In the tropics, Liu and Zipser (2009) showed that the water vapor (H$_2$O) presents a nighttime maximum in the upper troposphere consistent with the diurnal cycle of convective events.

In the Southern hemisphere, a strong negative day minus night (D-N) signal highlights the continental convective areas at 217 hPa and mostly disappears in JJA. To a lesser extent, the Northern hemisphere also presents a negative continental D-N in JJA at the same pressure (hemispheric asymmetry also observed in temperature by Khaykin et al., 2012). The MLS position of the main signal above South Asia remains unexplained and under investigation. Near the tropopause at 113 hPa and above at 49 hPa, the D-N signal only becomes slightly positive above South America and Africa in DJF, while the Northern part of the same region is present in JJA (MLS data). Liu and Zipser suggested that the nighttime formation of cirrus may be responsible for the observed dehydration.

**Figure 1:** (Top, from left to right), H$_2$O as observed by AIRS (x, res. 2° x 2°), the H$_2$O day minus night in convective period (DJF) and the day minus night in non-convective period (JJA), in ppmv, from 2002 to 2012, at 217, 113 and 49 hPa. (Bottom, from left to right) same as top but for MLS (res. 10° x 10°) interpolated on the AIRS pressure levels and from 2004 to 2012.

**Figure 3:** (left, from top to bottom) H$_2$O and temperature vertical profiles of MLS, AIRS, IASI, ECMWF and radiosonde between 250 to 30 hPa. (Right) diurnal cycle of H$_2$O calculated as the difference between hourly and daily average in DJF (left) and JJA (right) at 217, 113 and 49 hPa.

At Bauru, all the Temperature profiles show a warmer atmosphere in DJF than in JJA for pressure less than 150hPa, and conversely at lower pressure (not observed for H$_2$O). The cold point (~201K at ~90-100hPa in JJA moves down to ~194K at 80-90hPa in DJF). The amplitude of the H$_2$O diurnal cycle, larger in DJF (~20ppmv) than in JJA (~15ppmv except for ECMWF) and the nighttime maximum at 217hPa in DJF, is consistent with the Liu and Zipser study. Although no clear cycle is detected at lower pressure, the ratio between DJF and JJA remains greater than 10.

**Concluding Remarks**

This preliminary results point out geographical, physical and time dependent aspects of the H$_2$O and Temperature variability, consistent with previous work, in the tropics and more specifically in Bauru. Ongoing work at large and local scale including IASI, ECMWF and CNRM-CCM datasets will complete our analyses.

In the TTL, a better characterization of the diurnal variation mechanisms of H$_2$O (and potentially of the cirrus) linked to the diurnal cycle of convection, will help to assert the hydration/dehydration mechanism proposed by Liu and Zipser. In this optic, we also aim to perform high vertical resolution balloon-borne measurements in Bauru during the next convective period.

Next steps will focus on CO and HDO/ H$_2$O ratio, other well known convective tracers.