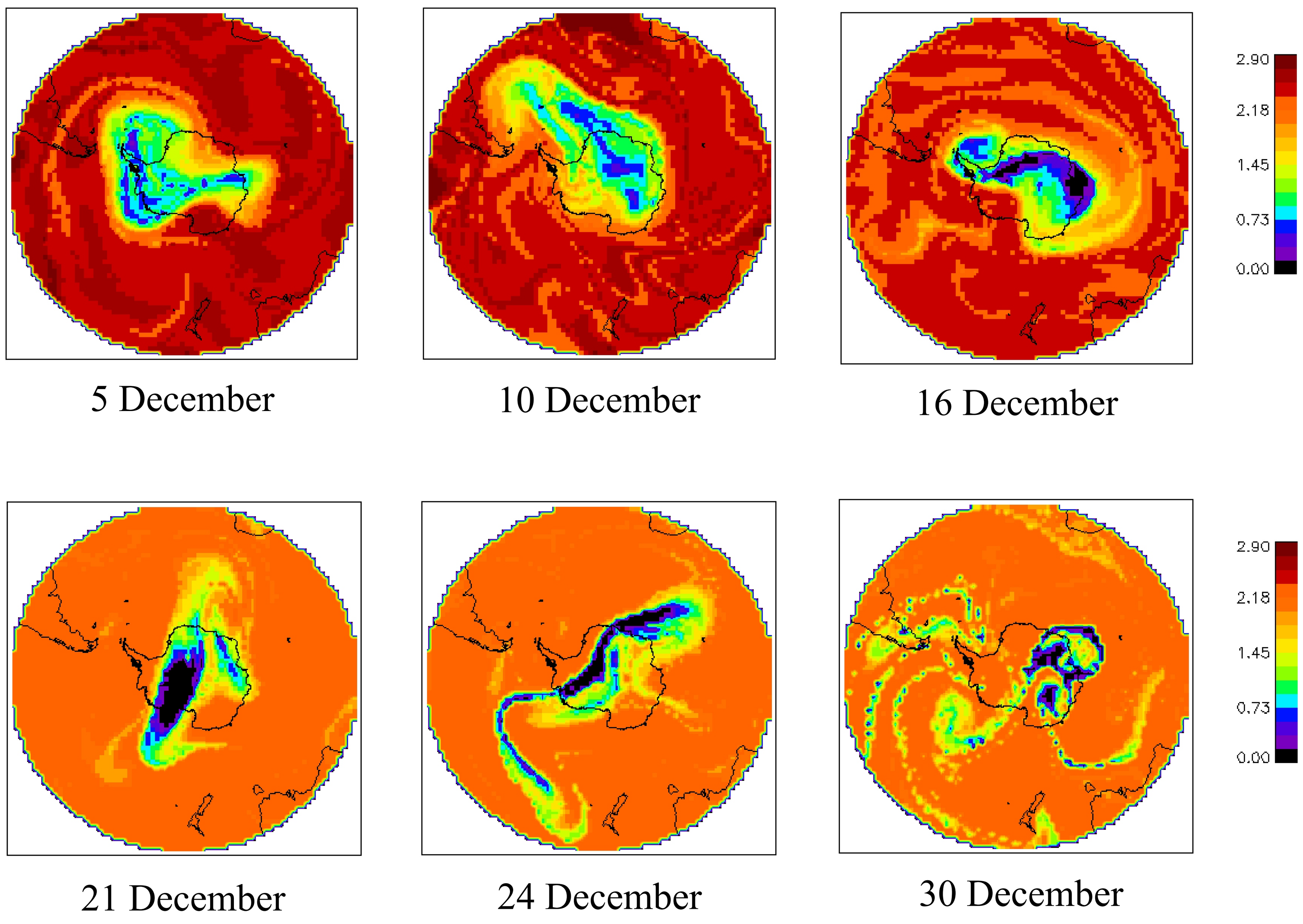


Figure 8: Polar stereographic (30-90 S) high-resolution proxy ozone images on the 500 K isentropic surface for six selected days in December 1998.

