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THE EFFECT OF SURFACE AIR ADVECTION IN DETERMINING COOL AND WARM YEARS IN THE NORTH OF THE ANTARCTIC PENINSULA

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Time: Sometime between Friday 11 June 16:00 and 17:30
theme: Theme 2. Past, present and future changes in Polar Regions
session: T2-2 Troposphere and stratosphere dynamics and processes and their links with climate
event: Poster session PS3 - Section C
location: Hall C

This paper explains the difference between marked warm and cool years in the north of the Antarctic Peninsula as a result of variations in the regional circulation pattern.

The observational period of 2006-2009 was analyzed using Ferraz station at King George Island (WMO #89252, ~62°S, ~58°W; http://antartica.cptec.inpe.br) as primary data source. Regarding the average air temperature of -1.7°C for the last 30 years, 2006 and 2008 were above it, with -0.8 °C and -0.7 °C, while 2007 and 2009 had -3.1 °C and -2.6 °C, respectively. Four variables acquired every hour were used in the analyses: air temperature, total incoming radiation, wind direction, and precipitation.

Daily maxima and minima temperatures only coincided with the period of higher solar elevation in less than 30% of the days; a similar amount occurred in the first or last hour of the day, thus indicating that the temperature cycles depend more on the air masses that prevail a few consecutive days in the region. In the cool year of 2007 25% of the maxima occurred at the end of the day, against 15% in the warm year of 2006. The total incoming radiation was ~8% smaller in the cold years, what was interpreted as resulting from clearer skies and stronger radiative heat loss. Winds originating from the cold sector (E, SE and S) accounted for 22% and 29% in 2006 and 2008, and 36% and 34% in 2007 and 2009, respectively, also confirming that the average temperatures depend on the origin of the air masses. Cumulative precipitation was about 450 mm in the warm years of 2006 and 2008, and 150 mm and 235 mm in 2007 and 2009, respectively; this also indicates differences in the air masses for the warm and cool years, since the precipitation tends to be higher with the relatively warm and moist air from the W-NW-N sector.

The north of the Antarctic Peninsula is as a region of strong weather and climate variability, as well as a key hot spot in climate change. Our results indicate that the annual variations in air temperature can be of a few degrees, and that changes in the regional tropospheric circulation should be looked upon as explaining such oscillations.