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Fabry–Perot interferometer as a solar background noise suppressor: application to daytime lidar

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Abstract

Continuous atmospheric probing by a lidar is a requirement for many applications. However, due to high solar background noise during the daytime, lidar operations are mostly restricted to night-time. While many techniques are in practice, like reducing the receiver field of view, changing the view angle, introducing a narrow band Interference Filter (IF), these are applied to circumvent problems, rather than to suppress the noise. Using a Fabry-Perot interferometer as a narrow passband filter for solar background noise suppression is a known technique, and its potential is exploited in our system. An optical-fiber-coupled lidar system with its transmitter injection seeded was developed and has been operated during the daytime at Gadanki (13.6°N, 79.2° E). The signal-to-noise ratio of the return signal is used as the performance indicator, to evaluate the improvements. Signal-to-noise ratios with and without the Fabry-Perot interferometer are measured with near identical test set-ups. The signal-to-noise ratio enhancement factor is ca. 4, in agreement with the theoretical value. The performance is compared when the receiver fields of view are changed.

Keywords

Lidar; Atmosphere; Daytime

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References

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