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– An autonomous middle atmosphere lidar in southern Argentina

The Compact Rayleigh Autonomous Lidar (CORAL) is a high-power Rayleigh backscatter lidar designed for profiling the middle atmosphere and studying gravity waves from the troposphere to the mesopause region at around 90 km altitude. It was deployed to Rio Grande, Tierra del Fuego, Argentina in November 2017 and has since then collected more than 1300 h of high-resolution data. Using local weather data and forecasts, the lidar operates autonomously and measurements are obtained on average on two out of three nights. The region of Tierra del Fuego is known for the largest stratospheric gravity wave activity on Earth, where gravity waves are excited by strong zonal winds crossing the Andes mountains. Average potential energy densities of 60 J/kg at 40-50 km altitude are reached during winter, and significantly higher values are observed during intermittent extreme gravity wave events. We present the lidar instrument technology, measurement statistics, an overview of the temperature and gravity wave datasets and selected examples of large-amplitude mountain waves.

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