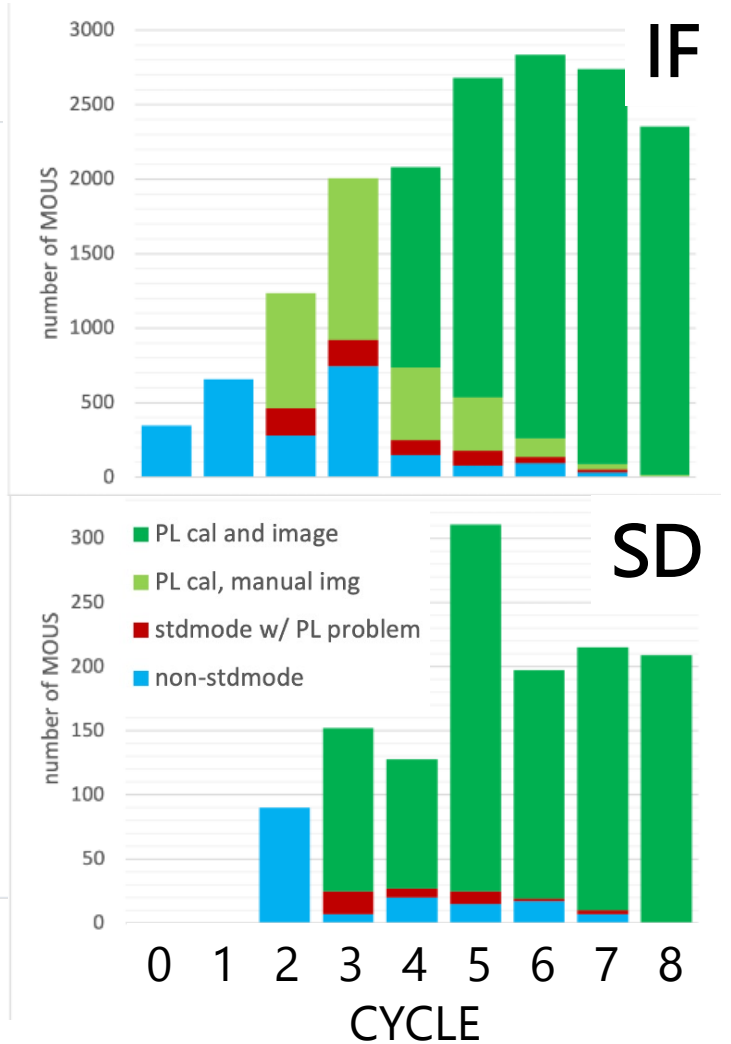
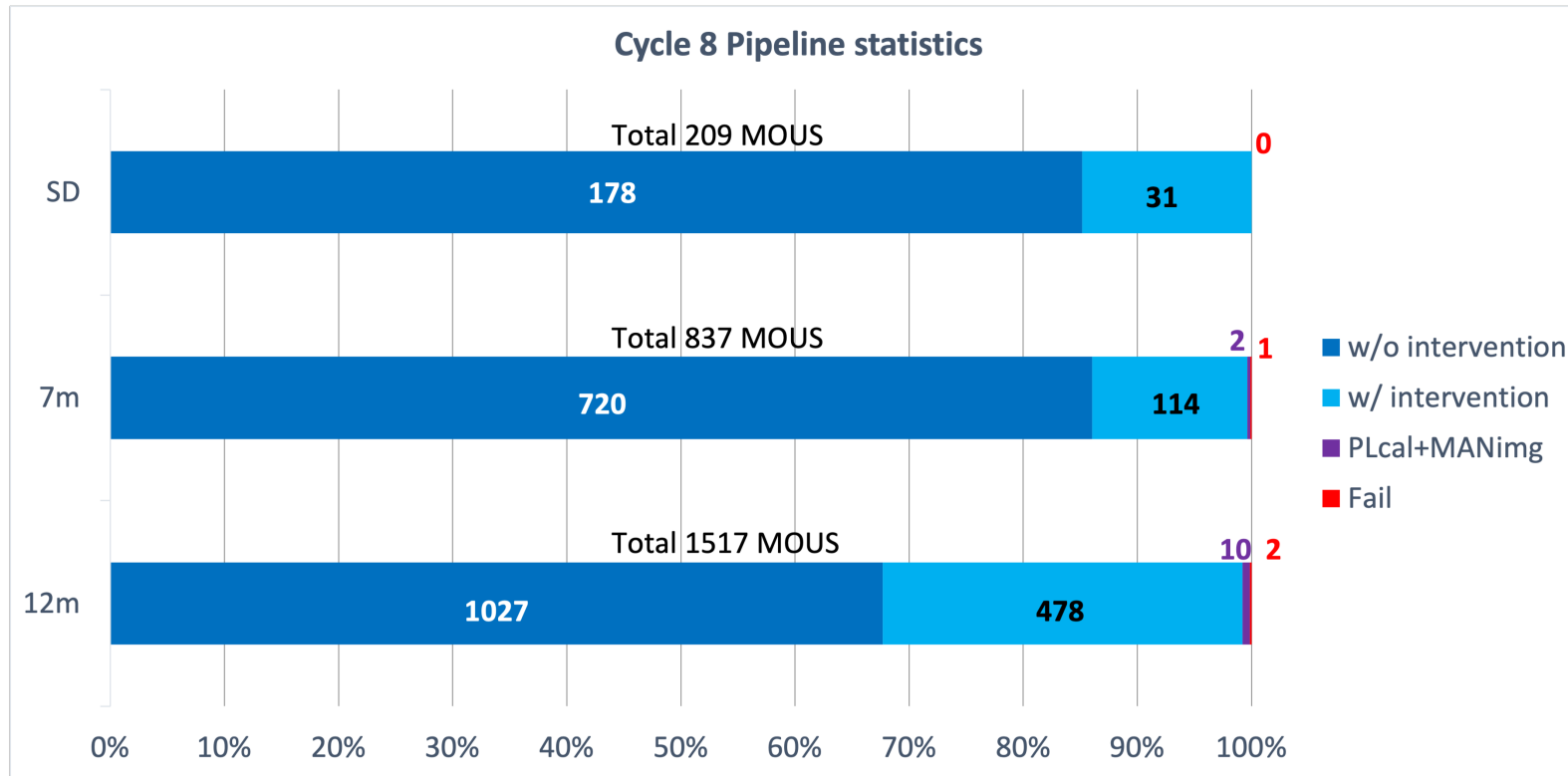


