can we optimize our treatment recipe as we consider...
...competing biochemical processes?

...potentially inhibitory compounds?

...alternative electron donors and nitrogen sources?

Batch Model Development and Evaluation

Preliminary Model Results and Insights

Model Inputs
- Nitrate (mol L⁻¹)
- Sulphate (mol L⁻¹)
- Ammonium (mol L⁻¹)
- Nitrite (mol L⁻¹)

Model Products
- Nitrate (mol L⁻¹)
- Sulphate (mol L⁻¹)
- Ammonium (mol L⁻¹)
- Nitrite (mol L⁻¹)

Next Steps
- Include additional inhibition mechanisms
- Consider alternative electron donors and nitrogen sources
- Use model to conduct a life cycle sustainability assessment to develop a framework for applying MIDP in the field

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