CASA Update

Recent Progress and Future Plans of CASA and PIPELINE

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on behalf of CASA and
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Common Astronomy Software Applications (CASA)

CASA

- A data reduction and analysis software of data observed by radio astronomical telescopes, both interferometer and single dish

- CASA officially supports ALMA (including TP), EVLA, Nobeyama 45-m telescope, and ASTE (spectral line observations)

- All ALMA PI data are processed by CASA before delivered to observers and data processed by CASA are archived
  - ALMA PIPELINE also uses CASA inside

- The latest CASA release is 4.7.0. Schedule of the next releases:
  - A patch release 4.7.1 in March for Cycle 4 use
  - CASA release 5.0 (ETA: March 2017)

- Developed in collaboration with NAOJ, NRAO, ESO, and ASIAA
  - ASIAA newly joined the team! The initial focus is on CARTA

CASA Progress (as of 4.7.1)

General

- **Proper handling of bdfflags from ALMA in importasdm** (4.7.1)

- **Extended support of data formats**

    – importatca (RPFITS), importnro (NOSTAR), inportasap (Scantable)

- **Extended metadata summarization features** (msmd tools)

- **Unification of data handling infrastructure**

    – refactoring of split, hanningsmooth, and cvel (ongoing: calibration)

Interferometry

- **tclean improvements**

    – Auto-boxing: usemask='auto-thres' or 'auto-thres2'

    – parallelization for continuum and cube modes (under tests)

CASA Progress - continued

Single Dish

- **Transition to processing on Measurementset (MS transition)**
  - 70% of single dish task features in ASAP has been migrated
  - verified a workflow to process multi-beam observation datasets by FOREST, a new receiver on Nobeyama 45-m telescope.

- **Support of ALMA Cycle 4**
  - CASA supports end-to-end processing of Solar fast-scanning observations
  - CASA and PIPELINE supports end-to-end processing of muti-target source observations

Find more at CASA webpage! http://casa.nrao.edu

CASA

CASA – Major development activities

- New web-based documentation using Plone (CASA 5.0)

  - https://casa.nrao.edu/plonedocs

- Activate crash reporter by default (CASA 5.0)

- Further improvements to tclean: finalize auto-boxing, cube parallelization

- Streamline polarization calibration of ALMA

- Complete MS transition of single dish module

- Performance improvements of new single dish module

- Use better ALMA Primary beams (details TBD)

- VLBI capabilities have been developed at Jive (CASA 5.0)

**Users feed back would be appreciated (via help desk, etc.)**

PIPELINE Status - Interferometry

- Standard mode observations of ALMA are processed by PIPELINE

- **Interferometry imaging PIPELINE is started to be used in Cycle 4!**

Pipeline Performance (as of Dec 15)

- **Calibration**: Apparent decrease in number requiring manual flags. (Still small number statistics for Cycle 4)

- **Preliminary Imaging Results**

  - 72 MOUSes processed at NAASC

  - 55% Success (w/o intervention)