CASA/Pipeline Updates

Toshiki Saito, Takeshi Nakazato, Kanako Sugimoto, and Satoko Takahashi (NAOJ)
on behalf of CASA and Pipeline teams



Operation of Cycle 8 Pipeline





CASA and Pipeline Releases

CASA

- Incremental release (every 2 months)
- Modular (pip wheels) and monolithic (tar-ball)
- CASA 6.4.3 (Jan. 2022), CASA 6.4.4 (Apr. 2022)
- CASA 6.5.0 (Jun. 2022), CASA 6.5.1 (Aug. 2022), CASA 6.5.2 (Oct. 2022)

Pipeline

- One release/year/project
- Packaged with CASA as a tar-ball
- **2022.2.0.64 + CASA 6.4.1 for ALMA Cycle 9, Nobeyama,** and VLA
- 2022.1.1.5 + CASA 6.4.1 for VLASS Coarse Cubes





Highlights of CASA Updates (1/3)

- Please see Release Information of casadocs for detail
 - CASA 6.4.x
<https://casadocs.readthedocs.io/en/v6.4.4/notebooks/introduction.html>
 - CASA 6.5.x
<https://casadocs.readthedocs.io/en/stable/notebooks/introduction.html>

Infrastructure

- Multi-platform support
 - RHEL7+Python 3.6/3.8, **RHEL8+Python 3.8**
 - Ubuntu 18.04+Python 3.6/3.8, Ubuntu 22.10+Python 3.8
 - macOS 10.14/10.15/11 x86/12 ARM+Python 3.8
- Performance benchmark <https://casangi.github.io/casabench/>
- prototyping for next generation CASA (CNGI) - not yet included





