IMAGER Bugs & Release Notes

A GILDAS software

Nov, 15th, 2022

Version 3.6-00

corresponding to code language versions:

```
Language DISPLAY   1.7-00 08-Nov-2022  S.Guilloteau
Language CLEAN     6.5-07 14-Nov-2022  S.Guilloteau
Language CALIBRATE 1.8-02 17-Jan-2022  S.Guilloteau
Language ADVANCED  2.6-00 08-Nov-2022  S.Guilloteau
Language BUNDLES   1.6-02 29-Sep-2022  S.Guilloteau
Language IMAGER    1.1-00 17-Oct-2022  S.Guilloteau
```

Questions? Comments? Bug reports? Mail to: `imager-hotline@services.cnrs.fr`

The GILDAS team welcomes an acknowledgment in publications
using GILDAS software to reduce and/or analyze data.
Please use the following reference in your publications:
`http://www.iram.fr/IRAMFR/GILDAS`
and for IMAGER
`https://imager.oasu.u-bordeaux.fr`

Documentation In charge: E. Di Folco (1)
Active contributor: S. Guilloteau (1)
Previous contibutors: J. Pety (2,3)

Software In charge: S. Guilloteau (1)
Active contributor: S. Guilloteau (1)
Previous contibutors: S. Bardeau (2), J. Pety (2,3)

1. Laboratoire d'Astrophysique de Bordeaux
2. IRAM
3. Observatoire de Paris

Note on Documentation

This document contains the list of Changes and Bug tracking records for the IMAGER program. The IMAGER program documentation can be found here for the PDF version or there for the Web version

Notations

Throughout this document, colors are used to highlight the names of categories of entities:

- PROGRAM is a GILDAS program name.
- LANGUAGE\ is a SIC Language name
- NAME is a command name, keyword or option
- SICVAR is a SIC variable
- ScriptName is an IMAGER script (external text file) that can be executed by the @ command
- FileName is an external file, e.g. a data file.

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1 Bugs and Release Notes

This section lists known bugs (or strange features) that are known at the date of release of the documentation, and the list of changes since previous releases.

Notes since Documentation release of Version 3.2, dated Jan, 30th, 2022

1.1 Recent changes in repository

This section gives the changes made since the last documentation release (as dated above). The changes are available in the working repository, but may not be distributed in any standard Gildas release yet.

- 15-Nov-2022 Add the /MODE option to the PIPELINE command, with 4 modes: CONTINUUM, SPLIT, ALL or SURVEY.
- 14-Nov-2022 Debug use of MAP_CENTER variable in various commands (for Mosaics, UV_SELF , UV_SHIFT).
- 08-Nov-2022 Reorganize commands in languages:EXTRACT, SLICE and POPUP are now part of the DISPLAY\ language
- 05-Sep-2022 Add the /ASYMMETRIC option of MAP_SMOOTH and UV_SMOOTH
- 05-Jul-2022 Add the MAP_POLAR command This corresponds to revision 3.4-1 of the Documentation.
- 29-Jun-2022 Ensure READ handles properly Random Frequency Axis in UVFITS format
- 29-Jun-2022 Ensure UV_EXTRACT works with Random Frequency Axis
- 22-Apr-2022 Improve UV_PREVIEW command
- 12-Apr-2022 Support for command STOKES on internal buffers.
- 23-Mar-2022 Introduce the IMAGER\ language, and the PIPELINE command. This corresponds to revision 3.3 of the Documentation.

1.2 Known Bugs

This section contains the list of bugs known as of October 16, 2025.

- Discovered 15-Nov-2022 UV_RESTORE in Mosaic mode leads to subsequent crashes if the channel range is restricted by UV_MAP because a single beam cannot be applied to all channels.
  This is often the case for ALMA data, because of the shift implied by the Doppler correction when creating the UVFITS files. A work around is to manually drop the edge channels by reading a coherent range of channels, and over-writing the UV data.
- Corrected 08-Sep-2022 Bug correction in EXTRACT command.
- Corrected 29-Jun-2022 STOKES command had incorrect derivation from H-V polarization
- Corrected 09-Jun-2022 Debug UV_FLAG command - Allow to use without Display.

- Corrected 13-Apr-2022 MAP_COMBINE and COMBINE were not supporting big files.
- Corrected 12-Apr-2022 UV_RESIDUAL was not working on a non-sorted Mosaic data set. This could only happen by reading the Clean Component Table after reading the UV data, without any imaging step.
- Corrected 09-Mar-2022 CCT_MERGE Concatenation was improper
- Corrected 07-Mar-2022 Beam size derivation was incorrect when an ANGLE was specified
- Corrected 08-Feb-2022 UV_RESTORE was not using fixed beam size.
- Corrected 18-Jan-2022 SINGLEDISH data was incorrectly read, probably since 20-Sep-2021 (v1.53 of read.f90). Improper values were thus used by the UV_SHORT command (Discovered 17-Jan-2022 only).
- Corrected 12-Jan-2022 Mosaic offsets were improperly computed by command UV_FIELDS since 29-Jul-2021 (bug reported 10-Jan-2022). The script @ fits_to_uvt was thus leading to wrong pointing offsets.
- Corrected 10-Jan-2022 A improper interaction between scripts was causing strange behaviour when switching between EXPLORE and INSPECT_3D commands.
- Corrected 06-Jan-2022 The SIC command DEFINE IMAGE failed on large FITS files. This prevented SHOW and VIEW to work directly from these files.
- Corrected 18-Dec-2021 UV_TIME produced incorrect results on tables with different weights per channel (e.g. those produced by UV_MERGE /MODE CONCATENATE).
- Corrected 13-Dec-2021 Remove occasional infinite loop in MAP_CONTINUUM with method GAUSS (discovered 01-Dec-2021)
- Corrected 18-Nov-2021 UV_REWEIGHT syntax bug

