



Single and multiple tropopause events as GPS, radiosonde and reanalyses data reveal: a comparison in the Southern Hemisphere

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Several global climatologies for temperature structure and tropopause parameters in the tropics and extra-tropics regions, based on radiosonde, remote sounding and reanalyses model have been studied in last years due to their relevance as a key feature of atmospheric structure and an all understanding troposphere-stratosphere exchange. The results show that for the almost all the longitude – latitude analysed, radiosonde observations present a very good agreement at tropical region, even for mid-latitudes, when are compared with data derived from remote sounding and reanalyses. Notwithstanding, this comparison in extra tropics region, especially at high latitudes, very often present substantial differences and biases while latitudes increases, which relapses on the variability of temperature profiles, location and trend of the tropopause. The aim of this work is to analyse temperature profiles and structure derived from the GPS occultation experiment on board the CHAMP and SAC-C satellites and monthly means ERA40 reanalysis during 2001-2003, when are compared with nearby radiosonde over Southern Hemisphere. For a detailed description we focus on a set of twenty five stations distributed along latitudes between 0° - 90° Southern three latitude bands, thirty degrees wide each (low, medium and high latitudes).

Statistical comparison of the profiles obtained indicates a good agreement at latitudes near the tropics while the biases between three methods increases as latitudes are

around the Pole. Moreover, for each station studied, profiles derived from occultation data are very close to radiosonde observations particularly at tropopause height; nevertheless for the low stratosphere satellital data yield overestimations for temperatures values among others parameters. The monthly means values for reanalysis, on the other hand, present a more considerable biases when compared with radiosonde data and profiles derived for each station yielding an underestimation for the values of the parameters studied.

Seeing that the tropopause plays an exceptional role in the climate changes and stratosphere – troposphere exchange, data from significant levels of radiosonde and radio-occultations measurements, are processed in order to obtain single and multiple tropopauses levels, using the LRT definition. The key of this study is to point out, that with radiosonde data is possible to detect the location not only for single, but also multiple tropopause for the stations studied, while with GPS retrievals only first tropopause is observed in the most of the cases.