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Meteorological profiles comparison from global models and experimental radiosoundings at the Antarctica station of Belgrano

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Ozonesoundings are launched from Antarctic Belgrano station (77.87S, 34.62W) since 1999 in the framework of an extensive stratospheric trace-gas measurement program. In the frame of VIOLIN (Extended Vertical Investigation of the Ozone Layer In ANtarctica) project and as a previous step in the application of meteorological models, a comparison-validation exercise has been carried out using simulations and experimental profiles. The aim is to assess the reliability of the meteorological files obtained from global models which could be used as input data in models of higher spatial resolution. Meteorological profiles (potential temperature, relative humidity, wind speed and direction) have been obtained from ECMWF and NCEP-GDAS models with a spatial resolution of 1ºx1º and 14 vertical levels from 950 to 500 mb. The simulated profiles have been compared with in situ soundings at Belgrano. A total of 83 soundings covering the period from 2009 to 2010 have been used. Data have been grouped in three period's: diurnal, nocturnal and transition diurnal-nocturnal or vice versa. The comparison has been performed with the statistical root mean square deviation (RMSD) and BIAS for the four meteorological variables. Results show that potential temperature using both models and wind speed with NCEP-GDAS are underestimated while the rest of parameters are overestimated. The RMSD of the potential temperature ranges between 1.7 and 3.2 ºC with a BIAS of -0.18 to -0.74 ºC. No differences were found according to the time of the year. The relative humidity analysis shows a RMSD between 21.4 and 30.2 % while the BIAS was ranging from 9.9 to 14.8 %. Best results have been obtained in the transition period. For the wind speed the RMSD oscillate between 2.9 and 4.9 m/s with a BIAS from -0.35 to 0.31 m/s. The wind direction is the parameter with the highest differences, RMSD between 68 and 104º, with a BIAS from 34 to 62º. The highest differences have been found for the diurnal period. According to the results obtained with these simulated and experimental profiles of Belgrano and applying RMSD and BIAS, the profiles obtained with ECMWF model show lower differences than NCEP-GDAS.