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In situ measurement of H_2O by the micro-SDLA balloon borne diode laser spectrometer in the tropical UT-LS : modelling interpretation.

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During the HIBISCUS European campaign in Bauru (Brazil, 22°S) in 2004, the micro-SDLA diode laser sensor was flown twice on February the 13^{th} (SF2 flight) and the 24^{th} (SF4 flight) from small size open stratospheric balloons operated by the CNES. In situ measurements of H_2O, CH_4 and CO_2 at high spatial resolution (a few meters) were obtained in the upper troposphere and the TTL.

The achieved in situ vertical concentration profiles are investigated by a combination a 3D trajectory code (Freitas et al., JGR, 2000), the mesoscale model RAMS and the high-resolution PV-advection model MIMOSA (Hauchecorne et al., JGR, 2001).

The mesoscale model RAMS allows us to study processes associated with convective clouds, whereas isentropic transport at global scale is investigated with MIMOSA.

Backward 3D trajectories have been calculated every km for the two flights. It appears that a very strong uplifting from the ground to 17.5 km has occurred 80 hours before the SF4 flight. This uplifting is associated with a perturbation in the vertical water vapour observed at this altitude. This perturbation can be qualified as "water bubble" comparing to SF2 water vapour measured at this altitude.

In addition, in the SF4 flight, a very dry layer has been observed between 8km and 10 km. Using MIMOSA PV-map on isentropic surface at 340K, an air mass intrusion from mid-latitude at the location and time of the measurements is predicted.