TROPOSPHERIC HUMIDITY DETERMINATION FROM LASER RADIATION RAMAN SCATTERING

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ABSTRACT

For tropospheric humidity determination a lidar using a ruby laser with a single pulse energy of 0.8 J and pulse length of 30 nsec was applied. By means of a KDP crystal the laser radiation frequency was doubled, the conversion efficiency being very low 1.5% - 2%. The radiation was received by an optical antenna with a 0.5 m diameter of the mirror and a 1.5 mrad angle of the field of view. The interference filters with a halfwidth of about $\sim$ 20 Å allowed to detect backscattered signals at Raman wavelengths of 3975 Å H_2O and 3777 Å N_2. The profile of N_2 was estimated for standard atmospheric conditions. The conducted measurements permitted to obtain water vapour profiles up to a 1.5 km altitude with spacial resolution of 150 m. The data of simultaneous water vapour measurements by means of a ground-based psychrometer coincide with the laser sounding results.