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# Effects of Temperature increase on $N_2O$ Emissions from Intertidal Area along the East China Coast

**Shu Chen** and Dongqi Wang
East China Normal University, School of Geographical Sciences, Key Laboratory of Geographic Information Science (Ministry of Education), Shanghai, China (sheenacs@163.com)

Coasts and estuaries are key contributors to atmospheric nitrous oxide ($N_2O$) emissions. Here, we used laboratory incubation experiments to investigate temperature (12, 25, and 35 °C) and tidal effects on $N_2O$ fluxes in sediments sampled from three contrasting latitudinal subareas along the East China Coast (ECC) (North, Mid, and South). Overall, responses of $N_2O$ emissions to increasing temperature varied among the three climatic zones. During non-flood and flooding, mean $N_2O$ fluxes in sediments sampled from the North subarea increased exponentially with temperature (49.0 ±40.6 nmol $m^{-2}$ $h^{-1}$ at 12 °C to 3160 ±3960 nmol $m^{-2}$ $h^{-1}$ at 35 °C, and 741 ±518 nmol $m^{-2}$ $h^{-1}$ at 12 °C to 1020 ±1400 nmol $m^{-2}$ $h^{-1}$ at 35 °C, respectively). However, mean $N_2O$ fluxes in sediments sampled from the South subarea decreased at higher temperatures during flooding (977 ±306 nmol $m^{-2}$ $h^{-1}$ at 12 °C to 68.0 ±47.5 nmol $m^{-2}$ $h^{-1}$ at 35 °C) and non-flood (233 ±292 nmol $m^{-2}$ $h^{-1}$ at 12 °C to 183 ±142 nmol $m^{-2}$ $h^{-1}$ at 35 °C). Under ongoing global warming, intertidal areas at temperate may act as potential sources of $N_2O$, whereas the contribution of low latitude coastal sediments to $N_2O$ budget may decrease. In addition, there is a combined impact of temperature and tidal fluctuation on $N_2O$ emissions that controls $N_2O$ production and consumption. Our results improve understanding of the diverse feedbacks of $N_2O$ emissions from coastal area to global climate change.