Single Dish Radio Observation

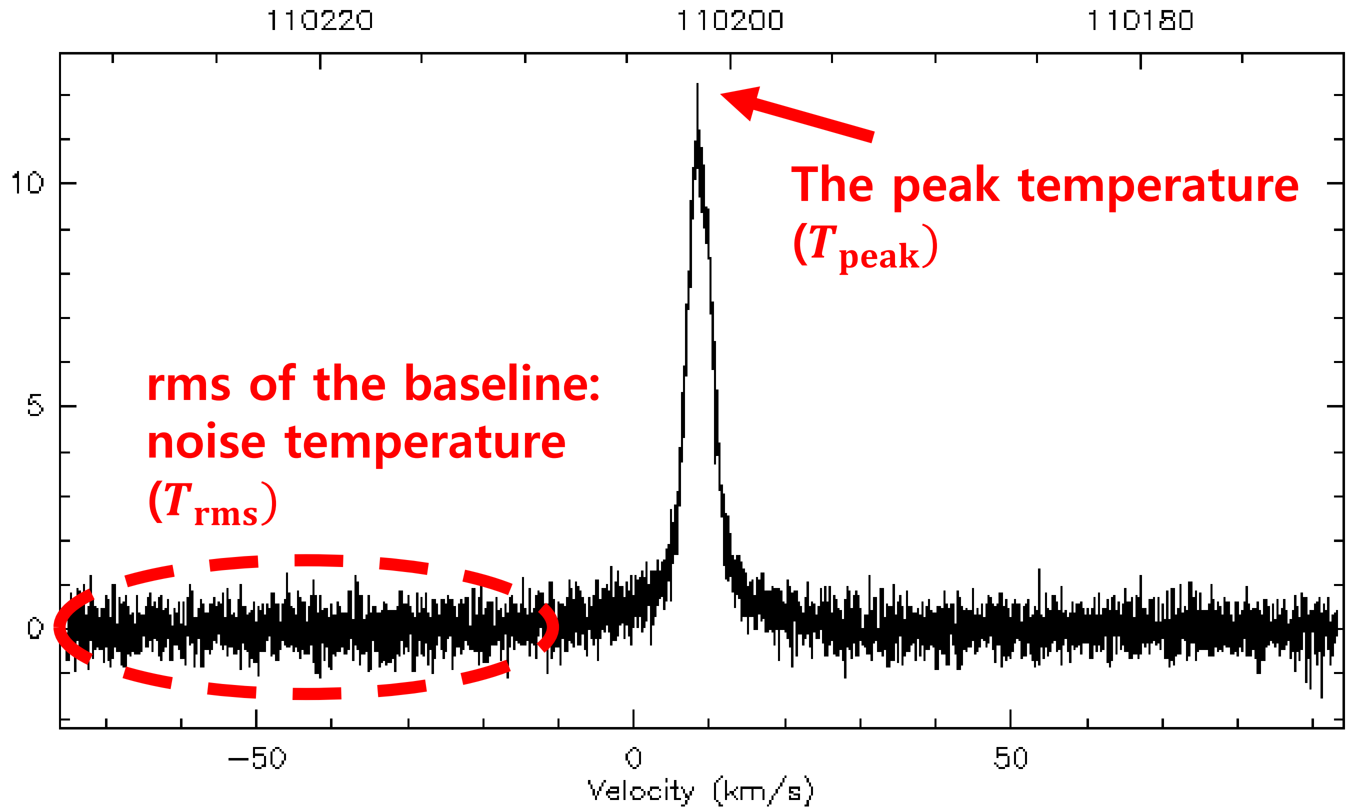
Signal to noise ratio; Map data; Data exportation

Hyeong-Sik Yun

Signal to noise ratio (SNR)

