

CARVE FTS Level 2 Quick Retrieval V3.x Plots README File

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This document provides a summary and brief explanation of the *image files* with visualizations of CARVE FTS Level 2 Quick Retrieval data products. For details on the FTS L2 QR data products themselves, please consult the **CARVE FTS Level 2 Quick Retrieval V3.1 README File** distributed with the data products.

The most important aspect to note about the images is this:

The images of CARVE FTS Level 2 Quick Retrieval data products are provided in the hope that they are useful. They are generated automatically and do not constitute an analysis of the data. They are not fit for publication purposes.

1. General Comment

The plots provided here are generated automatically from the CARVE FTS L2 file. This includes the choice of plot ranges, which is based on a set of checks and assumptions that have proven to work well for most of the flight observations. However, there are cases where plot ranges are less than optimum due to specific aspects of that particular product quantity on that particular flight day.

2. File Format and File Names

All images are in in Portable Network Group (PNG) format and contain a single plot. File names have the following format:

<l2 product file name>_<plot style>_<plot contents>.png

where

<l2 product file name> Base name of the CARVE FTS L2 Quick Retrieval data product file that is being plotted, e.g.,

carve_FTS_L2QR_b23_20130707_20151103005634

<plot style> One of lin, map, sca

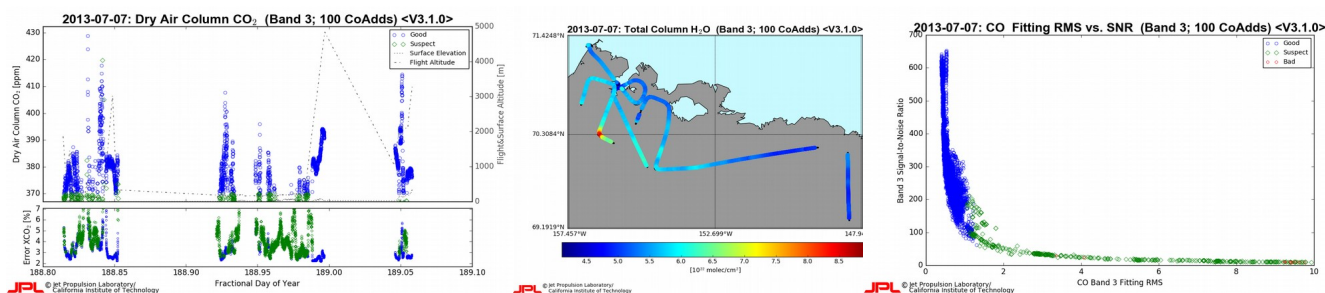
<plot contents> A combination of several elements, including <plot style>, col, dac, flight_altitude, rms_snr, ch4, co2, co, o2, ch4co2, wco2, sco2

In total, there are 48 image files provided with each data product file.

3. Plot Styles

lin	Line plot. X-axes are always "Fractional Day of Year". The plot window is divided vertically (2/3, 1/3), with the upper plot showing the product values and the lower plot its relative retrieval uncertainties. The color code indicates good , suspect , and bad data. The upper plot window also contains dotted and dashed-dotted lines for Surface Elevation and Flight altitude.
map	2D geographical plot of product values (no uncertainties). Retrieved product values are visualized with colored circular markers, and the average co-added geolocation. Underneath the colored markers, and usually covered by them, are smaller black markers at the original 1 second acquisition resolution. Due to the default "100 co-adding" (e.g., up to 100 of the 1 second observations are averaged), there can be differences between the two tracks.
sca	Scatter plot of fitting RMS of the data product against band Signal to Noise values.

Below are examples for each of the three general plot styles.



Examples of the three general plot styles: Line Plot (left), Map Plot (center), Scatter Plot (right).

3. Plot Contents

The <plot contents> field of the file name indicates the details of the plotted quantity. The table below lists all the naming elements and what they represent. Together with the <plot styles> table above, this provides a means to deduce the contents of a given PNG image based on its file name.

<element>	Type	Description
col	Column	Total Column [molec/cm ²]
dac	Column	Dry-Air Column [ppm] or [ppb]
rat	Ratio	Column Ratio, either between the same molecule from different FTS bands (in which case there is no FTS band indicator in the file name) or CH ₄ /CO ₂ from the same FTS band (either wco2 or sco2). Ratios are calculated from the total column values.
rms_snr	n/a	Molecule Fitting RMS vs Band Signal-to-Noise Ratio
flight_altitude	n/a	Flight Altitude above ground, the difference between flight altitude ASL and surface elevation.
abo2	FTS Band	Band 1 of the FTS; used to measure O ₂
wco2	FTS Band	Band 2 of the FTS; used to measure CH ₄ , CO ₂ , and H ₂ O
sco2	FTS Band	Band 3 of the FTS; used to measure CH ₄ , CO ₂ , CO, and H ₂ O
ch4	Molecule	Methane (CH ₄)
co2	Molecule	Carbon Dioxide (CO ₂)
co	Molecule	Carbon Monoxide (CO)
h2o	Molecule	Water Vapor (H ₂ O)
o2	Molecule	Molecular Oxygen (O ₂)
ch4co2	Molecule	The total column ratio of "CH ₄ /CO ₂ "