## Ozone change over New Zealand

The study of combined influence of natural and anthropogenic effects was based on the comparison of high-resolution proxy ozone with the mean ozone in the New Zealand region over two weeks prior to the breakdown. The reduction in ozone was integrated over all air parcels originating in the vortex, with an assumed 50 K layer thickness. The analyses were done for seven layers, centred between 400 and 700 K, and for the years 1998, 1999 and 2000.

Figure 9 shows the ozone reduction, as percent of the average pre-breakdown ozone levels, over New Zealand. The impact was the greatest in the layers shown (centred around the isentropic surfaces of 550 and 600 K), especially for the year 1998, when it amounted to more than 30 % in the 550 K layer.

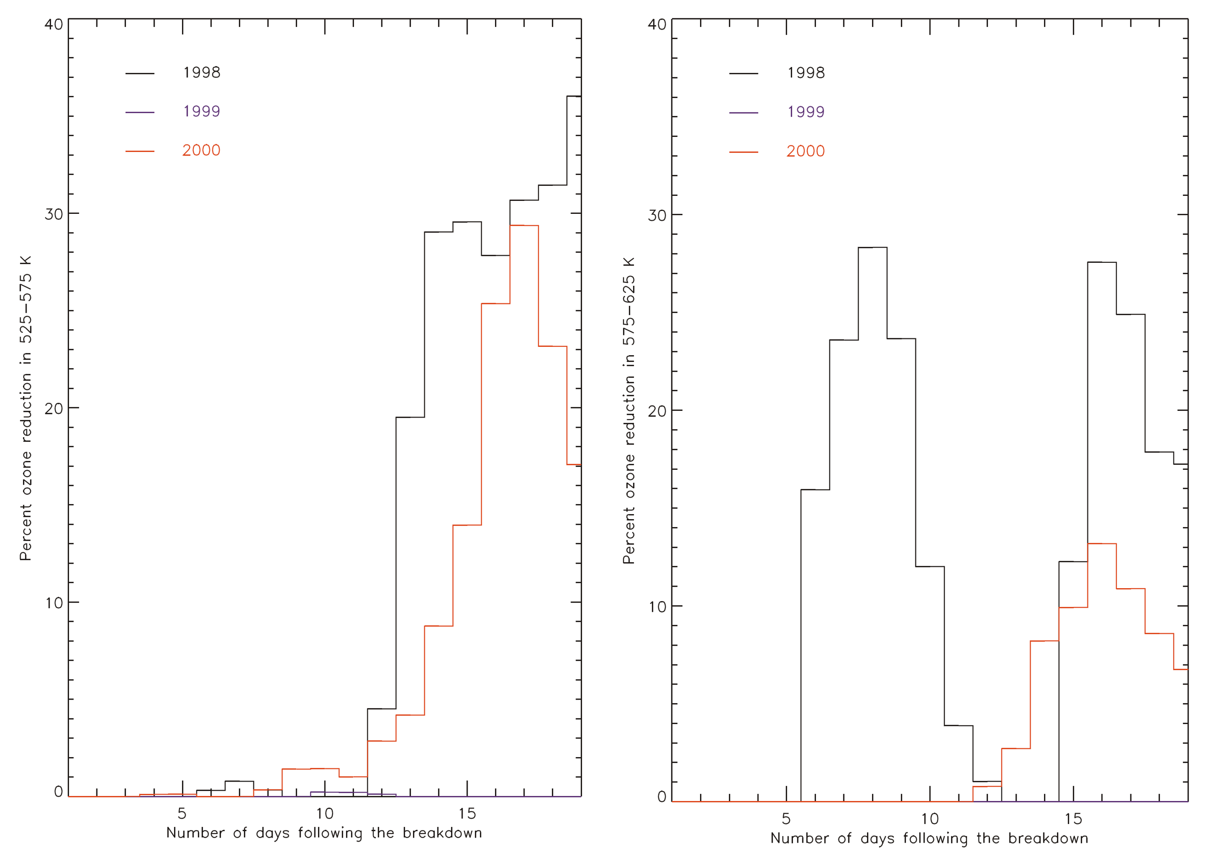


Figure 9: Ozone reduction in the years 1998, 1999 and 2000, over the New Zealand region (as percent of average pre-breakdown ozone levels) centred around two isentropic surfaces of 550 and 600 K.