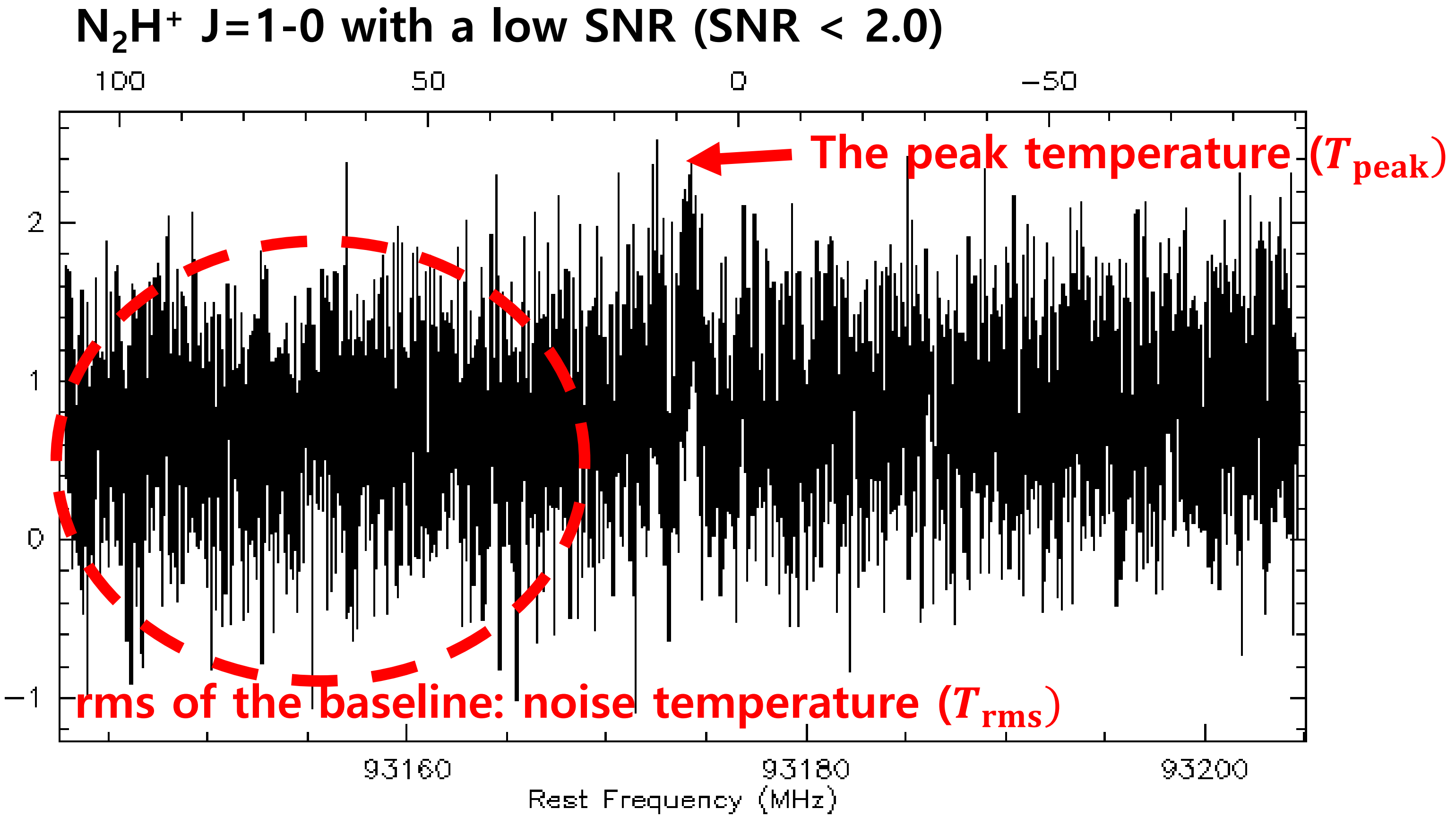
- One of the important parameter in observations.
- $SNR = \frac{T_{\mathrm{peak}}}{T_{\mathrm{rms}}}$

^{13}CO J=1-0 toward Orion KL with a high SNR



Signal to noise ratio (SNR)

- One of the important parameter in observations.
- $SNR = \frac{T_{\text{peak}}}{T_{\text{rms}}}$
- Hard to identify the observed line



How to increase the signal to noise ratio (SNR)?

