

2-ND ABSTRACT:

CONTROL ID: 967827

TITLE: "ALTITUDE VARIATION" OF THE CO₂(V₂)-O QUENCHING RATE COEFFICIENT IN MESOSPHERE AND LOWER THERMOSPHERE

PRESENTATION TYPE: ASSIGNED BY COMMITTEE (ORAL OR POSTER) CURRENT SECTION/FOCUS GROUP: SPA-AERONOMY (SA) CURRENT SESSION: SA01. SPA-AERONOMY GENERAL CONTRIBUTIONS

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TITLE OF TEAM:

ABSTRACT BODY: AMONG THE PROCESSES GOVERNING THE ENERGY BALANCE IN THE MESOSPHERE AND LOWER THERMOSPHERE (MLT), THE QUENCHING OF CO₂(N₂) VIBRATIONAL LEVELS BY COLLISIONS WITH OXYGEN ATOMS PLAYS AN IMPORTANT ROLE. HOWEVER, THE K(CO₂-O) VALUES MEASURED IN THE LAB AND RETRIEVED FROM ATMOSPHERIC MEASUREMENTS VARY FROM 1.5 X 10⁻¹² CM³ S⁻¹ THROUGH 9.0 X 10⁻¹² CM³ S⁻¹ THAT REQUIRES FURTHER STUDYING. IN THIS WORK WE USED SYNERGISTIC DATA FROM A GROUND BASED LIDAR AND A SATELLITE INFRARED RADIOMETER TO ESTIMATE K(CO₂-O).

WE USED THE NIGHT- AND DAYTIME TEMPERATURES BETWEEN 80 AND 110 KM MEASURED BY THE COLORADO STATE UNIVERSITY NARROW-BAND SODIUM (NA) LIDAR LOCATED AT FORT COLLINS, COLORADO (41N, 255E) AS GROUND TRUTH OF THE SABER/TIMED NEARLY SIMULTANEOUS (±10 MINUTES) AND COMMON VOLUME (WITHIN ±1 DEGREE IN LATITUDE, ±2 DEGREES IN LONGITUDE) OBSERVATIONS. FOR EACH ALTITUDE IN 80-110 KM INTERVAL WE ESTIMATE AN "OPTIMAL" VALUE OF K(CO₂-O) NEEDED TO MINIMIZE THE DISCREPANCY BETWEEN THE SIMULATED 15 MM CO₂ RADIANCE AND THAT MEASURED BY THE SABER/TIMED INSTRUMENT. THE K(CO₂-O) OBTAINED IN THIS WAY VARIES IN ALTITUDE FROM 3.5 X 10⁻¹² CM³ S⁻¹ AT 80 KM TO 5.2 X 10⁻¹² CM³ S⁻¹ FOR ALTITUDES ABOVE 95 KM. WE DISCUSS THIS VARIATION OF THE RATE CONSTANT AND ITS IMPACT ON TEMPERATURE RETRIEVALS FROM 15 MM RADIANCE MEASUREMENTS AND ON THE ENERGY BUDGET OF MLT.

INDEX TERMS: [0300] ATMOSPHERIC COMPOSITION AND STRUCTURE, [3359] ATMOSPHERIC PROCESSES / RADIATIVE PROCESSES, [3300] ATMOSPHERIC PROCESSES, [3360] ATMOSPHERIC PROCESSES / REMOTE SENSING.