

Lidar Ozone and Temperature Profiles with Satellite Validation at mid-latitude Station (51.5 °S, 69.3 °W), Southern Hemisphere: Results and a retrospective

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Abstract: The long-term evolution of stratospheric temperature and ozone at a mid-latitude station is investigated in the Southern Hemisphere through a ground-based instrument installed in Río Gallegos, Argentina (51.5° S, 69.3° W). A total of 302 Rayleigh Lidar measurements observed for the period 2005 – 2015 are compared with multiple satellite platform (MLS, COSMIC, SABER), data reanalysis and ground-based instrumental as Brewer and SAOZ. Rayleigh Lidar data were collected during all years considering the non-intensive period (January-July) and intensive period (August-December) during the polar vortex overpass. The profiles retrieved cover the range 15-60 km for temperature and 15-40 km for ozone.

Data from different satellite platforms (SABER, MLS, COSMIC), radiosounding and reanalysis are used to correlate observations and evaluate potential biases in the Rayleigh Lidar temperature profiles. The spatio-temporal criteria for inter-comparison is $\pm 2^\circ$ in latitude, $\pm 5^\circ$ in longitude and ± 12 hr respect to the mean time Rayleigh Lidar observation. An average relative difference in the range 15-25 km ~ 2.5 % with all platform satellite is shown due to stratospheric aerosols. Corrections on Rayleigh Lidar signals are applied and comparison is done again to evaluated aerosols impacts. The results showed good agreement without relative drifts at range affected by stratospheric aerosols. Three in-situ comparison between Lidar and radiosoundings are also done. The campaign denominated **O**Zone profile a**T** Rio Galleg**O**S (OZITOS) was conducted at the Atmospheric Observatory of the Southern Patagonia (OAPA) during March 2010 and 2011 and October 2014 with a total eleven ozonsondes. Results show good correlations coefficient (CC's) between sondes and Lidar at fixed altitude range: 15-18, 18-21, 21-24 and 24-27 km. Finally new lines of research such as Gravity Waves through Lidar and Airglow cam are presented as well the potentialities of the site for the scientific community.