Acousto-optic frequency shifter experiments for the new high power sodium temperature lidar

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The capability of our new sodium lidar has a laser output power of more than 4 W which is 20 times of the current system, and it enables us to measure temperature with extremely high special and temporal resolution (dH˜100 m, dt ˜5 minutes). To make such a high temporal resolution measurements, the fast frequency shift technique is necessary for measuring temperature in the Mesopause region. Currently the frequency shift in the Doppler-broadened Na D2 line is done by controlling the temperature of the crystal in the seed laser and it takes at least 30 seconds to lock to the another frequency. The new plan is to use an AO (Acousto-optic) frequency shifter which makes the shift from the one to another by individual laser pulse shots. In this presentation, we show the whole plan of bland-new sodium lidar system and the experimental results using the AO frequency shifter.