

An all-solid-state transportable narrowband sodium lidar for mesopause region temperature and horizontal wind measurements

C. She (1), J. Vance (1), T. Kawahara (2), B. Williams (3), Q. Wu (4,5)

1. Department of Physics, Colorado State University, Ft. Collins, Co, USA
2. Faculty of Engineer, Shinshu University, Nagano, Japan
3. Colorado Research Associates, Boulder, Co 80305, USA
4. High Altitude Observatory, National Center for Atmospheric Research, P. O. Box 3000, Boulder, Co 80307-3000, USA (qwu@ucar.edu /phone 303 497 2176)
5. Laboratory for Space Weather, Chinese Academy of Sciences, P. O. Box 8701, Beijing, China 100080

An all-solid-state narrowband sodium lidar transmitter based on proven technologies is proposed. These technologies consist of the sum frequency generation of 589 nm coherent radiation with pulsed solid-state Yag lasers at 1064 nm and 1319 nm, developed and employed in laser guided star applications and in lidar measurements of mesopause region temperatures by Shinshu University, the Doppler-free spectroscopic seed control developed by the Colorado State University and employed in a lidar system with hybrid solid-state and dye technologies for mesopause region temperature and horizontal wind measurements, and the low-power continuous wave sum frequency generation tunable around 589 nm developed by the University of Nevada. The combination of these mature technologies, deployed along with sodium-vapor Faraday filters, also developed by the Colorado State University, is a proposed all-solid-state sodium fluorescence lidar, capable of measuring mesopause-region temperature and horizontal wind on 24-hour continuous basis, weather permitting. The integration of all proven solid-state technologies makes this proposed lidar suitable for mobile deployment and remote operation.