Greenhouse gas (CO_2, N_2O, CH_4) emissions from Llobregat (Barcelona) riverbed sediment: Effects of soil moisture and C, N, Fe substrates

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Nutrient input to river water from adjacent agricultural and industrial areas can create soil conditions suitable for greenhouse gas emissions. In this study, we report three major greenhouse gas; CO_2, N_2O and CH_4 emissions from riverbed sediments of Llobregat River, Barcelona. In a 45 day laboratory incubation experiment, we monitored the emissions from the sediments kept at three different soil moisture conditions- 40, 60 and 80% water filled pore space with added carbon, nitrogen and iron substrates. The treatments were DI + N, DI + N + organic C, DI + N + Fe, control with DI and no DI added. Gas and soil samples were collected after 0, 1, 2, 5,7, 10 days after the start of the experiment and then once every week. Gas samples were analyzed in a Gas Chromatograph equipped with TCD, ECD and FID detectors and soil extractants were analyzed for organic C and N. Results show that the soil had less then 1 mg per liter NH_4-N, which increased with the added C and N substrates but then decreased with time. This increased levels of C and N reflected in increased respiration, however both N_2O and CH_4 emissions remained low across all treatments in spite of the increase in C and N at all three different soil moisture conditions, which could be an indication of lack of indigenous methane-producing and denitrifying soil microbial populations.

Exploring the spatial and temporal complexity of the last interglacial sea level highstand

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The future response of Earth's remaining ice sheets remains the most uncertain and controversial aspect of sea level-rise projections. In this context, past climate and sea-level reconstructions present a valuable opportunity to gain insight about the response of the cryosphere to warmer temperatures. Although studies of the timing, phasing, and magnitude of sea level changes on glacial-interglacial timescales have long been studied, conventional paradigms of the dynamics of this process have come under new scrutiny. In particular, studies based on chronologies and proxies derived from corals, speleothems, deep sea cores and ice cores that probe the timing of peaks in sea level as well as the length of the assumed lag between insolation and sea level response are increasingly indicating that the polar ice caps may be more sensitive than previously thought—both in the timing, frequency, and magnitude of response [*e.g.*, 1,2].

The last interglacial period has received much attention in terms of understanding the sensitivity of ice sheets during warm climates, as much for its relevance to future climate conditions as for the accessibility of sea level indicators from this time period. New analyses of open-system U-Th age data of corals, of compilations of coral U-Th age-elevation data, and of absolute chronologies recorded by speleothems and corals are transforming our understanding of the dynamics of polar ice sheets during the last interglacial period. Of particular significance is the emerging consensus that sea level peaked somewhere around 6 to 9 meters above present [3,4], and experienced at least one if not more oscillations in sea level [5].

The state of understanding of the absolute timing, duration, and stability of the last interglacial sea level highstand will be reviewed, with particular consideration given to the unresolved complexities in the spatial and temporal signal of sea level from this time period.

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