1.3 Functional changes from previous versions

Changes in Version 3.3

- 23-Mar-2022 Introduce the IMAGER\ language. Implement the PIPELINE command there, and some miscellaneous (previously user-defined) commands like TIPS and POPUP

Changes in Version 3.2

- 18-Mar-2022 Add the CLEAN /RESTART capability
- 10-Mar-2022 Improve dirty beam related commands behaviour: replace MAP_BEAM_STEP by BEAM_STEP, use BEAM_SIZE to specify beam shape.
- 07-Mar-2022 Allow WRITE BEAM /APPEND in all cases
- 08-Feb-2022 Implement the CLEAN_STOP syntax in CLEAN
- 10-Jan-2022 Implement the LOAD command in VIEWER.
- 07-Jan-2022 Implement SHOWPV and improve transposed data display.

- 06-Jan-2022 Allow direct READ of FITS data cubes.
- 03-Jan-2022 Improve syntax of COMBINE
- 17-Dec-2021 Improve UV_CHECK BEAM and FIT commands.
- 16-Dec-2021 Add the UV_MERGE /MODE CONCATENATE command to stitch adjacent or overlapping spectral windows. Imaging is in general only possible using BEAM_STEP = 1 after this, so far.
- 13-Dec-2021 Implement a fast, reliable version of "statcont" through the MAP_CONTINUUM command (run time < 40 secs for a 28 Gbyte data set on a 64-core machine)
- 13-Dec-2021 Globally revised the Robust weighting scheme. Speed up by huge amount for large (¿ 10 MegaVis) number of visibilities. UV data sorting not required anymore.
- 08-Dec-2021 Change the CASA - GILDAS interface. Use pure-Python scripts and put them in the $HOME/.casa directory to have a CASA-version independent solution.
- 07-Dec-2021 A missing initialization was causing UV_RESTORE to use the slow mode on some compiler versions.
- 06-Dec-2021 Speed up (by a factor 5-10) the Natural weighting scheme when there is only 1 channel.
- 19-Nov-2021 Create the VIEWER program, that only contains the DISPLAY\ language.
- 19-Nov-2021 Expand the COMMAND ? Key mechanism to many commands.
- 18-Nov-2021 Add the STATISTIC /UPDATE andFIT /JVM_FACTOR commands

Changes in Version 3.0

- 31-Oct-2021 Introduce new DISPLAY\ language. Move commands CATALOG, COLOR, FIND, EXPLORE, INSPECT_3D, SHOW, STATISTIC, and VIEW from their initial languages to this one.
- Improvements in control variables of SHOW and related commands (e.g. allow unit of contours to be specified).

Changes up to Version 2.8 dated of Jan 31, 2021

- 17-Jun-2021 Add SPECIFY FREQUENCIES command for VLA data
- 01-Jun-2021 Allow MULTISCALE Clean on Mosaics, better FIT command.
- 14-Dec-2020 SPECTRAL_CLEAN command
- 31-Jan-2020 Add CCT_CLEAN command
- 13-Nov-2020 Add MAP_SMOOTH command
- 26-Oct-2020 Add UV_SMOOTH command
- 11-Sep-2020 Add KEPLER /MASK command for Mask creation
- 03-Sep-2020 Better behaviour of command UV_TIME

- 01-Sep-2020 Improve FIT command for Mosaics

Changes since Version 2.5 of Feb 27th, 2020, and older ones.

