Specifications

All the visualizations and information in this document are based on footprints generated by STILT, a lagrangian atmospheric transport model, implemented as online tool at the ICOS Carbon Portal. Output footprints are presented on a grid with $1/12\times1/8$ degrees cells (approximately 10km x 10km) where the cell values represent the cell area's estimated surface influence ("sensitivity") in ppm / (µmol/ (m^2s)) 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 inventory (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 all maps and the land cover polar graph, an average footprint for the specified date range has 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 unit of the maps is either percent or the absolute value of the aggregated cells. 100% in terms of the sensitivity map is the value of all aggregated cells summarized, hence footprint cells with the value of 0 will not add to this. 100% in terms of the population map is the value of all aggregated (total population count * sensitivity) cells summarized, hence footprint cells with the population value of zero - despite being cell areas the station is possibly sensitive to - will not add to this value. The population data are from GEOSTAT (2018) and point source emissions data from E-PRTR (2017). The resulting values in the population map are mainly interesting for intercomparisons 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 selected ICOS 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 centre 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 centre, with the less significant land cover types displayed in descending 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 seasons 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). Individual footprints with associated estimates of CO_2 concentration components from respiration and GEE, as well as from anthropogenic emissions are displayed on the STILT result visualization page. The values for sensitivity, point source contribution and population are produced by summarizing the cells of maps where these layers have been multiplied by average footprints for the different parts of the year. The seasonal values are shown relative to the yearly averages. A positive relative difference of the seasonal GEE means more uptake of CO_2, which is usually true for the growing seasons.

The same type of values that are presented in the seasonal variations table but for the average footprint of the selected data range are used in the extbfmultiple 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 of these stations and the selected station. 0% indicates the station with the lowest variable value, and 100% the highest.

Additional resources

More specifics about the processing of the ancillary data layers 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 characterisation for a hypothetical station. The only requirement is that footprints have been generated using the STILT on demand calculator.

To re-generate this PDF in the interactive Notebook, use the following settings. Copy and save the information as a JSON-file and use the option to "Load settings from file".


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{
 "stationCode": "HPB131",
 "startYear": 2018,
 "startMonth": 1,
 "startDay": 1,
 "endYear": 2018,
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 "endDay": 31,
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