Project Title: The ALMA survey to Resolve exoKuiper belt Substructures (ARKS)
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Project code: 2022.1.00338.L

Introduction:

This data delivery is for the target HD10647. It includes the continuum image at 0.89 mm, using only ALMA data belonging to this large program. Since no CO gas was detected in this system, we do not include any CO data product. This system was observed with three antenna configurations: the 7m array and two configurations of the 12m array.

The main goal of these observations was to resolve the radial structure of the debris disc around this star.

Content of the data delivery:

The data products include the continuum image (*.cont.fits) and associated primary beam image (*cont.pb.fits):

-   member.uid__A001_X2d20_X2e5e.lp_sebamarino.HD61005.cont.fits, continuum image (not primary beam corrected).
-   member.uid__A001_X2d20_X2e5e.lp_sebamarino.HD61005.cont.pb.fits, primary beam image (which can be used to perform a primary beam correction).

Files are named with the following prefix:

member.**Group_oui_id.lp_username.target.**

Sources present in the image with coordinates from Gaia eDR3 in the ICRS reference frame at J2000 epoch.

Source	RA (h m s)	Dec (d m s)	Notes
HD61005	07 35 47.4623	-32 12 14.0451	Target star

Data processing methods:

a) **Data calibration:** The raw measurement sets were calibrated using the ALMA pipeline provided in CASA.

b) **Data reduction:** We reduced the calibrated MS files using CASA version 6.4.1.12 as follows. We first transformed the MS files to the barycentric reference frame using the task mstransform and kept only the target observations. We then time-averaged the data using 60s bins using the task split. Subsequently, we spectrally averaged the data by 2GHz using the task split. The time and spectral averaging kept the effect of

bandwidth smearing below 5% at a radius equal to twice the size of the belts' outer edges.

c) **Data correction:** Before imaging the reduced data, we perform an additional step to correct the data to align the phase centre, absolute flux, and scale the weights of each execution block using a model as a reference. This is explained in detail in Marino et al. 2026.

d) **Imaging:** We imaged the continuum using the task tclean in CASA. We use Briggs weighting with a robust parameter of 2. We use the mosaic gridder as recommended when combining 7m and 12m data. We use the multiscale option, setting the scales to roughly 0, 1, 3 and 9 times the beam size to recover better larger-scale structures. While cleaning, we manually masked the dirty image, only including regions with positive emission and updated these masks between cleaning cycles to include lower surface brightness regions as imaging artefacts disappeared. We stopped cleaning once the residuals outside the mask appeared like Gaussian noise to visual inspection without large-scale artefacts.

The data reduction and data correction scripts can be found at https://github.com/SebaMarino/ARKS-data-reduction