- 13-Nov-2020 Speed-up the UV_RESTORE command.
- 30-Jul-2020 Miscellaneous improvements in the KEPLER command
- 26-May-2020 Implementation of the UV_DETECT command, that encapsulates all actions needed for matched filtering in UV plane.
- 14-May-2020 Proper implementation of the UV_CORRRELATE command, that performs matched filtering in the UV plane
- 13-May-2020 MODEL defines the UV_MODEL variable
- 25-Mar-2020 Implementation of the KEPLER command, that allows optimal detection of spectral lines in Keplerian disks, and estimates of radial profiles.
- 19-Mar-2020 Proper implementation of the MODEL command, with the MODEL /MODE option and several channels.
- 11-Mar-2020 Command EXPLORE added to language BUNDLES
- 10-Mar-2020 CASA to GILDAS interface
  The `casagildas()` tool has been totally re-written in pure Python to avoid issues with incompatible releases of Fortran compilers and Python between CASA and GILDAS
- 27-Feb-2020 UV_SHORT now allows to use images with non-circular beams as short spacings data. Such images can be, for example, an ACA image to be combined with ALMA data.
- 24-Feb-2020 `imager-linedb.sic` script converted to Python 2 and 3 compatible syntax
- 21-Feb-2020 UV_MAP was crashing on Mosaic in Robust weighting. Linked to a missing (although optional !) argument to call doweig, despite the interface was used.
- 18-Feb-2020 3D size was incorrectly set by UV_MAP on "huge" file (1200 x 1200 x 3840).
- 14-Feb-2020 Normalize message colours.
- 14-Feb-2020 Suppress blanking when not needed
- 13-Feb-2020 Make UV_MERGE compliant with its Help: allow to merge Line data sets in Continuum mode.
- 10-Feb-2020 SLICE command changes.
  The `SLICE` buffer had to be renamed to `SLICED`, as "slice()" is a built-in Python method. The axis starts now from the closest point to (0,0), leading to more intuitive slices.
- 06-Feb-2020 MAP_COMPRESS syntax was incorrectly handled. The `HELP MAP_COMPRESS` is still unclear, however.
- 18-Dec-2019 VIEW CCT optimized by coding the component compression after a MULTI.
- 17-Dec-2019 SELFCAL optimization (was using slow mode in UV_RESTORE by default).

- 27-Nov-2019 UV_CHECK /FILE implemented.
- 27-Nov-2019 UV_TIME /FILE implemented.
- 27-Nov-2019 UV_SHIFT /FILE implemented.
- 20-Nov-2019 Make sure UV_PREVIEW also works for 1 channel.

1.4 Older Bug corrections

This section contains the list of bugs corrected much longer ago...

1. Corrected 28-Jun-2021 UV_SHIFT bug correction for "false" mosaics (ID and MOFF columns)
2. Corrected 28-Jun-2021 UV_SORT bug correction for /FILE option
3. Discovered and Corrected 27-Oct-2021 MAP_INTEGRATE lead to wrong units and noise level.
4. Discovered and Corrected 04-Apr-2021 MULTISCALE was using an incorrect convergence strategy since years... Results were sub-optimal, and convergence was unduly slow.
5. Discovered and Corrected 31-Jan-2021 UV_MAP /RANGE was producing a wrong velocity/frequency axis since 11-Dec-2020. (a line of code had disappeared).
6. Discovered and Corrected 10-Dec-2020 MODEL after UV_FIT was ending with an undue error (bug present since 2-Jun-202
7. corrected 8-Dec-2020 Mosaic offsets were not accounted for properly since 19-Jun-2019. The reason was a misplaced exclamation mark that transformed a key instruction into a comment in the code file. Anomalous behaviour of the Mosaic mode were reported end of November, and a test case isolated on Dec 7 for analysis, leading a prompt correction.
8. corrected 26-Oct-2020 Several bugs in UV_MERGE made it fail on some (usually large) data files, sometimes depending on the order in which they were given (discovered 15-Oct-2020).
9. corrected 14-Sep-2020 Incorrect transfer of self-calibration solution in APPLY and SELFCALAPPLY on some UV data set from ALMA.
10. corrected 11-Sep-2020 KEPLER was off by 1 pixel.
11. corrected 11-Sep-2020 Blanking was not updated in MASK APPLY
12. UV_SHORT /REMOVE does not properly delete the SHORT% variable in some cases, in particular if command XY_SHORT is (or has been) used (discovered 15-Feb-2020, still pending, difficult to reproduce).
13. corrected 10-Jul-2020 IMAGER occasionally crashed after a sequence of UV_MAP /CONT and UV_RESTORE commands, because of a map size mismatch. This size mismatch occured when the baseline min-max of the UV data set are inconsistent with the UV data. (discovered 07-Jul-2020).
14. corrected 10-Jun-2020 KEPLER does not handle KEPLER_XO and KEPLER_YO properly.

15. corrected 20-May-2020 FITS fails on large (300 GBytes..) UVFITS files. (discovered 15-Feb-2020).

16. corrected 19-Mar-2020 MODEL /MINVAL threshold was erroneously transformed between Jy/beam and K.

17. corrected 10-Mar-2020 MAP_RESAMPLE may crash on some combination of values (discovered 10-Mar-2020).

18. corrected 10-Mar-2020 VIEW may fails the RANGE is non zero and the 3rd axis increment is negative.

19. corrected 05-Mar-2020 UV_MAP fails after UV_RESIDUAL and SELECT UV_RESIDUAL if the initial UV data set was not sorted in XY.

20. corrected 05-Mar-2020 MULTI with non-zero value for CLEAN_NITER did not set up properly the number of components (it finds 0). SHOW CCT and UV_RESTORE could not be used after.

