What is new in CIA 5.0?

New and improved algorithms

- New **distortion correction**: We have now significantly improved distortion corrections. You can apply them not only for rasters as before, but also for CVFs and staring observations:
  - **Distortion coefficients** exist now for all 6″ PFOV, LW configurations and for some 3″ PFOV, LW fixed filters
  - With the routines
    * **project_bs**
    * **project_cvf**
    * **project_struct**

    You can now correct your beam-switch, cvf or staring observations for distortion effects, magnify them or, if you corrected the astrometry with **xcorr_astro** for shifts induced by the CVF, get even a properly aligned image-stack where you can derive easily a spectrum
- Improved **projection** via the routine **raster_scan** featuring:
  - Reduced flux loss
  - More projection methods
  - New WCS library
  - Improved astrometric accuracy
  - Creation of the raster via weighted mean (options *wcalg*, *wauto* and *wmap*)
  - Easier access for drizzling via the keyword */shrink*
- Improved treatment of **solar system objects** by the new routine **project_sso**

  ```
  CIA> project_sso, struct, eph=eph
  ```
- Upgrade of **flux conversion** calibration. **conv_flux** uses improved flux conversion (sensitivity) factors) and is now time-dependent. Additionally the calibration file **ccglwsens** contains now the column senserr to hold the uncertainty on the conversion factors
- New **deglitching routines**: sky-cube deglitching *sky* and two-pass sigma deglitching *ksig*. Sky-cube deglitching can do miracles rejecting faders and dippers from rasters with redundant pointings. ksig deglitching is a second order deglitching on stabilized data to remove:
  1. Glitches
  2. Tails of glitches
  3. Residual tails of up-/downward transients

  You can call these methods by

  ```
  CIA> deglitch, raster, method="sky"
  CIA> deglitch, data, method="ksig"
  ```
- The **median filtering** for the treatment of faint source observations was improved, including a new algorithm to best window size.

  The calling syntax is:

  ```
  CIA> stabilize, data, method="med"
  ```

New and improved functionality

- With **xcorr_astro** you can correct for the astrometric shift due to ISOCAM's wheel jitter
- Several routines can exist now in **multiple copies**:
  - **xdisp**
  - **ximage**
  - **xphot**
  - **cvf_display**
  - **show_frame**
  - **xcube**
- Improved **help** help functionality:
  - **cia_help** can now search for multiple items (separated by blanks), e.g. entering ≪display product≫ will list you all routines which contain the words display and product in their headers
  - The IDL help functionality (available with **widget_olh** or **ciainfo**) works also for the ASTROLIB
  - We have now the command **cia_html** which provides help in HTML format
- additional capabilities for **creation of rasters** by **get_sscdraster**:
  - The keywords */north* and */camera* can overrule the default behaviour (mosaic north oriented for north axis rasters and camera oriented for spacecraft axis rasters), thereby giving the user the choice to determine the orientation of the mosaic
  - The */square* option ensures the creation square mosaic pixels. (For certain raster-steps rectangular pixels are produced as default, which leads to elliptical looking sources)
  - Using the */nocheck* keyword also rasters with missing or repeated images/positions can be treated
- New display tool **xcube**. You might like to use this instead of **x3d**.

  xcube has many features:
  - The input can be 2 cubes, so it easy to compare them (e.g. before and after transient correction).
  - You can select the data to be displayed, cube, image, mask by clicking.
  - Range in the cube : the borders of the scd appears in the time plot of the cube, and you can zoom on one scd, one block, etc... You can also type the range (e.g from frame 400 to 500).
  - You can select the scale of the time plot : linear-linear, linear-log, etc... You can choose minimum and maximum of intensity and the unit of time : seconds or frame index.
  - You can choose the scale of the intensity of displayed cube (linear, logarithmic, by histogram equalisation), and the minimum and maximum of intensity
  - You can put the plot in a different window and save it as postscript file.
  - You can put the image in a different window and save it as postscript file.

- Upgrade to the latest **SLICE** version, **SLICE V1.2**. New features of this **SLICE** version are:
  - actions on bad pixels, ghost and sources have been integrated into one task
  - the */docube* option permits now to perform operations which were previously performed on raster positions can be now done on individual frames. This is quite interesting for bad pixels
  - the error map is now generated by default
- The faint source detection tool **PRETI** is now distributed with CIA.

  Calling syntax is:

  ```
  CIA> reduce_faint_source, 'cisp_file.fits', raster
  ```
- Improvement of **display routines**:
  - for **tviso** the *min_real* and *max_real* keywords work now properly, and accept also 0 as input. Furthermore a new keyword *source_lis*t was added, which puts a star on the positions given by source list
  - **ximage** uses now the distortion correction on the sky view (pixel history) of a raster
- Improved functionality of **sscd_clean**:
  - The new keyword *min_scd* rejects sscds if they have less than min_scd states was introduced
  - **sscd_clean** now acts properly on trailing CAM parallel readouts which still contain the raster-point ID of the last raster-point
- Upgrade of **point-source photometry routines**:
  - **fit_isopsf** doesn't modify the input parameters xin and yin any more. As option the output remainder, a fltarr containing the PSF subtracted input image was added. The option *confused* improves **fit_isopsf's** behaviour for confused regions. Additionally it also returns a statistical measure of the positional error.
  - the new routine **photom_psf** was introduced as an user-friendly way to do PSF photometry
  - the new routine **photom_aper** was introduced as an user-friendly way to do aperture photometry
  - **xcvf** now has the ability to read/write apertures. This way, users can simply load a previously defined aperture to work on several different cvf datasets. The file I/O is now done via IDL's dialog_pickfile routine
- It is now possible to **recover previously unusable data** suffering from the mis-use of the raster-point with the program **repair_rpid**. It patches a (0,0) raster-point id (contained in GPSCRPID) of an ISOCAM ERD or SPD fits file with the best guess rasterpoint ID contained in GPSCFILL.

  Calling syntax is:

  ```
  CIA> repair_rpid, file
  ```
- The **slicers** were improved:
  - use corrected coordinates from the pointing files by default
  - the number of read-outs accumulated or sampled on board (ACSA) was added as slicing criteria
- We upgraded to the latest version of the **ASTROLIB**
- CIA runs under all IDL versions 5.0, 5.2, 5.3 and 5.4

Bug fixes

There are several bug fixes and many more small improvements:

- **isocont** doesn't crash any more if the image dimension is a prime number
- sliders were introduced into **xphot** to help to get the cuts right
- **simul_source** can now also generate distorted PSFs by setting the */use_disto* keyword. Also the */raw* option (sources are added in ADUs, not ADUGs) was added.
- The new option */pol* in **spdtoscd** ignores now the beam-switch flag, whose spurious changes during polarisation observation led to unnecessary slicing
- The central wavelength used for color-correction was outdated. This is fixed now.
- **imagette2fits** works now properly for observations with different pixel-field-of-view and for mixed SW/LW observations
- the chattiness of low-revel routines was reduced
- **la_mul** works now also for cube $\times$ image