- During the observation
  - Longer integration time

- During the data reduction
  - Smooth a spectrum
  - Combine multiple spectra (Average spectrum)

Example: Average

LAS> file in weak_N2Hp_spectra.class

LAS> find

LAS> get first

LAS> pl

…

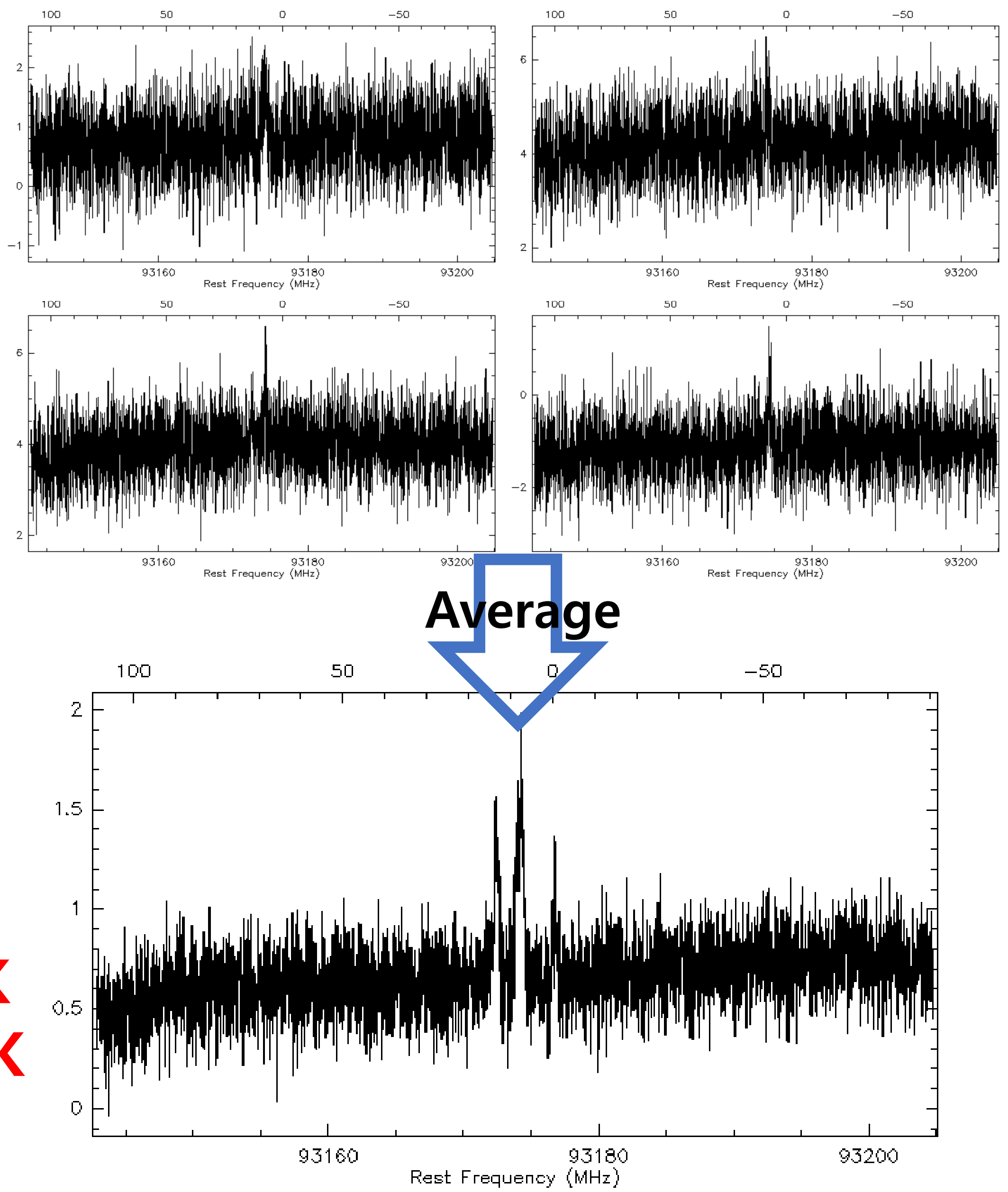
…

LAS> find

LAS> average

LAS> pl

SNR ~ 2.0



T_{peak} ~ 1.0 K

T_{rms} ~ 0.15 K

SNR ~ 7

Map data

How to check the spatial distribution of the observed lines?

