LABORATORY INVESTIGATION OF THE AIRGLOW BANDS

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We report the first high spectral resolution laboratory measurements of oxygen A-band night glow simulated using a static discharge cell. Our static discharge system reproduces the conditions of the mesospheric oxygen night glow - suggesting $O(^1D) + O_2$ as the primary source of the emission. Additionally, use of the static cell has enabled us to collect spectra for rare molecular oxygen isotopologues using isotopically enriched samples. The (0,0), (0,1), and (1,1) $b - X$ vibrational bands were observed with a Bruker 125 HR for all six isotopologues. The (1,2) and (2,2) bands were observed also for the main isotopologue. The frequencies of the observed (0,1) transitions resolved discrepancies in Raman data for (16-17, 17-17, and 17-18), enabling us to improve the vibrational parameterization of the ground electronic state in the global fit of Yu *et al.*[a] Rotationally resolved intensities were determined for the (0,0), (0,1) and (1,1) bands. The experimental band intensity ratios I(0,0)/I(0,1) = 13.6 and I(0,0)/I(1,1) = 60 are in excellent agreement with the recent mesospheric remote sensing data.

[a] S. Yu, C.E. Miller, B.J. Drouin, H.S.P. Müller, J. Chem. Phys. 136, 024304, 2012