A Revised Tall Tower Dataset for LEF, WKT and AMT for 2004-Present: Automated Data Processing and Quality Assurance Algorithms for Continuous CO$_2$ and CO Measurements

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Data from LEF, WKT, and AMT for the period 2004-present has been reprocessed using a new set of data processing and quality assurance software for continuous CO$_2$ and CO measurements. The new algorithms compute the mixing ratio and an estimate of the uncertainty for each measured value. The new algorithms are being converted to IDL and in the near future will be run each day and new data will automatically be added to the GMD database along with the uncertainties. Our goal is to make the tall tower data available to the community in near real time. The uncertainty estimates will allow us to identify instrument problems quickly and pinpoint their origin. Sources of uncertainty that are addressed by the new algorithms include drift in the baseline and the gain of the sensors, dilution error associated with residual water vapor in the dried sample airstream, curve-fitting errors, uncertainty in the calibration scale, the extent to which standards and air samples are equilibrated at the end of the sampling interval, and errors caused by calibration curve extrapolation outside of the range of the standards. We have applied these algorithms to two years of data from the LEF, WKT and AMT tower sites and will present an overview of the data and uncertainties for this period along with a comparison to network flask data. We will also present results from one of our new tower trace gas measurement systems that is currently deployed on Kohler Mesa.
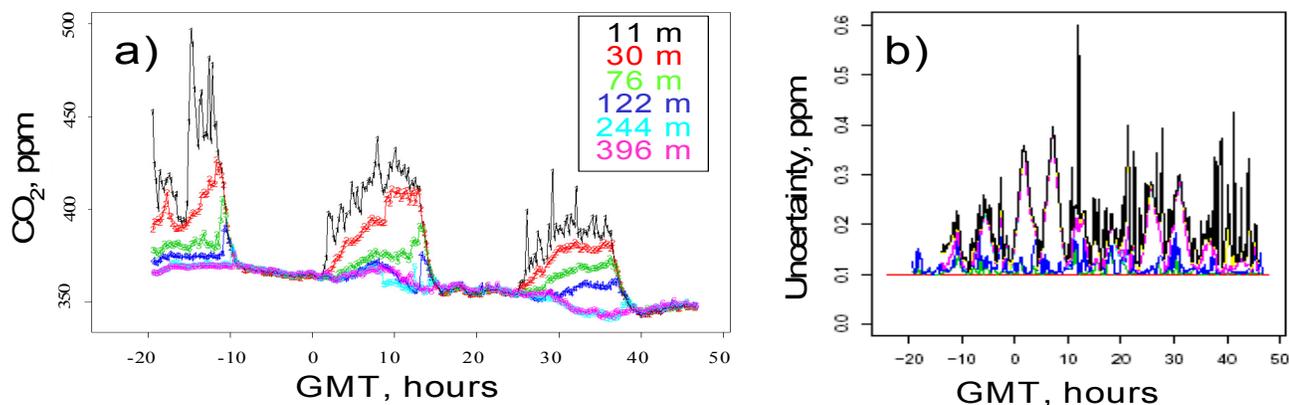
Figure (a) Time series of CO$_2$ data from the WLEF tower for August 5-7 2005. (b) Corresponding cumulative uncertainty plot for the 396 m level. The red curve is the baseline uncertainty corresponding to the 0.1 ppm uncertainty stated for the WMO scale, the additional curves represent the addition of individual terms in the uncertainty estimate with the black curve representing the total uncertainty.