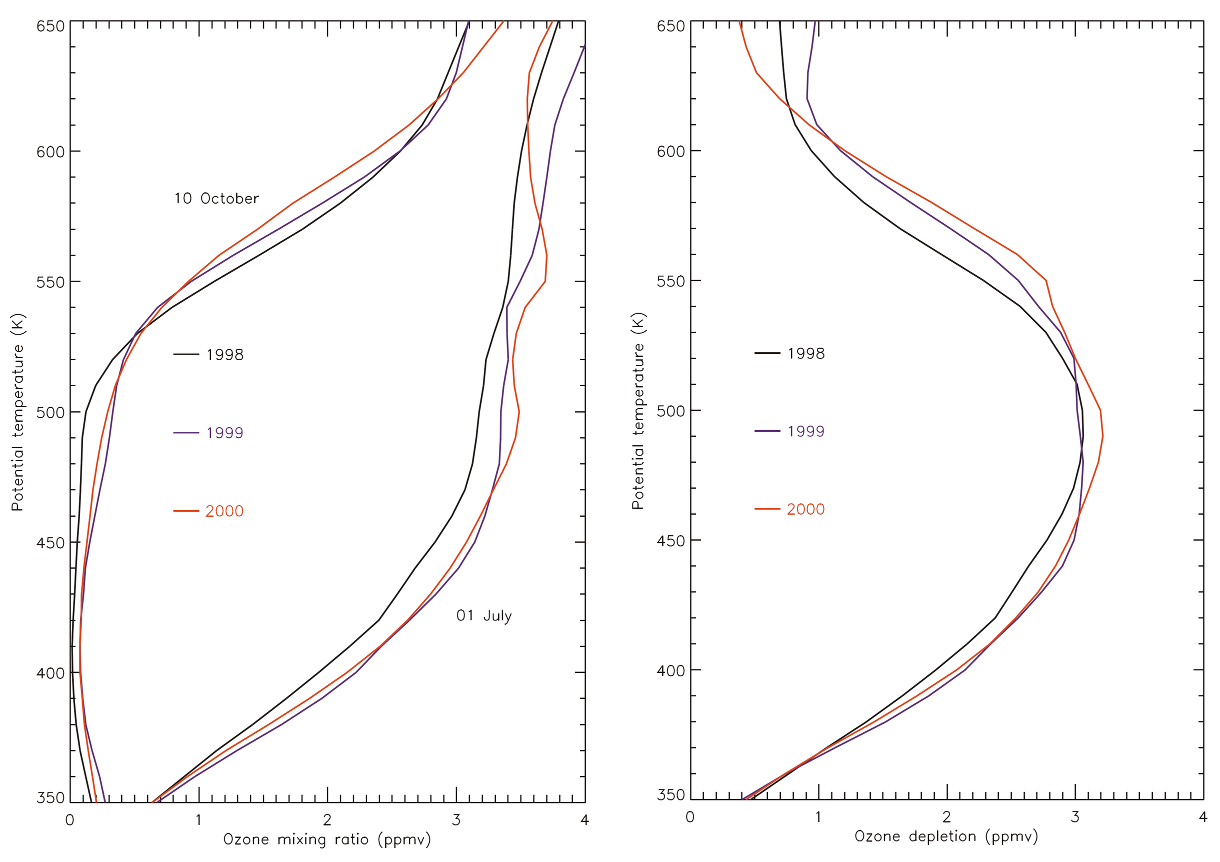


Figure 10: The vertical profiles of ozone, on 1 July and 10 October, and ozone depletion for the years 1998, 1999 and 2000.

## Antarctic ozone depletion

Ozone loss within the Antarctic vortex for the years 1998, 1999 and 2000 was estimated using POAM III data combined with calculations of diabatic cooling (Hoppel et al., 2001.). It was assumed that the ozone depletion processes started after 1 July and that the ozone loss reached its maximum on 10 October. Hence, the depletion was calculated by subtracting the vertical ozone profiles on 1 July and 10 October, after they were adjusted vertically to account for descent (Figure 10). In all the years, the depletion peaked around the 500 K potential temperature surface. Although the depletion was most severe in 2000, the ozone abundance in the spring of 1998, between isentropic surfaces of 350 and 550 K, was less than in the spring of 2000.