



Development of a solid-state sodium Doppler lidar using an all-fiber-coupled injection seeding unit for simultaneous temperature and wind measurements in the mesopause region

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We present a solid-state sodium (Na) Doppler lidar developed at YanQing Station, Beijing, China (40°N, 116°E) to achieve simultaneous wind and temperature measurements of mesopause region. The 589nm pulse laser is produced by two injection seeded 1064nm and 1319nm Nd:YAG pulse lasers using the sum-frequency generation (SFG) technique. An all-fiber-coupled seeding laser unit was designed to enable absolute laser frequency locking and cycling the measurements among three different operating frequencies. Experimental observations were carried out using this Na lidar system and the preliminary results were described and compared with the temperature of the Sounding of the Atmosphere using Broadband Emission Radiometry (SABER) and the horizontal wind of the meteor Radar, demonstrating the reliability and good performance of this lidar system. The all-fiber-coupled injection seeding configuration together with the solid-state Nd:YAG lasers make the Na Doppler lidar more compact and greatly reduce the system maintenance, which is conducive to transportable and unattended operation.