- Multi-beam obs.
- Grid mapping
- OTF mapping

Integrate line intensities

Irregular grid spacing
- Interpolate
- Contour maps

Regular grid spacing
- Image map

Example: Integrated intensity map

- Orion_13CO_baseline_subtracted.class
  : the class file containing the baseline subtracted spectra

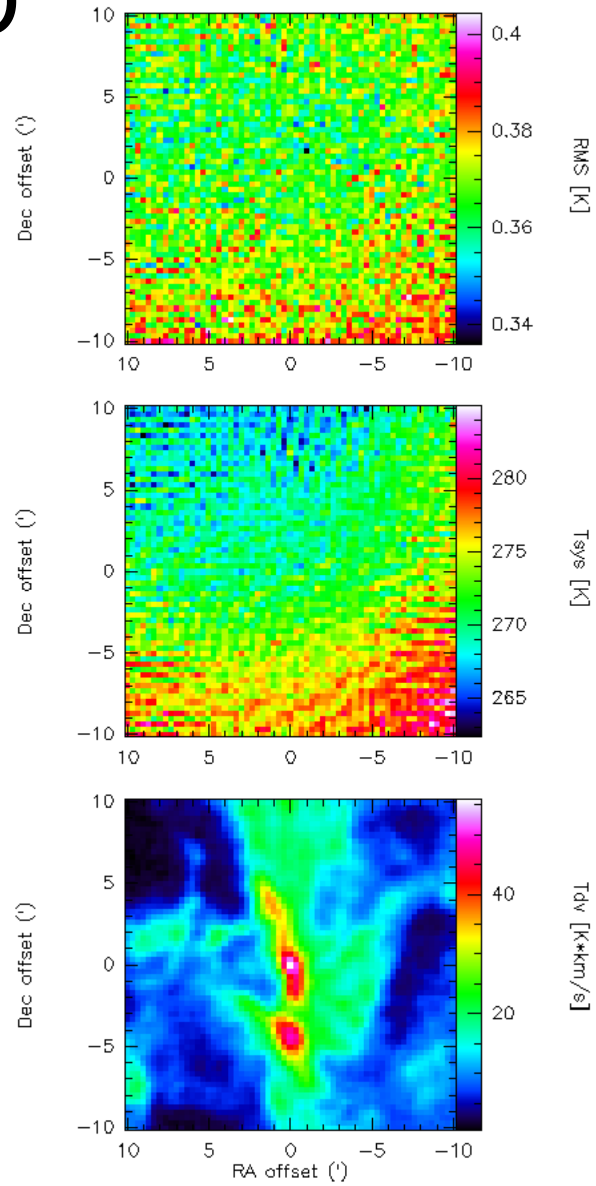
- plot_int_map.class
  : the class code to produce the integrated intensity map

Example: Integrated intensity map

1. Check the velocity range where the line is detected.
2. Run the class code using following command

   LAS> @plot_int_map

3. Type the velocity range that estimated in the Step 1.
4. The Greg window would present the figures.



Export the spectrum into the ascii format

- ascii_output.class:

  The class code to export the first spectrum of the class file.

- output.dat:

  The output file, which containing the velocities (in km/s) and intensities (in K) of the spectrum.

Export map data into the fits format

Requirements: cube data (spectral data with a regular grid)

- Export the cube data using the 'gildas_fits' procedure.

- Orion_13CO_baseline_subtracted.class

  : the class file containing the baseline subtracted spectra
- class_to_fits.class

  : the class code to export a cube data into the fits format

Export map data into the fits format

1. Run the code

   LAS> @class_to_fits
2. Type the velocity range where the line emission is detected (sw1 & sw2)
3. Type the velocity range that will be exported in the fits file (mx1 & mx2)
4. If a graphic window appears, select the lmv file in the directory and type the name of output file.