



Four years of CO₂ and meteorological measurements in Mataró (Catalonia, Spain). An example of the CO₂ diurnal cycles in a Mediterranean coastal city.

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Since November 2009, in collaboration with the science section of the Mataró Museum, IC3 is measuring CO₂ concentration in the roof of this museum using a calibrated infrared (IR) analyzer (GMP343 Vaisala Carbocap[®]). The measurements began within the frame of the CarboSchools project (EU Science in Society programme). Meteorological variables (ambient temperature, relative humidity, precipitation, barometric pressure, wind direction and wind speed) are also measured with a Davis Vantage Pro2 Station. The Mataró Museum is located in the Mediterranean coastal city of Mataró (41.540174° N, 2.445486° E), 25 Km north-east of Barcelona.

The in-situ meteorological data (pressure, temperature and humidity) is used to adjust the settings of the GMP343 every minute to calculate CO₂ concentration. From late 2009 to 2012 CO₂ data was calibrated using integrated discrete flask samples that were collected fortnightly and then measured using an optical analyzer (Licor-7000). From 2013 onwards CO₂ GMP343 data has been calibrated by data inter-comparison with a Picarro G2301. Both the Picarro G2301 and the Licor-7000 analyzers were calibrated and referred to the International Scale using a scale strategy with seven NOAA reference cylinders.

The dataset shows that CO₂ signal in the coastal city of Mataró is regulated by the periodic land-sea breezes and the local emissions. The CO₂ variability along the year (diurnal and seasonal CO₂ signal) responds to the variability of the influence of the sea-land breezes, the contribution of the land and the sea ecosystems in the CO₂ cycle and the variability of anthropogenic emissions

Finally the CO₂ data from Mataró is compared with the CO₂ time series from other stations which have the same equipment but are located in different ecosystems. The other stations presented here are (1) DEC3: Located at the Ebre River Delta in a coastal and agricultural area. This station is also provided with GC and Picarro instrumentation and is part of the Climadat network (www.climadat.es/en/) and InGOS network (www.ingos-infrastructure.eu/); (2) CRAM: At the top of the Ribagorça valley in the middle of the Pyrenees at 1600 m a.s.l. and (3) Barcelona: In the roof of a building in Barcelona city. The influence of the topography, agricultural activity and anthropogenic emissions characterize the variability in these four CO₂ time series.