  - 36% Intervention

  - 8% Need Selfcal

  - 1% Diverted to Manual

Cycle2
Cycle3
Cycle4
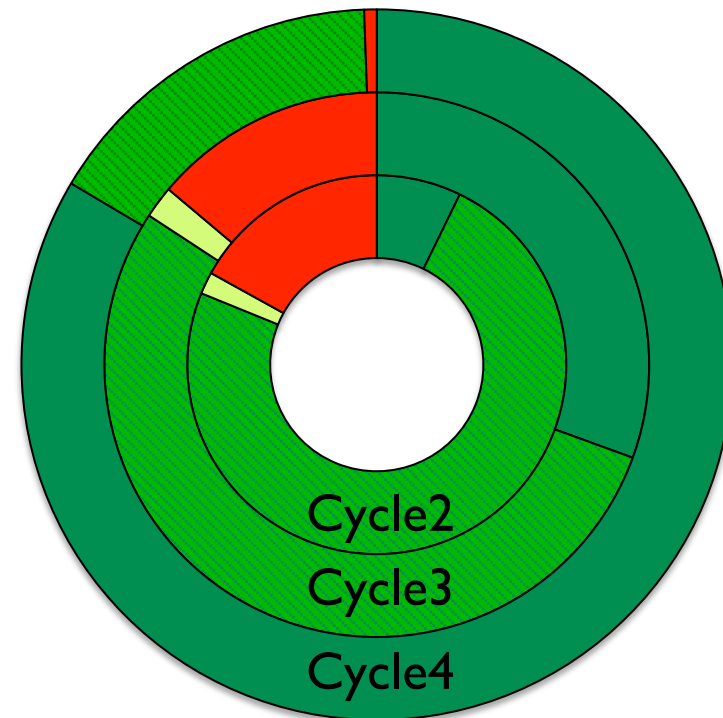
■ No Intervention   ■ Intervention
□ Tweaked   ■ Sent to Manual

PIPELINE Status - Single Dish

- Standard mode observations of ALMA are processed by PIPELINE
- **Single Dish PIPELINE is started to be used in Cycle 3 for both calibration and imaging!**
- **PIPELINE fully operates on Measurementset in Cycle 4**

Cycle 3 results as of Nov. 25
- 72 MOUSes processed by PL
- 75% Delivered to PI (w/o intervention)
- 17% PL Failed
  - 3/4 of them failed by memory consumption

malformed data 8%

Fail 17%

Success 75%

CASA
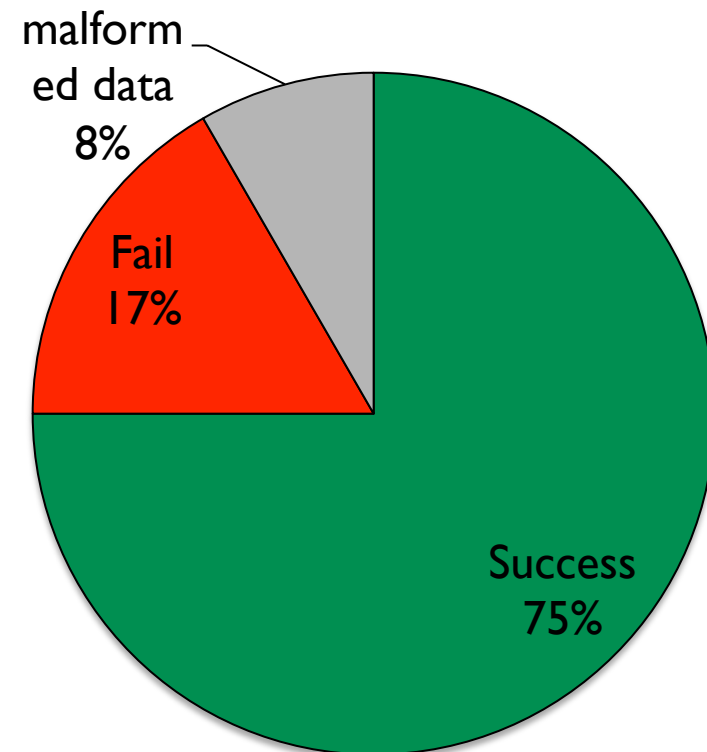
PIPELINE Priorities toward Cycle 5

- **AQUA interaction**: AQUA is responsible for QA2 support
  - PIPELINE passes information for sensitivity calculation and more FITS keywords
- **Support efficient review of PL results**: WebLog, PIPELINE QA score
- **Performance improvements**
  - parallelization, better memory management, less memory usage
- **Improvements of imaging product** (interferometer)
  - auto-boxing and deeper clean
- **APDM interaction**
  - getting user intents, e.g., imaging parameters, a representative source
- **Nobeyama PIPELINE**
  - based on ALMA single dish PIPELINE (ETA: 2017 Q4)