2 Revision History

This section contains a verbatim revision history taken from the IMAGER code. Except for minor typos or cosmetic changes, each modification in the code is documented by 1 line of code that includes three informations:

- The language revision number of the affected command
- the date of the revision
- a short description of the change

IMAGER lists the revision numbers of all its languages at start of the program. This information can be useful for users encountering a suspected bug or strange behaviour, allowing him/her to see whether the problem has been handled since the version of IMAGER they use.

```
character(len=20) :: v_program = '3.6-00  15-Nov-2022'   ! Global IMAGER Version (matching D
```

2.1 DISPLAY Language

```
character(len=20) :: v_display   ! Display
! DISPLAY\ Language versions  v_display
v_display = '1.0-00 21-Oct-2021' ! First DISPLAY\ Language
v_display = '1.2-00 23-Oct-2021' ! Also move EXPLORE here
v_display = '1.3-00 23-Oct-2021' ! Also move STATISTIC here
v_display = '1.3-01 10-Nov-2021' ! Improve CATALOG command
v_display = '1.4-00 18-Nov-2021' ! STATISTIC /UPDATE command
v_display = '1.4-01 23-Nov-2021' ! Allow re-entrant calls for STATISTIC
v_display = '1.5-00 10-Jan-2022' ! LOAD command
v_display = '1.5-01 30-Jan-2022' ! Improve CATALOG command
v_display = '1.5-06 16-May-2022' ! Ensure STATISTIC works correctly on big data
v_display = '1.6-00 14-Oct-2022' ! Include the SPECTRUM command calling GreG code
v_display = '1.6-01 15-Oct-2022' ! Include the POPUP command
```

```
v_display = '1.6-02 04-Nov-2022' ! Include the SET command
v_display = '1.6-03 07-Nov-2022' ! Add the /DEFAULT option to the SET command
v_display = '1.7-00 08-Nov-2022' ! Move the EXTRACT and SLICE command here
```