Highlights of CASA Updates (2/3)

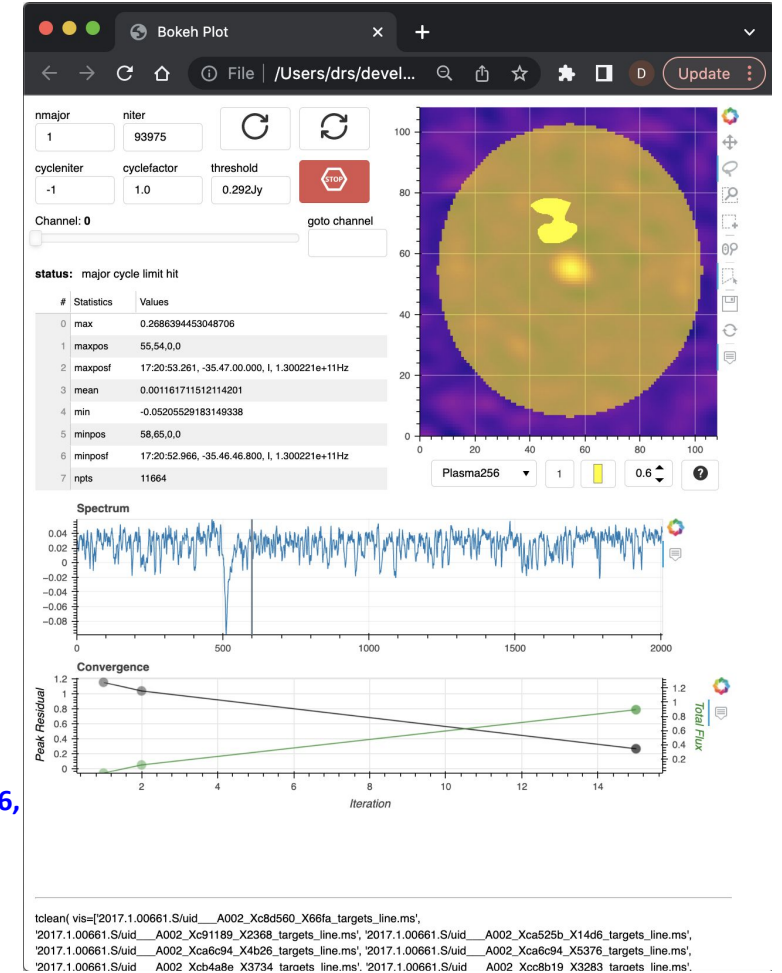
Interferometry

- new **deconvolve** task
- new **uvcontsub** task
- improved shadow flagging for ACA
- restructuring imaging tasks to return dictionaries to include convergence history
- new interactive CLEAN prototype (browser/standalone app)

```
>>> from casagui.apps import InteractiveClean
```

```
>>> ic = InteractiveClean(
    vis=vis, imagename='try', imsize=256,
    cell='8.0arcsec', specmode='cube',
    interpolation='nearest', niter=400,
    threshold='0.05Jy', cycleniter=25,
    deconvolver='hogbom')
```

```
>>> ic()
```



```
toclean(vis=['2017.1.00661.S/uid__A002_Xc8d560_X66fa_targets_line.ms',
'2017.1.00661.S/uid__A002_Xc91189_X2368_targets_line.ms', '2017.1.00661.S/uid__A002_Xca525b_X14d6_targets_line.ms',
'2017.1.00661.S/uid__A002_Xca6c94_X4b26_targets_line.ms', '2017.1.00661.S/uid__A002_Xca6c94_X5376_targets_line.ms',
'2017.1.00661.S/uid__A002_Xcb4a8e_X3734_targets_line.ms', '2017.1.00661.S/uid__A002_Xcc8b19_X3283_targets_line.ms']
```





Highlights of CASA Updates (3/3)

Single-Dish

- new **imbaseline** task - image based spectral baseline subtraction
- new caltype of **gencal** to access Jy/K DB
- performance improvement of imaging tasks
 - ~30% improvement of **sdimaging** for Solar TP data
 - ~20% improvement of **tsdimaging** for ephemeris data
- several bug fixes/improvement of **sdbaseline**





