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Study of air masses trajectories during the TRO-pico campaign aiming at studying of the impact of convective overshooting on the stratospheric water budget

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Water vapor directly affects the climate as greenhouse gas emissions, but also indirectly by the formation of other essential elements of radiative forcing as aerosols, clouds of ice. In addition, water has a significant role in the chemical composition, the balance of ozone and the oxidizing capacity of the atmosphere. Transfers of water vapor in the troposphere to the stratosphere are one of the major scientific challenges in modeling the stratosphere and climate.
The TRO-pico small balloon campaign took place in Bauru (22.3 ° S) in southern Brazil during two convective seasons. Its main objective was to study the exchange of water vapor between the upper troposphere and lower stratosphere, and better understand the role of overshooting convection in the moistening of the lower stratosphere and its variability at the local scale to infer a typical impact at a larger scale. Here we focus on the purely convective seasons of the campaign, with a first period in March 2012 and a second in Jan-Feb 2013, during which, in addition to convective tracers measurements (methane, O_3...) H_2O was intensively sampled by two different in situ hygrometers : Pico-SDLA H_2O and FLASH-B. Here we investigated all the measurements gathered close to deep convective events and analyze them in term of potential signature of overshooting convection in the lower stratosphere, to put to the fore possible impact at the wet season time scale.
The approach is the use of a trajectory model (HYsplit) running with the GDAS analyses, the different H_2O profile from both instruments, echo top from the Bauru S-Band radar highlighting any potential overshoot occurrence in the vicinity of the balloon flight earlier during the day.
For each local maximum of H_2O, a back trajectory is computed from the balloon position. It is checked if the back trajectory cross an overshooting cell seen by the Bauru radar, and matches it in time and maximum altitude
Here we use a total of 8 vertical profiles of H_2O from the campaign. At least 4 profiles were shown to be influenced by overshooting convection. Statistics for the whole campaign will be given, as well as their mean impact. Same kind of analysis will be shown using ECMWF analyses with the FLEXTRA trajectory model. The later results will be compared to the HYSPLIT/GDAS trajectory analysis.