

## EXTREME OZONE HOLE DEPLETION ON OCTOBER 06, 2003, OVER THE BRAZILIAN ANTARCTIC STATION

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### Abstract

During the Spring of 2003, a field campaign was organized to measure the vertical distribution of ozone at the Brazilian Antarctic Station, on King George Island (62.1° S; 58.4° W). The Electrochemical Concentration Cell, ECC sonde technique was used, launched on balloons. 20 successful ozone soundings were obtained during September and October. Several of these soundings showed severe depletion of stratospheric ozone, mostly in the lower stratosphere, which reached a maximum on October 06. During this period the total column ozone and the UV-B radiation were also measured daily with a Brewer spectrophotometer. The UV-B radiation reached an index of 9.9, the largest ever recorded at this location and the total ozone content varied considerably: between 121 Dobson Units (DU) on October 06 and 391.6 DU for November 03.

### Introduction

Launching ozonesondes on balloons is a well known technique (Kirchhoff et al., 1991) of obtaining the vertical profile of ozone in the trop and stratosphere. A series of ozone profiles were obtained using the Electrochemical Concentration Cell (ECC). The technique has been used extensively in Antarctica (Kirchhoff et al., 1997a,b,c) to document the vertical position of the ozone hole, which is not perceived by ozone integrating instruments (Dobson, Brewer, Toms). The Mark IV Brewer spectrophotometer measured O<sub>3</sub> (Direct Sun, DS and Zenith Sky, ZS), NO<sub>2</sub>, SO<sub>2</sub> and UV-B radiation. Here we present only the daily total column ozone averages for direct sun (DS).

### Results

The 2003 measurement campaign started the sonde launchings in early September and finished in October, obtaining a total of 20 vertical ozone profiles, but the Brewer was operational through December 10. We emphasize the one ozone profile which had the maximum ozone depletion of the 2003 campaign, a condition that was not surpassed in previous campaigns (1996, 1997, 1999,2001). Over the Brazilian Antarctic Station, the ozone hole condition started August 25 and lasted until October 15, with minimum total ozone showing during 16 consecutive days (September 19 to October 12). The minimum ozone value observed by Brewer and ozonesonde was 121 DU for October 06.

Fig. 1 shows a composite of the vertical profile of the severe ozone hole of October 6, plus a "normal" profile shown for comparison, obtained on October 20. The second panel shows the ozone integrals measured by a Brewer spectrophotometer, plus the ozone integrals from vertical soundings, shown

with x sign. The UV-B index observed on this day was 9.9 and the ozone was 121 DU measured with the Brewer spectrophotometer.

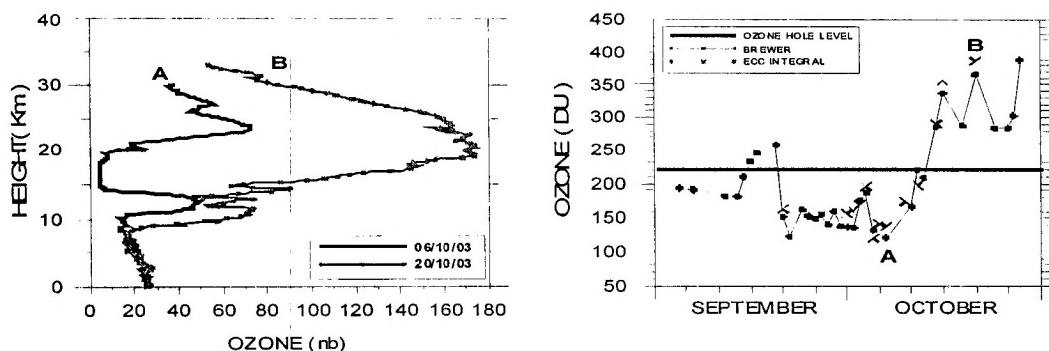


Fig. 1. The first panel shows two ozone profiles obtained using ozonesondes at the Brazilian Antarctic Station during 2003, one showing a severe ozone hole condition (continuous line A, October 6), and a "normal" profile (dotted line B, October 20), shown for comparison. The second panel shows the time variation of total ozone, and the days with ozonesonde launches. A and B show the days of the profiles shown in the first panel.

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