2.2 CLEAN Language

```
character(len=20) :: v_clean     ! CLEAN
! CLEAN Language versions   v_clean
v_clean = '4.0-01 08-Mar-2018' ! First IMAGER release with new Variable names (may still cha
v_clean = '4.1-01 08-Mar-2018' ! IMAGER release with Self Calibration commands
v_clean = '4.1-02 15-Mar-2018' ! Bug correction in Self Calibration commands
v_clean = '4.1-02 02-May-2018' ! Split with CALIBRATE\ language
v_clean = '4.2-01 03-Jul-2018' ! Add /RANGE options to UV_FILTER and UV_BASELINE
v_clean = '4.3-01 05-Sep-2018' ! Minor change in SHOW NOISE to identify properly Dirty and C
v_clean = '4.3-02 05-Nov-2018' ! Debug MX, improve MULTI and cleanup messages
v_clean = '4.3-03 14-Nov-2018' ! Add the UV_TRIM command, support READ CCT /RANGE
v_clean = '4.4-01 14-Jan-2019' ! Add the UV_HANNING command
v_clean = '4.4-02 17-Jan-2019' ! Add the UV_EXTRACT command
v_clean = '4.4-03 04-Feb-2019' ! Add the /FILE option to UV_BASELINE,UV_FILTER, UV_SPLIT and
v_clean = '4.4-04 07-Feb-2019' ! Bug correction in UV_MAP for Phase offset mosaics
v_clean = '4.4-05 08-Feb-2019' ! UV_TRIM /FILE syntax
v_clean = '4.4-06 12-Feb-2019' ! Protect against incomplete UV data (Nvisi < dim(2))
v_clean = '4.4-07 13-Feb-2019' ! Operational version of UV_SORT /FILE (still slow)
v_clean = '4.4-08 14-Feb-2019' ! Operational version of UV_SORT /FILE (reasonable now)
v_clean = '4.4-09 15-Feb-2019' ! UV_TIME /FILE syntax
v_clean = '4.4-10 25-Feb-2019' ! UV_RESAMPLE, UV_COMPRESS, UV_HANNING /FILE syntax
v_clean = '4.5-01 27-Feb-2019' ! Move STOKES command to ADVANCED\ language
v_clean = '4.5-02 14-Mar-2019' ! Improve the STATISTIC and SUPPORT commands behaviour
v_clean = '4.5-03 29-Mar-2019' ! Support for SHOW SOURCES
v_clean = '5.0-01 05-Apr-2019' ! Remove CLARK, ..., SDI commands, leave only CLEAN
v_clean = '5.0-02 05-Apr-2019' ! Move COLOR to CLEAN\
v_clean = '5.0-03 29-Apr-2019' ! Option /CONT for UV_MAP
v_clean = '5.0-04 02-May-2019' ! BUFFERS command
v_clean = '5.0-05 06-May-2019' ! /NOPAUSE option to VIEW command
v_clean = '5.0-06 07-May-2019' ! UV_STAT DEFAULT and associated variables
v_clean = '5.0-07 25-May-2019' ! /INDEX option for UV_MAP
v_clean = '5.1-01 05-Jun-2019' ! Command UV_REWEIGHT re-written
v_clean = '5.1-02 15-Jun-2019' ! UV_EXTRACT /FIELDS
v_clean = '5.1-03 25-Jun-2019' ! UV_FIELDS command
v_clean = '5.1-04 03-Jul-2019' ! UV_COMPRESS /CONTINUUM option
v_clean = '5.1-05 04-Jul-2019' ! Remove obsolete /SELF option of UV_MAP & UV_RESTORE
v_clean = '5.2-01 03-Sep-2019' ! Move STATISTIC command out of this language
v_clean = '5.2-02 13-Sep-2019' ! Move UV_SORT command out of this language
v_clean = '5.2-03 25-Sep-2019' ! UV_FLAG bug correction
v_clean = '5.2-04 07-Oct-2019' ! UV_MAP 'Map_Center' bug correction (header not updated)
v_clean = '5.2-05 10-Oct-2019' ! WRITE does not accept ambiguities
v_clean = '5.2-06 10-Oct-2019' ! VIEW with no argument just re-displays
v_clean = '5.3-01 10-Oct-2019' ! Support for the CONTINUUM image
```

```
v_clean = '5.3-02 11-Oct-2019' ! MAP_REPROJECT, MAP_COMBINE commands (+syntax MAP_RESAMPLE)
v_clean = '5.3-03 13-Oct-2019' ! SHOW /NOPAUSE and VIEW /OVERLAY commands
v_clean = '5.3-04 16-Oct-2019' ! SHOW /SIDE instead of /NOPAUSE and new MASK THRESHOLD comma
v_clean = '5.3-05 06-Nov-2019' ! /FILE option of UV_CHECK
v_clean = '5.3-06 20-Nov-2019' ! /FILE option of UV_SHIFT
v_clean = '5.3-07 06-Feb-2020' ! Bug correction for MAP_COMPRESS syntax
v_clean = '5.3-08 20-Feb-2020' ! Size computation for Large data set may exceed 2GBytes
v_clean = '5.3-09 21-Feb-2020' ! Bug correction for Mosaic in Robust weighting
v_clean = '5.3-10 24-Feb-2020' ! /LIKE option of MAP_RESAMPLE
v_clean = '5.3-11 05-Mar-2020' ! Bug correction in MULTI
v_clean = '5.3-12 05-Mar-2020' ! Bug correction about buffers selected by UV_SELECT and/or U
v_clean = '5.3-13 11-Mar-2020' ! Bug correction in MAP_RESAMPLE (overflow of channel ranges)
v_clean = '5.3-14 25-Mar-2020' ! Remove a restriction in MAP_RESAMPLE (overflow of channel ra
v_clean = '5.3-15 25-Mar-2020' ! Improve the /FLUX display in CLEAN command
v_clean = '5.3-16 13-May-2020' ! Improve the WRITE MODEL command
v_clean = '5.4-01 21-May-2020' ! /FOR option of SPECIFY
v_clean = '5.4-02 09-Jul-2020' ! Command DISCARD
v_clean = '5.4-03 01-Sep-2020' ! Option /THRESHOLD for command FIT
v_clean = '5.4-04 03-Sep-2020' ! Improve UV_TIME command : more consistent defaults
v_clean = '5.4-05 11-Sep-2020' ! Bug correction in MASK APPLY (Blanking was not updated)
v_clean = '5.4-06 15-Sep-2020' ! Optimize MAP_RESAMPLE if no resampling needed
v_clean = '5.5-01 26-Oct-2020' ! Command UV_SMOOTH
v_clean = '5.6-01 07-Dec-2020' ! Command CCT_MERGE and CCT_CONVERT
v_clean = '5.6-02 14-Dec-2020' ! STATISTIC /EDGE option
v_clean = '5.6-03 14-Dec-2020' ! /ARES Argument must be Real array
v_clean = '5.6-04 14-Jan-2021' ! Debug VIEW and SHOW 4-D Beams
v_clean = '5.6-05 19-Jan-2021' ! Make sure UV_MAP works on Mosaics even in Memory limited co
v_clean = '5.7-01 31-Jan-2021' ! Command CCT_CLEAN
v_clean = '5.7-02 31-Mar-2021' ! FIT command make one fit per pointing
v_clean = '5.7-03 01-Apr-2021' ! MULTISCALE is now operational for Mosaics
v_clean = '5.7-04 01-Jun-2021' ! Bug correction for MULTISCALE in 4-D Beams
v_clean = '5.7-05 01-Jun-2021' ! More flexible FIT command
v_clean = '5.8-01 17-Jun-2021' ! SPECIFY FREQUENCIES command for VLA data
v_clean = '5.8-02 28-Jun-2021' ! UV_SHIFT bug correction for "false" mosaics (ID and MOFF co
v_clean = '5.8-03 28-Jun-2021' ! UV_SORT bug correction for /FILE option
v_clean = '6.0-00 21-Oct-2021' ! Split Language CLEAN\ into CLEAN\ and DISPLAY\ (no \at end p
v_clean = '6.0-01 09-Nov-2021' ! Bug correction in READ UV: undefine PREVIEW%, avoid write U
v_clean = '6.1-00 17-Nov-2021' ! Add /JVM option to command FIT
v_clean = '6.1-01 17-Nov-2021' ! CLEAN Variable ? syntax
v_clean = '6.1-02 17-Nov-2021' ! UV_MAP Variable ? syntax
v_clean = '6.1-03 19-Nov-2021' ! UV_REWEIGHT syntax bug correction
v_clean = '6.1-04 23-Nov-2021' ! Use the BEAM_JVM value in UV_RESTORE - (Defaults to 1 if not
v_clean = '6.2-00 02-Dec-2021' ! Add the /LIKE option to UV_RESAMPLE
v_clean = '6.2-01 16-Dec-2021' ! Optimize parallel processing
v_clean = '6.2-02 17-Dec-2021' ! Debug MAP_BEAM_STEP = 1 mode
v_clean = '6.2-03 17-Dec-2021' ! UV_CHECK beam works better
v_clean = '6.2-04 18-Dec-2021' ! UV_TIME now works for UV tables with per-channel weights
```

```
v_clean = '6.2-05 20-Dec-2021' ! UV_RESAMPLE must reset BEAM_RANGES variable
v_clean = '6.3-00 21-Dec-2021' ! Use new way of defining Dirty Beams number and properties.
v_clean = '6.3-01 03-Jan-2021' ! Parallel programming optimization for CLEAN
v_clean = '6.3-02 06-Jan-2022' ! Allow direct READ of FITS data cubes.
v_clean = '6.3-03 07-Jan-2022' ! READ /PLANES option now works as expected
v_clean = '6.3-04 11-Jan-2022' ! UV_FIELD bug correction
v_clean = '6.3-05 18-Jan-2022' ! READ SINGLE bug correction
v_clean = '6.3-06 20-Jan-2022' ! READ  with FITS format improvement
v_clean = '6.3-07 08-Feb-2022' ! Allow to use Fixed beamsize in UV_RESTORE
v_clean = '6.3-08 08-Feb-2022' ! CLEAN_STOP syntax in CLEAN
v_clean = '6.3-09 07-Mar-2022' ! Allow WRITE BEAM /APPEND in all cases
v_clean = '6.3-10 07-Mar-2022' ! Bug correction in beam derivation if ANGLE is specified
v_clean = '6.3-11 09-Mar-2022' ! Bug correction in CCT_MERGE : Concatenation was improper
v_clean = '6.4-00 18-Mar-2022' ! Implement the /RESTART option of CLEAN
v_clean = '6.4-01 22-Mar-2022' ! Flag out of band channels in UV_RESAMPLE
v_clean = '6.4-02 03-May-2022' ! /RESET option of UV_FILTER
v_clean = '6.4-03 10-May-2022' ! Bug correction in UV_SHIFT and PROPER_MOTION
v_clean = '6.4-04 02-Jun-2022' ! Make SPECIFY TELESCOPE work on Images too
v_clean = '6.4-05 09-Jun-2022' ! Debug UV_FLAG command
v_clean = '6.4-06 29-Jun-2022' ! Make UV_EXTRACT work with Random Frequency Axis
v_clean = '6.4-07 29-Jun-2022' ! Make READ handle properly Random Frequency Axis in UVFITS fo
v_clean = '6.5-00 05-Sep-2022' ! Add the /ASYMMETRIC option of MAP_SMOOTH and UV_SMOOTH
v_clean = '6.5-01 27-Sep-2022' ! Add the UNIT specifier to MAP_REPROJECT
v_clean = '6.5-02 07-Oct-2022' ! Bug correction in Beam Consistency checking
v_clean = '6.5-03 10-Oct-2022' ! Use a Channel mask array to hide line-emitting parts of the
v_clean = '6.5-04 07-Nov-2022' ! Make sure MAP_CENTER is also used for Mosaics
v_clean = '6.5-05 14-Nov-2022' ! Bug in UV_SHIFT: Pointing center was incorrectly reset in /I
v_clean = '6.5-06 14-Nov-2022' ! Bug in UV_MOSAIC: Wrong identification of arguments
v_clean = '6.5-07 14-Nov-2022' ! Make sure MAP_CENTER is never forgotten (Mosaic stills needs
v_clean = '6.5-08 15-Nov-2022' ! UV_TIME crashed on Mosaics
```

