TECHNICAL PROGRAM
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ABSTRACT DIGEST

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LIDAR TECHNIQUES APPLIED TO REMOTE DETECTION OF CHEMICAL SPECIES IN THE ATMOSPHERE

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ABSTRACT

Laser remote sensing techniques provide opportunities for measuring primary natural atmospheric species and can be used to detect several of those extraneous or foreign species introduced into the atmosphere by various means. In recent years, interest has developed in detecting lower concentration levels of various species for air pollution monitoring and for warnings of the presence of strange or hazardous chemicals. Current capabilities are examined for various approaches using remote sensing techniques to measure concentrations of a wide range of chemical species. Our efforts and those reported by several other laboratories for development of various applications of Raman and DAIL lidar techniques to measure atmospheric species during the last thirty years are summarized. New optical devices and improved electronics are leading to advances in these lidar instruments and expanding our measurement capabilities. The recent advent of femtosecond lasers and their use with photonic crystal fibers to generate white-light sources have opened new opportunities for monitoring chemical species. These white-light laser sources open the possibility of applying the well-developed science of hyperspectral remote sensing to new measurements of path concentrations of molecular species while using a controlled radiation source, instead of sunlight. Advances in the traditional techniques and several new opportunities for remote detection of various molecular species in the atmospheric gases are considered. Recent results, simulations and calculations are used to describe current capabilities. Several new techniques are considered that are expected to expand future instrument performance and result in new capabilities for laser remote sensing.