Examples of Annotated Bibliography Entry

(Thank you to Emily Chua and Claudia Mazur for these examples)

Topic: Gas Fluxes from sediments

Fulweiler et al. (2007)

"Reversal of the net dinitrogen gas flux in coastal marine sediments"
Nature
BEAM: Method
Annotation:
Mesocosm experiment
3 treatments:

- 0X (no organic matter)
- ½X (four monthly aliquots of 6.25 g C m-2)
- 1X (four monthly aliquots of 12.5 g C m-2 → 50 g C m-2 total deposition approximates field conditions in 1970s

Core experiment
1 treatment:

- Replicated 1X treatment from mesocosm experiment

Rosentreter et al. (2021)

"Half of global methane emissions come from highly variable aquatic ecosystem sources"
Nature Geoscience
BEAM: Background
Annotation:

- Complied aquatic methane flux measurements to estimate global methane emissions from aquatic ecosystems to update previous estimates
- Methane emissions higher in:
    - Impacted vs. natural aquatic ecosystems
    - Freshwater vs. coastal ecosystems
- In coastal environments, reducing eutrophication should decrease methane emissions (Extended Data Fig. 3)
- Implications:
    - Aquatic methane emissions will probably increase due to eutrophication
    - Potential mitigation strategy: Management of nutrient and organic matter inputs

Topic: Impact of Acidification on Greenhouse Gases

Hopkins FE, Suntharalingam P, Gehlen M, et al (2020) The impacts of ocean acidification on marine trace gases and the implications for atmospheric chemistry and climate. In: Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences. The Royal Society Publishing

BEAM: Background
Keywords: Review, greenhouse gases, nitrous oxide, methane
Key Points:

- ***Varying impacts on N_2O:*** The direct influence of acidification on N_2O is poorly understood but there is greater insight into the impact on the processes of nitrification. Potential reduction of nitrification by 90% at a pH of 6.5 and inhibitory effects at 7.42. No relationship between OA and N_2O was observed in NW European shelf seas.

- ***Shift in NH3:NH4 equilibrium*** due to decrease in pH
    - Fulweiler found that nitrification rates increased with decreasing natural gradients of pH in Narraganset Bay due to changes in the microbial community in response to competition for NH4+/NH3+.
    - Nitrification may be influenced by OA directly via altered microbial physiology or community composition or by changes in the supply of organic material.
- ***Microbial flexibility:*** OA induced shift to ammonia oxidizing bacteria may alter N_2O production yet metabolic flexibility may provide adaptability with continued growth by coastal AOA at a pH of less than 6.
- ***Nitrification rates decreased:*** Generally, nitrification rates are decreasing thus the N_2O production is likely to decrease too
- ***Limited methane information:*** Possible cellular level impacts explained

Su X, Wen T, Wang Y, et al (2021) Stimulation of N2O emission via bacterial denitrification driven by acidification in estuarine sediments. Glob Chang Biol 27:5564–5579. https://doi.org/10.1111/gcb.15863

BEAM: Exhibition
Keywords: denitrification, nitrous oxide, microbial
Key Points:

- N_2O production was mediated significantly by bacterial denitrifiers, fungi but not chemo-denitrification.
- Acidification changes the keystone taxa of sedimentary dentirifiers from N_2O reducing to N_2O producing ones and reduced the electron transfer efficiency during denitrification.
- These findings provide novel insights into how acidification stimulates N_2O emission and modulates its pathways in estuarine sediments.

Breider F, Yoshikawa C, Makabe A, et al (2019) Response of N2O production rate to ocean acidification in the western North Pacific. Nat. Clim. Chang. 9:954–958

BEAM: Argument
Keywords: nitrification, water column, nitrous oxide, microbial
Key Points:

- Examine the response of N_2O production and nitrification to acidification in a series on water column incubation experiments.
- Even though nitrification rates remained stable or decreased, N_2O production increased suggesting the rates are probably uncoupled.
- Cultivated strains of AOB could reduce the sensitivity to pCO_2

Rees AP, Bange HW, Arévalo-Martínez DL, et al (2021) Nitrous oxide and methane in a changing Arctic Ocean. Ambio 1–13. https://doi.org/10.1007/s13280-021-01633-8

BEAM: Background
Keywords: methane, nitrous oxide, Arctic Ocean, microbial, social implications
Key Points:

- Present a current understanding of N_2O and CH_4 in the Arctic Ocean and its relevance to regional and global impacts
- Discuss two studies showing an increase in N_2O under acidification while another shows no relationship (Rees et al., 2016) thus the impact is equivocal.

- Breider et al., 2019 attributed differences in N_2O production to the relative sensitivities of microbial communities
- Thus no obvious response of N2O production under a changing climate

- Unaware of experimental evidence to suggest whether methanogenesis or methanotrophy show any sensitivity to changing conditions of ocean acidification.
  - This study indicates that CH_4 production and consumption are likely to prove resilient to OA in the AO.

Terrestrial

Berg W, Brunsch R, Pazsiczki I (2006) Greenhouse gas emissions from covered slurry compared with uncovered during storage. Agric Ecosyst Environ 112:129–134. https://doi.org/10.1016/J.AGEE.2005.08.031

BEAM: Exhibit
Keywords: nitrous oxide, methane, manure, acidification, terrestrial
Key Points:

- Lowering the pH values of manure slurries can reduce both methane and nitrous oxide emissions by covering with straw and acidifying.
- These conditions also reduce ammonia emissions