

Specifications

All the visualizations and information in this document are based on footprints generated by [STILT](#), a lagrangian atmospheric transport model. Output footprints are presented on a grid with $1/12 \times 1/8$ degrees cells (approximately 10km x 10km) where the cell values represent the cell area's estimated surface influence ("sensitivity") in ppm / ($\mu\text{mol} / \text{m}^2\text{s}$) on the atmospheric tracer concentration at the station. The footprints for a given station vary in time according to meteorological conditions. Combining individual footprints with an anthropogenic emission database ([EDGAR](#)) and a biogenic model ([VPRM](#)), which models the exchange of the tracer between the atmosphere and the natural surface vegetation, results in estimates of the anthropogenic emissions contribution, and the biogenic component, on the CO_2 mole fraction at the station.

For maps and the land cover polar graph, an average footprint for the specified date range have been used. In the **sensitivity area map** the 192 000 cells have been aggregated depending on their distance to, and direction of, the station. The same aggregation principles were used for the **population sensitivity map** and **point source contribution map**, where the average footprint cells were multiplied by underlying ancillary data layers. The population data are from [GEOSTAT](#) (2011) and point source emissions data from [E-PRTR](#) (2017). The resulting values in the population map are mainly interesting for inter comparisons between areas, whereas the point source emissions were converted to estimated contribution to the CO_2 mole fraction at the station. The descriptions of the maps include what quartiles the station falls into in terms of absolute ranking among the labeled atmospheric stations. The first quartile includes the stations with the lowest total average values.

The **land cover polar graphs** are similar to the maps in that the center represents the location of the station and the direction bins have been used to aggregate data but do not represent the distance of the land cover type to the station. Each land cover type of the [CORINE](#) (2018) dataset is weighted by the average footprint. The legend shows the breakdown of the influence area to the major land cover types, and the area of a land cover type in the figure represents its presence in each direction of the station. The dominant land cover type is closest to the center, with the less significant land cover types displayed in ascending order. The **land cover bar graph** is a simpler way to visualize land cover type by direction. Eight 45 degrees bins around the station are represented by stacked bars.

The **seasonal variations table** shows the average anthropogenic and biogenic contributions during the different parts of the year. The biogenic contributions include respiration (CO_2 input to the atmosphere) and Gross Ecosystem Exchange (GEE, CO_2 uptake by the biosphere). On the [STILT result visualization page](#) individual footprints with associated estimates of respiration and GEE are found. The remaining variable values – for sensitivity, point source contribution and population – come from summarizing the cells of maps where these layers have been multiplied by average footprints for the different parts of the year. The values are shown relative to the yearly averages.

The same type of values that are found in the seasonal variations table but for the average footprint of the selected data range are used in the **multiple variable graph** to place the selected station relative to reference atmospheric stations in the ICOS network. The placement on the y-axis is determined relative to the minimum and maximum variable values these stations and the selected station. 0% means that it is the station with the lowest variable value, and 100% the highest.

Additional resources

More specifics about the processing of the ancillary data layer can be found in [Storm\(2020\)](#) (section 3.3).

An interactive Jupyter Notebook is available at [ICOS explore data](#) and can be used to output the figures and maps presented in this document, e.g. for a different time-period and/or specific hour(s) of the day. It is also possible to change the bin-sizes and intervals used in the maps and the land cover wind rose. Furthermore, it is possible to generate a characterization for a hypothetical station. The only requirement is that footprints have been generated using the [STILT on demand calculator](#).