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Imaging mesospheric winds using the Michelson Interferometer for Airglow Dynamics Imaging (MIADI)

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The Michelson Interferometer for Airglow Dynamics Imaging (MIADI) is a ground based optical instrument designed to obtain two dimensional images of the line of sight Doppler wind and irradiance field in the mesosphere. The intention of the instrument is to measure the perturbations in the airglow due to the presence of gravity waves. In its current configuration, the instrument observes a ~ 80 km x ~ 80 km region of the night sky in ~ 33 minutes using the O(1S) emission at 557.73 nm and the OH (6, 2) P1 (2) emission at 839.918 nm. The instrument was installed and tested at a field site outside Fredericton, NB (45.96 N, 66.65 W) during the summer of 2014. Successful measurements over a six hour period were obtained on July 31, 2014. Variations in the meridional and zonal wind were observed that are consistent with a semi-diurnal tide with an amplitude of ~ 35 m/s. Smaller scale variations (< 10 m/s) were also observed that indicate the presence of gravity waves. In this paper, the instrument concept will be presented and the results from the field measurements will be discussed.

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