

Proposal ID: 09\_0030  
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Bonn, 28 June 2022

Dear Dr. Clark,

The attached scripts:

- Convert-Tant-toTmb.class,
- Cycle9\_GR\_OT\_09\_0030\_CClark\_IC342\_CII.class,
- Cycle9\_GR\_OT\_09\_0030\_CClark\_IC342\_OI.class,

contain the processing steps to create the level 3b and level 4 data products (\*.great files), including:

- Calibration to  $T_{\text{mb}}$  scale, which is done with the script “Convert-Tant-to-Tmb.class”, where you can find the values of the beam efficiencies for each individual LFA and HFA pixels.
- Smoothing to a final velocity resolution of 5 km/s.
- Removal of a first order spectral baseline.
- Reduced spectra of the single-point observations of IC342. Final averaged spectra for both [CII] and [OI] (using a  $1/\sigma_{\text{rms}}^2$  weighting of individual spectra,  $\sigma_{\text{rms}}$  derived from the baseline noise). The scripts offer two solutions: one for averaged spectra per pixel (in the case of the LFA receiver both polarisations were also averaged), and other for the average of all spectra, irrespective of their positions.

For the Cycle 9 deployment in spring 2022, your project was observed during the flights NOAH #853, on April 9, and NADINE #858, on April 23. The [CII] line was nicely detected toward IC342, while there is no sign for [OI] emission.

Note about the calibration: both the LFA and the HFA arrays had some instabilities during the flights. As a result, the precipitable water vapour (PWV) values showed some drifts, which were corrected by the measurements taken

during the first subscan of each load. This does not affect the quality of the data.

Note about pixels: the pixels #2 of the LFA array in both linear polarisations had intermittent problems with their performance, resulting in some blanked spectra. Following a quality assessment of the data, bad spectra are not included in this release, Also note that the HFA pixel #5 (identified in the data as "SOF- HFAV\_5\_S") was under pumped, meaning that the pixel is almost blind. Thus, we do not recommend its use for science analysis.

Note about telluric lines: there is a telluric line entering the LFA[CII] spectra from the signal band at approximately -250 km/s. Since it is well separated in velocities from the IC342 emission, I have not blanked it. The same happens in the HFA[OI] spectra, although in this case the telluric line unfortunately appears at exactly the IC342 systemic velocity, of -10 km/s.

We recommend the use of a recent version of the CLASS software (Jun 21 or later) which is part of the GILDAS software package (<http://www.iram.fr/IRAMFR/GILDAS>).

If you have any questions please do not hesitate to contact me.

Best regards,

Rebeca Aladro  
GREAT liaison