Highlights of Pipeline Updates (1/3)

- Please see User's Guide for detail
<https://almascience.nao.ac.jp/documents-and-tools/cycle9/alma-science-pipeline-users-guide-casa-6-4.1>

Infrastructure

- Weblog: better "Pipeline QA" notifications

1. hifa_importdata
2. hifa_flagdata
3. hifa_fluxcalflag
4. hif_rawflagchans
5. hif_refant
6. h_tsyscal
- 7. hifa_tsysflag**
8. hifa_antpos
9. hifa_wvrgcalflag
10. hif_lowgainflag
11. hif_setmodels
12. hifa_bandoassflag

7. Flag T_{sys} calibration

BACK

QA Score: 0.98 6.79% of data in uid__A002_Xc8592e_Xd7b4.ms.h_tsyscal.s6_2.tsyscal.tbl was newly flagged [All QA Scores \(4 green\)](#)

Most Severe Notification: Attention! uid__A002_Xc8592e_Xd00e.ms.h_tsyscal.s6_1.tsyscal.tbl: 40 out of 1840 spectra were fully flagged in all channels (for any polarisation) prior to evaluation of flagging heuristics. [All Notifications \(27\)](#)

Contents

- Reference antenna update
- T_{sys} after flagging





Highlights of Pipeline Updates (2/3)

Interferometry

- several improvements to Low-SNR calibration heuristics
- findContinuum: better handling of weak extended emission with strong compact source
- hifa_renorm: exclude atmospheric features from renormalization
- prepare for self-calibration in a future release
- QA
 - new phase stability QA diagnostic (hifa_spwphaseup)
 - new spw-spw phase offset QA (hifa_timegaincal)
 - hifa_wvrgcalflag QA improvements

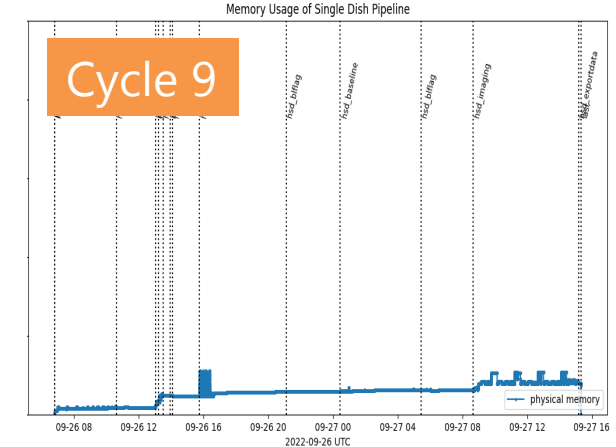
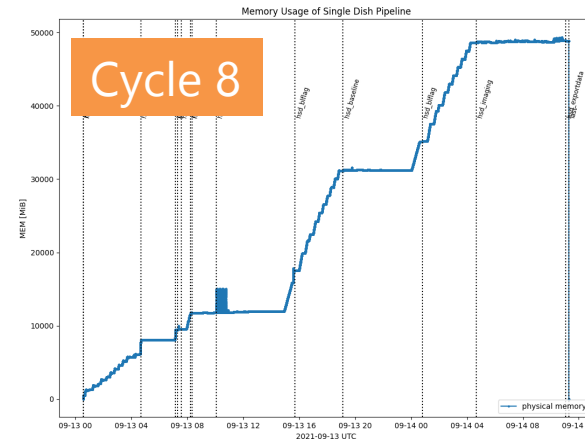
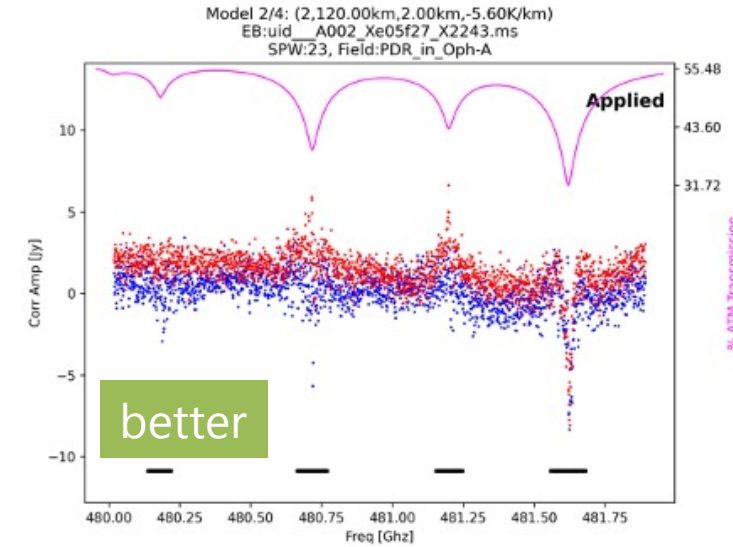
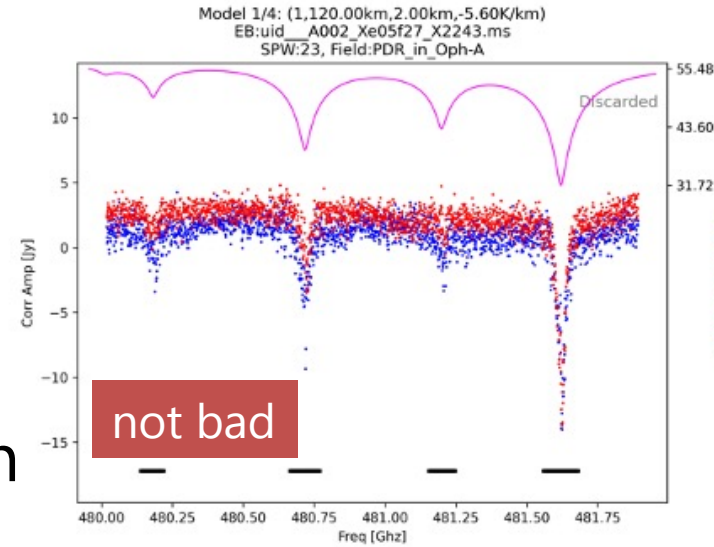