2.3 ADVANCED Language

```
character(len=20) :: v_advanced  ! ADVANCED
! ADVANCED\ Language versions   v_advanced
v_advanced = '1.0-01 01-Dec-2017' ! Command UV_PREVIEW
v_advanced = '1.0-02 08-Mar-2018' ! Commands UV_DEPROJECT  and UV_RADIAL
v_advanced = '1.1-02 08-Mar-2018' ! Commands MODEL, SOLVE /MODE, CALIBRATE and UV_MAP /SELF
v_advanced = '1.2-01 10-Apr-2018' ! Template for Command UV_SHORT
v_advanced = '1.2-02 26-Apr-2018' ! Operational Command UV_SHORT - Still problems with repeti
v_advanced = '1.3-01 03-Jul-2018' ! Rename CALIBRATE into APPLY -- Split with CALIBRATE\ lang
v_advanced = '1.3-02 26-Sep-2018' ! Add SLICE and EXTRACT commands
v_advanced = '1.3-03 26-Sep-2018' ! allow support for VIEW (or SHOW) AnySicImage
v_advanced = '1.3-04 26-Sep-2018' ! UV_PREVIEW bug correction
v_advanced = '1.4-01 23-Nov-2018' ! Rename language to ADVANCED, and insert SELFCAL command
v_advanced = '1.4-02 26-Nov-2018' ! Add UV_FIT command
v_advanced = '1.4-03 28-Nov-2018' ! Add MOMENTS command
v_advanced = '1.4-04 28-Nov-2018' ! Add CATALOG command
```

```
v_advanced = '1.4-05 15-Jan-2019' ! Better version of the CATALOG command - Drives a script
v_advanced = '1.4-06 23-Jan-2019' ! Correction of a bug in UV_PREVIEW
v_advanced = '1.5-01 24-Jan-2019' ! Add the ADVANCED\MASK command
v_advanced = '1.5-02 04-Feb-2019' ! Debug the UV_FIT command -- Add the /FILE option for UV_
v_advanced = '1.6-01 26-Feb-2019' ! Add the UV_ADD command (similar to UV_DOPPLER in ASTRO)
v_advanced = '1.6-02 27-Feb-2019' ! Move the STOKES command from the Clean\ language
v_advanced = '1.6-03 19-Mar-2019' ! Add the UV_MERGE command (simpler than the task...)
v_advanced = '1.6-04 20-Mar-2019' ! Add the COLOR and FLUX commands
v_advanced = '1.6-05 28-Mar-2019' ! /SAVE option of UV_FIT
v_advanced = '1.6-06 14-May-2019' ! HOW_TO command
v_advanced = '1.7-01 19-May-2019' ! FEATHER command
v_advanced = '1.7-02 24-May-2019' ! XY_SHORT command
v_advanced = '1.8-01 20-Jul-2019' ! UV_CIRCLE command
v_advanced = '1.8-02 22-Jul-2019' ! /RESULT option of UV_FIT command
v_advanced = '1.8-03 31-Jul-2019' ! PROPER_MOTION command
v_advanced = '1.8-04 23-Sep-2019' ! Improved UV_FIT command
v_advanced = '1.8-05 16-Oct-2019' ! COMBINE command
v_advanced = '1.8-06 17-Oct-2019' ! FLUX and MAP_CONTINUUM commands bug correction
v_advanced = '1.9-00 29-Nov-2019' ! Move the COMBINE and SELFCAL to the BUNDLES\ language
v_advanced = '1.9-01 20-Jan-2020' ! Speed-up (considerably) UV_PREVIEW
v_advanced = '1.9-02 20-Jan-2020' ! Add the UV_CORRELATE command
v_advanced = '1.9-03 06-Feb-2020' ! Change name of SLICE buffer to SLICED for Python
v_advanced = '1.9-04 12-Feb-2020' ! Allow UV_MERGE to merge Line tables in CONTINUUM mode
v_advanced = '1.9-05 17-Feb-2020' ! UV_PREVIEW bug correction. Also affects MAP_CONTINUUM
v_advanced = '1.9-06 18-Feb-2020' ! Improved STATISTIC command
v_advanced = '2.0-00 19-Feb-2020' ! MOMENTS /CUTS option and improved SHOW MOMENTS
v_advanced = '2.0-01 20-Feb-2020' ! UV_SHORT ? proper support
v_advanced = '2.0-02 20-Feb-2020' ! UV_SHORT with non-circular Short-Spacing beam
v_advanced = '2.0-03 26-Feb-2020' ! UV_SHORT /CHECK option
v_advanced = '2.1-00 27-Feb-2020' ! UV_SHORT with minimum baseline and single-fields
v_advanced = '2.1-01 29-Mar-2020' ! Improvements in MOMENTS
v_advanced = '2.1-02 13-May-2020' ! Improvements in UV_CORRELATE
v_advanced = '2.1-03 14-May-2020' ! Bug correction in UV_PREVIEW and UV_CORRELATE
v_advanced = '2.1-04 28-May-2020' ! UV_PREVIEW /BROWSE command
v_advanced = '2.1-05 10-Jun-2020' ! UV_PREVIEW /FILE Fich [Drop] command
v_advanced = '2.1-07 26-Oct-2020' ! Debug completely UV_MERGE command (or 2021 ?)
v_advanced = '2.2-00 26-Oct-2021' ! Move CATALOG and FIND to DISPLAY\ Language
v_advanced = '2.2-01 18-Nov-2021' ! UV_SHORT V 3.9 syntax and Help improvement
v_advanced = '2.3-00 26-Nov-2021' ! MAP_CONTINUUM /METHOD option
v_advanced = '2.4-00 02-Dec-2021' ! UV_MOSAIC command
v_advanced = '2.4-01 19-Dec-2021' ! UV_MERGE /MODE CONCATENATE command
v_advanced = '2.4-02 19-Dec-2021' ! EXTRACT and SLICE syntax improvements.
v_advanced = '2.4-03 19-Dec-2021' ! EXTRACT now allows expansion
v_advanced = '2.4-04 08-Feb-2022' ! UV_FIT prints primary beam corrected flux
v_advanced = '2.4-05 17-Apr-2022' ! STOKES can now work on internal buffer
v_advanced = '2.4-06 22-Apr-2022' ! UV_PREVIEW syntax change & improvement
v_advanced = '2.4-07 25-May-2022' ! MOMENTS SMOOTH keyword
```

```
v_advanced = '2.4-08 07-Jun-2022' ! UV_FIT /UVRANGE Min Max
v_advanced = '2.4-09 29-Jun-2022' ! STOKES: Correct derivation from H-V polarization
v_advanced = '2.5-00 05-Jul-2022' ! First operational version of MAP_POLAR
v_advanced = '2.5-01 08-Sep-2022' ! Bug correction in EXTRACT command
v_advanced = '2.5-02 13-Oct-2022' ! Allow adding columns in UV_ADD /FILE
v_advanced = '2.6-00 08-Nov-2022' ! Move EXTRACT and SLICE to DISPLAY\ language
```

