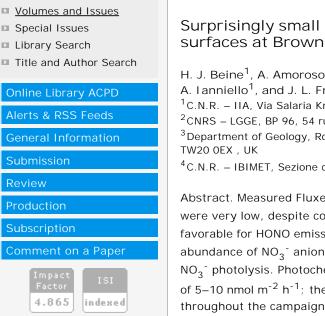
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Surprisingly small HONO emissions from snow surfaces at Browning Pass, Antarctica

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Abstract. Measured Fluxes of nitrous acid at Browning Pass, Antarctica were very low, despite conditions that are generally understood as favorable for HONO emissions, including: acidic snow surfaces, an abundance of NO3⁻ anions in the snow surface, and abundant UV light for NO3⁻ photolysis. Photochemical modeling suggests noon time HONO fluxes of 5–10 nmol $m^{-2} h^{-1}$; the measured fluxes, however, were close to zero throughout the campaign. The location and state of NO3⁻ in snow is crucial to its reactivity. The analysis of soluble mineral ions in snow reveals that the NO₃⁻ ion is probably present in aged snows as NaNO₃. This is peculiar to our study site, and we suggest that this may affect the photochemical reactivity of NO3⁻, by preventing the release of products, or providing a reactive medium for newly formed HONO. In fresh snow, the NO3⁻ ion is probably present as dissolved or adsorbed HNO3 and yet, no HONO emissions were observed. We speculate that HONO formation from NO3⁻ photolysis may involve electron transfer reactions of NO2 from photosensitized organics and that fresh snows at our site had insufficient concentrations of adequate organic compounds to favor this reaction.

■ Final Revised Paper (PDF, 1198 KB) ■ Discussion Paper (ACPD)

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