Highlights of Pipeline Updates (3/3)

Single-Dish

- Heuristics on offline atmospheric correction
 - choose best atmospheric model per EB
- Support of TP SpectralScan mode (Cycle 10)
- Improved ephemeris imaging (SOURCE frame)
- Significant reduction of memory consumption
 - CASA's bug fix
 - memory usage is ~1/10 of Cycle 8 Pipeline





Nobeyama Pipeline

- CASA 6.1.1-15 (Pipeline 2020.1.40) or later supports OTF observations by Nobeyama 45-m telescope with FOREST.
- Please use CASA 6.2.1-7 (Pipeline 2021.2.0.128) or later, which fixes a bug in restoredata task
- See Nobeyama Pipeline Users Guide for detail:
<https://www.nro.nao.ac.jp/~nro45mrt/html/obs/CASA/pipeline/NobeyamaPipelineUsersGuide.html>

Nobeyama 45-m / ASTE Science Data Archive status (as of 2022/12/20)

- <https://nobeyama-archive.nao.ac.jp/user/index.html>
- 4777 (3537+1240 compared to the previous users meeting) datasets from five seasons (2017-18, 2018-19, 2019-20, 2020-21 and 2021-22) were successfully processed and stored.
- MeasurementSets and the pipeline products including FITS data
- will process the data observed from 2013 to 2017 as well as the future seasons (2022-23 and beyond)





Plans of Pipeline and CASA releases in 2023

CASA 6.6

- introduction of CNGI functions into CASA 6
- GPU gridder
- new Interactive CLEAN, deprecate viewer
- multi-MS support for polcal
- more performance improvement of tsdimaging, retirement of sdimaging

Pipeline 2023

- Migration from RHEL7/Python 3.6 to RHEL8/Python 3.8
- QA improvements
- Band 1 support
- initial selfcal implementation
- further improvement of line detection & validation for spectral baseline subtraction





Thank you for your attention