2.4 CALIBRATE Language

```
character(len=20) :: v_cal       ! CALIBRATE
! CALIBRATE\ Language versions  v_cal
v_cal = '1.0-01 03-Jul-2018' ! Split with CALIBRATE\ language
v_cal = '1.1-01 07-Jul-2018' ! /MINVAL option instead of /MINFLUX for MODEL
v_cal = '1.2-01 20-Mar-2019' ! Rename command FLUX_SCALE into SCALE_FLUX
v_cal = '1.3-01 16-Jul-2019' ! Command COLLECT
v_cal = '1.3-02 16-Jul-2019' ! Command DERIVE
v_cal = '1.4-01 03-Sep-2019' ! Move STATISTIC command to this language
v_cal = '1.4-02 06-Sep-2019' ! Implement UV_SELECT selection command
v_cal = '1.4-03 13-Sep-2019' ! Move UV_SORT command to this language
v_cal = '1.4-04 26-Sep-2019' ! APPLY command modification ((weights and flags, r1.11)
v_cal = '1.5-01 08-Nov-2019' ! COLLECT /FLAG option and bug correction
v_cal = '1.6-01 17-Jan-2020' ! FIND Fmin Fmax command
v_cal = '1.7-01 19-Mar-2020' ! MODEL /MODE IMAGE  implemented.
v_cal = '1.7-04 13-May-2020' ! MODEL command defines UV_MODEL
v_cal = '1.7-05 26-May-2020' ! Finish MODEL /MODE IMAGE implementation
v_cal = '1.7-06 15-Sep-2020' ! Add time tolerance in command APPLY
v_cal = '1.8-00 28-Oct-2021' ! Move STATISTIC command to DISPLAY\ language
v_cal = '1.8-01 11-Jan-2022' ! Protect MODEL against undefined data units.
v_cal = '1.8-02 17-Jan-2022' ! Add the Frequency keyword to MODEL /MODE
```

