The UVO$_3$ Patagonia Project

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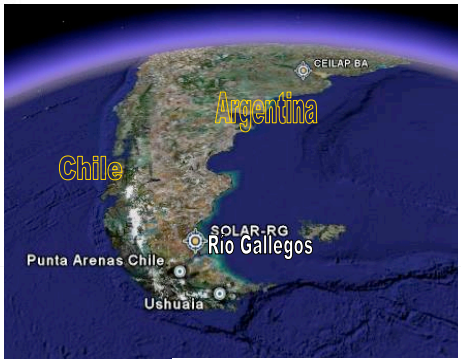
Abstract

Since October (middle) 2007, Argentina and Chile with the financial support of JICA, has joined scientific efforts to develop the UVO3 Patagonia project, following the SOLAR campaign (2004-2007). It has as main objectives monitoring ozone and UV radiation and other atmospheric parameters, in southern Patagonia. The Laboratorio de Ozono y RUV (LabO3RUV) of the Universidad de Magallanes, located in Punta Arenas, Chile (53.03 S , 70.85 W) and the CEILAP (CITEFA-CONICET) located in Río Gallegos, Argentina (51.6 S,69.3 W), far 200 km from the first one, are the execute Institutions (laboratories) of this project.
Brewer spectrophotometer and UV radiometers (LabO3RUV) and a differential absorption lidar (DIAL), a backscattered Raman Rayleigh lidar, an AERONET (NASA) Cimel, a SAOZ spectrometer and other UV radiometers (CEILAP), are between the principal instruments involved in this project, devoted in the measurement of total ozone column and surface UV irradiance and ozone number density profiles between 14 – 45 km range, and also aerosols and water vapour (profiles and columns). Monitoring the ozone hole overpasses on high inhabitant cities as Punta Arenas and Río Gallegos and the stratospheric polar vortex dilution process are reported in this paper as examples of geophysical products that are produced in this project. It will be held between 2007 and 2011.

UVO$_3$ PATAGONIA

http://uvo3patagonia.blogspot.com



Instrument Capabilities in Río Gallegos and Punta Arenas Sites

#Instruments in Punta Arenas Site

Instrument	Model	Spectral Range
Differential Absorption Lidar	Made in Home	Emitted Wavelength 308 and 355 nm. Received 308-355-332-387
Backscatter Aerosol Lidar	Made n Home	Emitted Wavelength 1064, 532, 335 nm
Narrow band UV Radiometer (#)	GUV-511 Biospherical Inst. Inc	305, 320,340 y 380 nm PAR
Narrow band UV Radiometer	GUV-541 Biospherical Inst. Inc.	305, 313, 320,340 y 380 nm
Broadband UV-A Radiometer	YES – Model UVA1	315nm-400nm
Broadband UV-B Radiometer	YES – Model UVB1.	280nm-320nm
Broadband UV-B Radiometer (#)	SOLAR LIGTH 501	280 – 320 nm
Pyranometer	Kipp & Zonen Holland	305nm- 2800nm
SAOZ instrument	Made by CNRS-France	UV – Visible DOAS
Brewer Spectra Photometer (#)	MK III (SN 180)	290 -360 nm Spectral
Brewer Spectra Photometer	MK IV (SN 124)	290-360 nm Spectral
Solar Photometer	CIMEL	1200,940,870,670,500, 440, 380,340 nm

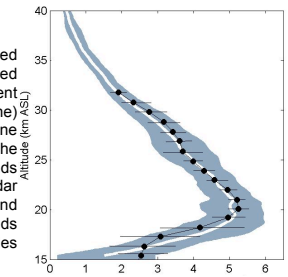
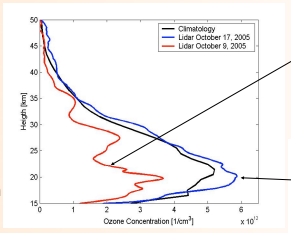


Figure 2

Comparison of averaged ozone profiles obtained from 5 quasi coincident ECC sondes (dotted line) and averaged lidar ozone profile (white line). The shadow area corresponds to +/- 1s of lidar measurements and horizontal line corresponds to +/- 1s of sondes

The stronger reduction of ozone column over Rio Gallegos for 2005 was produced at October 8 with total ozone column of 196 DU. The lidar profile measured for this day is showed in Figure 1 (red line) together the ozone profile measured at October 17 (blue line) witch correspond to normal ozone conditions outside ozone hole (357 DU). Also in this figure the climatologic profile (black line) of SAGE II measurements is showed.



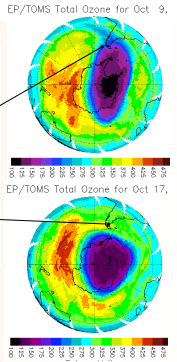


Figure 1

As part of common activities between two labs, different inter comparisons were made.
A set of five quasi-coincident sondes launched in Punta Arenas and lidar measurements in Río Gallegos were found in the September – October period. This is spring time in South Hemisphere and the ozone hole can have a strong influence in the shape of measured ozone profiles at this latitude, in case of overpass of the polar vortex over the station at some altitude level. For that reason the ozone profiles measured with sondes in Punta Arenas can show differences with lidar profiles taken in Río Gallegos. To avoid differences between both measurements because they are sensing different air masses, the selected measurements for coincidence were chosen when both sites were outside the polar vortex. Figure 2 shows the averaged ozone profiles obtained from 5 quasi coincident ECC sondes and DIAL lidar ozone measurements.With the purpose of increasing the number of comparisons between the lidar and other measurement methods at Rio Gallegos, we compare the integral of lidar profiles with total ozone column measured with spectrophotometer Brewer MKIII-180 deployed in Punta Arenas, Chile (Figure 3).
We plan to continue with common measurements during next years joining instruments and research capabilities to increase the monitoring and understanding of ozone hole situation in South Patagonia.

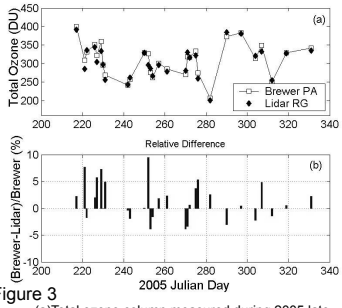


Figure 3

(a)Total ozone column measured during 2005 late winter spring with Brewer spectrophotometer in Punta Arenas and calculated from lidar profile. (b): Relative difference (Brewer-Lidar)/Brewer

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