## Removing Baselines from Cross-Dispersed, Multi-Order 1D EXES Spectra

The Jupyter notebook "COMbaselineremoval.ipynb" has been provided to users of EXES data who want to remove baselines from cross-dispersed, multi-order (e.g. high-medium & high-low) observations. Two settings that this is particularly helpful for are high-low settings taken near 805 cm^{-1} (12.42 µm) & 850 cm^{-1} (11.76 µm). Below is what the merged order (MRD/MRM) product looks like from the EXES pipeline for IRC +10216 (75_0106_275):
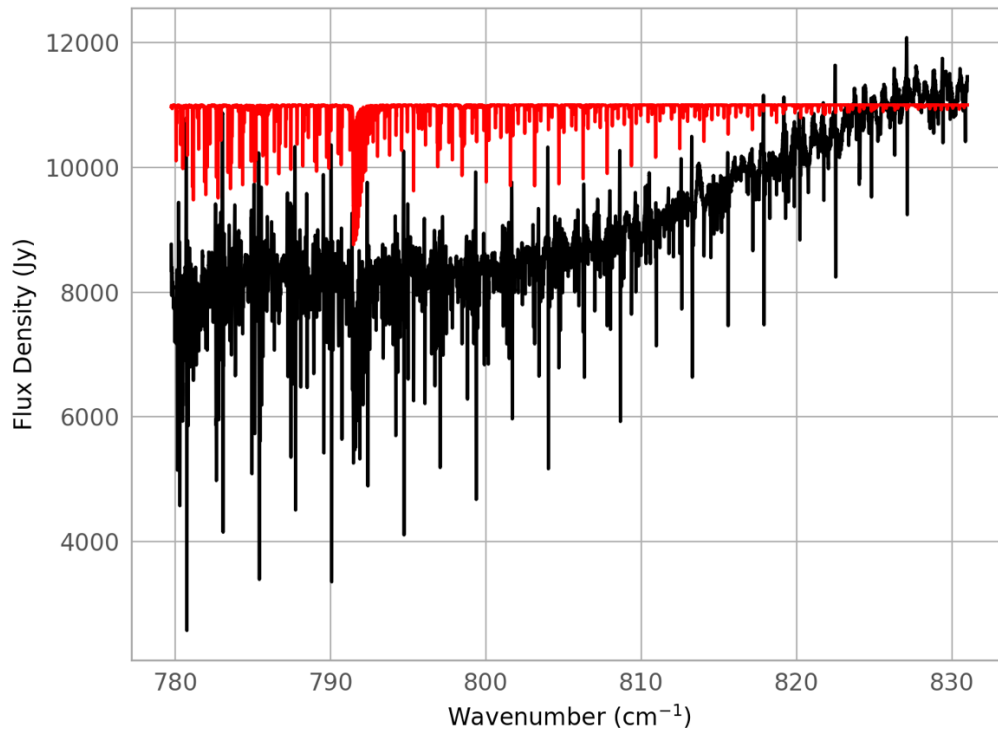
There is a rising trend to the extracted orders as the data moves to higher wavenumber (shorter wavelength). To correct this, COMbaselineremoval has been written to take the 2D "spectral image" (either the SPM or COM files) and operate on the "SPECTRAL_FLUX_ORDER_XX" & "SPECTRAL_ERROR_ORDER_XX" (where XX is the order number) planes to divide a median smoothed version of the former. The smoothing parameter smoothParam is set to 100 by default but can be freely adjusted by a user to determine results to their liking. Below is the example MRD file after baseline removal has been applied (load redux with the COM file and run the merge order step):
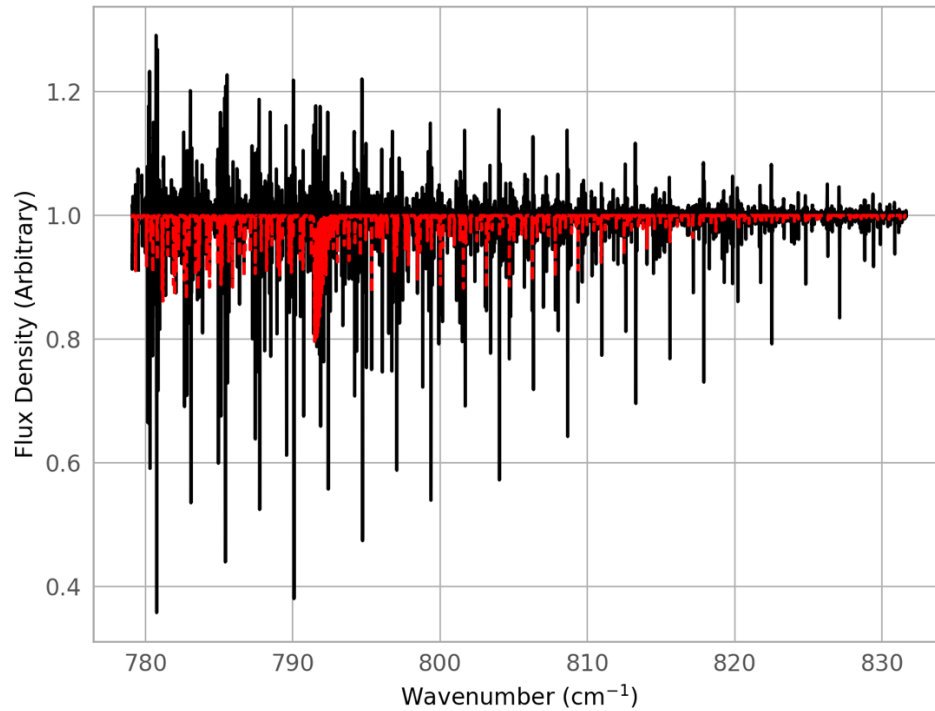
Note this works best on settings that do not have numerous strong telluric lines, which is why the 805 & 850 cm^{-1} high-low settings are great starting points. For settings with strong telluric lines, the user will have to perform some masking of the telluric lines. High-low observations that are centered around 805 & 850 cm^{-1} are IRC+10216 (75_0106_275 & 75_0106_274) and VY CMa (09_0148_5 & 09_0148_7).