2.5 BUNDLES Language

```
character(len=20) :: v_bundles   ! BUNDLES
! BUNDLES\  Language versions  v_bundles
v_bundles = '1.0-00 29-Nov-2019' ! Move the COMBINE and SELFCAL to the BUNDLES\ language
v_bundles = '1.1-00 11-Mar-2020' ! Add the EXPLORE tool
v_bundles = '1.2-00 25-Mar-2020' ! Add the KEPLER tool
v_bundles = '1.2-01 29-Mar-2020' ! Add the KEPLER_VELO variable
v_bundles = '1.2-02 13-May-2020' ! Add the KEPLER /RESET option
v_bundles = '1.3-01 22-May-2020' ! Add the UV_DETECT /COMPRESS command
v_bundles = '1.3-02 26-May-2020' ! Better UV_DETECT command
v_bundles = '1.3-03 30-May-2020' ! First correct UV_DETECT command
v_bundles = '1.3-04 10-Jun-2020' ! Handle KEPLER_X0 and KEPLER_Y0 properly
v_bundles = '1.3-05 09-Jun-2020' ! Re-size CONTINUUM data if needed in UV_RESTORE
v_bundles = '1.4-01 30-Jul-2020' ! /VDISK option for KEPLER
v_bundles = '1.4-02 01-Sep-2020' ! /VELOCITY option for KEPLER
v_bundles = '1.4-03 09-Sep-2020' ! /MASK option for KEPLER
v_bundles = '1.4-04 11-Sep-2020' ! /VDISK renamed to /VSYSTEM in KEPLER
```

```
v_bundles = '1.5-05 14-Dec-2020' ! SPECTRAL_CLEAN command
v_bundles = '1.5-06 14-Dec-2020' ! /HFS option to KEPLER SHOW
v_bundles = '1.6-00 28-Oct-2021' ! Move command EXPLORE to DISPLAY\  Language
v_bundles = '1.6-01 18-Nov-2021' ! Finish moving command EXPLORE to DISPLAY\  Language
v_bundles = '1.6-02 29-Sep-2022' ! /WIDGET option to KEPLER
```

2.6 IMAGER Language

```
character(len=20) :: v_imager    ! IMAGER
! IMAGER\ Language version v_imager
v_imager =  '1.0-00 23-Mar-2022' ! First built-in release of IMAGER\ language
v_imager =  '1.0-01 10-May-2022' ! Insert the PIPELINE command in stack
v_imager =  '1.0-02 30-May-2022' ! Add the /PLOT option to SDI
v_imager =  '1.1-00 17-Oct-2022' ! Move the POPUP command to DISPLAY\
v_imager =  '1.1-01 02-Nov-2022' ! Add the /MODE option to PIPELINE
```