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Studying the Upper Atmosphere Using a Sodium LIDAR

ZACHARY BUTTERFIELD, BRETT BOSTROM, TITUS YUAN, Utah State University — Studying the mesopause region of the atmosphere (between 80 km and 105 km) is important when trying to understand atmospheric turbulence and global temperature change in the upper atmosphere. A Sodium LIDAR system can be used to generate laser induced fluorescence by Na atoms that are naturally present in this region of the atmosphere. The LIDAR system at Utah State University was designed in such a way that its laser pulses are not only narrow band (120MHz FWHM) but also strictly frequency controlled ($\pm \sim 1$ MHz), and therefore can measure the profiles of temperature and horizontal wind velocity, as well as sodium density. The mesopause seems to have two distinct levels in its thermal structure and, opposite from intuition, is cold during summer months and warm in the winter.¹ Through the observations of Sodium LIDAR over the past few decades, a much better understanding of this area of the atmosphere has been gained. However, in order to better understand certain phenomena that occur or to make any reliable inference on climate change more data are needed.

¹C. Y. She and D. A. Krueger, Optics and Photonics News **18** (9), 35-41 (2007).

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