

meteoLCD Weblog

A weblog on climate, global change and climate measurements

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On wind, CO2 and other gases (1/3)



[\(link to image\)](#)

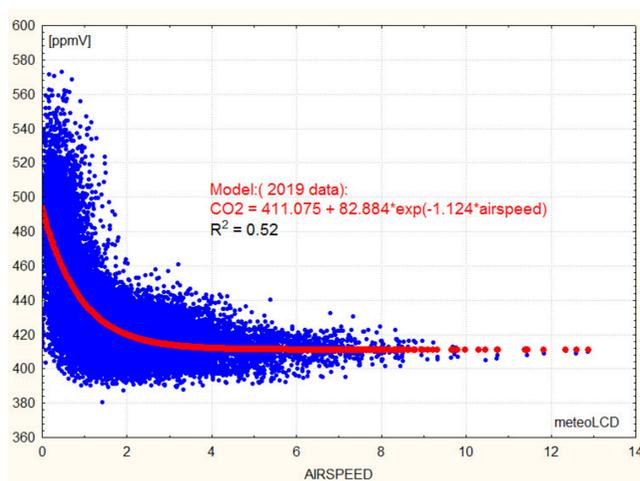
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1. Introduction

meteoLCD is one of the few stations that publish CO2 measurements at near-ground level; our readings give the real situation as it is. If you look at the CO2 plots ([here](#)), you may be surprised by the often huge daily swings in concentration, when the media usually suggest a smooth and continuous rise. BTW one should say "mixing ratio", but "concentration" is so much easier on the mind...

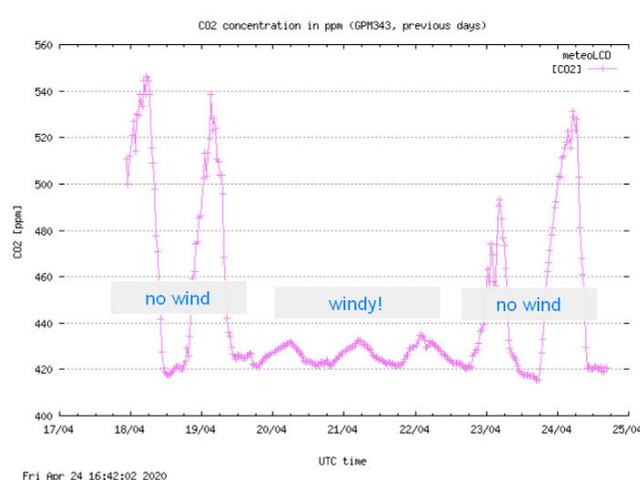
One of the main factor influencing the CO2 levels is wind speed: no wind means no turbulent mixing of the boundary layer, and especially at the cool morning hours, CO2 will remain trapped by the inversion and levels reach high values. During the day, when the sun warms the air, convection springs into action and this will dilute the CO2 concentration. Now, add some more or less heavy wind movements, and that dilution will reach "extreme" levels. The concentration begins to be comparable with the numbers published by stations located at the beach-front, on small islands or on top of a high volcano, as is the case for the famous Mauna Loa station. But even Mauna Loa must watch its steps: from time to time the volcanoes belch out a CO2 plume, and this moments must be "edited out" of the data series. Other continental stations keep only the measurements done in the afternoon, to get what is called "the background level".

I published a very long time ago (2009) a paper with the late Ernst-Georg Beck on how to calculate that background if one has both the wind-speed data and the CO2 mixing ratio. Beck was a specialist on vintage CO2 measurements done with chemical methods, and so we tried to find a possible background out from these historic measurements. You may look at the paper (published by Springer) [here](#). In our [TRENDS](#) section I redo this exercise every year, and this is the situation for 2019:



The number 411 ppmV represents the horizontal asymptote and is practically the same as the Mauna Loa value for 2019 (411.4), so this might be a lucky year!

The last days, we had sunny weather, and several days with high wind speed, than 3 days with poor wind, and again a couple of more windy days. Look how the CO2 concentration was influenced by this wind pattern (the graph is from today, Friday 24th April 2020):



Do you see the difference?

Well, in the next part which I try to write during the weekend, we will look more into the details, and see how other atmospheric gases like ozone and NO2 behave during that same period.

(to be continued)

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