



ASKAP Pipeline source finding

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ASKAP Pipelines Overview

Several pipelines running on Pawsey Centre supercomputer

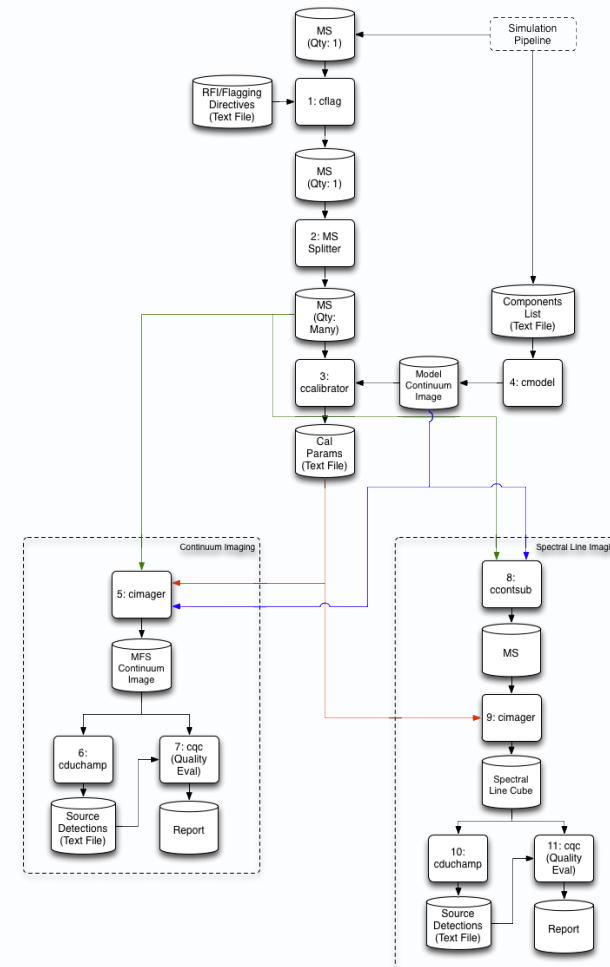
Continually running:

- Calibration
- Transient detection

Run at end of observing:

- Continuum imaging (MFS)
 - Run first to finalise calibration
- Spectral imaging (30-300 or 16K channels)

Source finding in each case, for science and Sky Model updating



Imaging pipeline summary

Current understanding of what the continuum imaging pipelines will look like

- “EMU” imaging:
 - Multi-scale multi-frequency synthesis
 - Just Stokes I (?)
 - Outputs: Taylor-term images (0,1,2: model, residual, restored), plus PSF, sensitivity
- “POSSUM” imaging
 - Multi-scale synthesis, 30-300 channels, IQUV
 - Each channel imaged separately
 - Outputs: Cleaned cubes (IQUV: model, residual, restored), plus PSF, sensitivity

“EMU” source finding

Primary EMU data product: Stokes I Taylor-term image

Source finding done on “Taylor-0” image – flux at reference frequency

Searching algorithms still topic of research

- Spatial variation of detection threshold
- De-blending of merged/confused sources
- Component fitting to compact sources
- Extended/Diffuse source extraction likely to be a separate pipeline

Catalogue produced includes:

- Set of components, with fluxes, spectral index/curvature, local noise

Sky Model

Global Sky Model used as basis for calibration of telescope

Best prior guess as to what the sky looks like

Composition of Sky Model:

- All sources down to $\sim 1\text{mJy}$
- Discrete components, as result of source finding
- Image cutouts, for complex sources

Sky model used for

- Calibration
- Starting point for cleaning
- Continuum subtraction for spectral-line imaging



POSSUM source-finding

Inputs

- Imaging:
 - Multi-frequency synthesis (Stokes I)
 - Coarse spectral-cube (up to 300 channels, all Stokes)
- Source catalogues:
 - “EMU” catalogue: Stokes I continuum sources
 - Sky Model: will contain polarisation information

Outputs

- Integrated spectra (Q, U, V?) of each “EMU” source location
- RM Synthesized spectra, no RM clean
- Basic polarisation measurements on dirty RM spectrum

Methods

- Have detailed specifications of algorithms for extraction of spectra and RM synthesis
- Cormac’s software pipeline as starting point

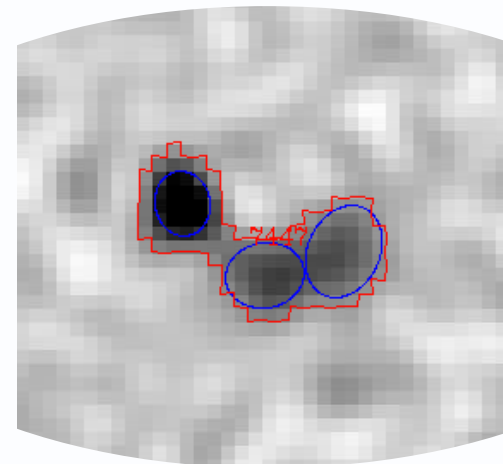
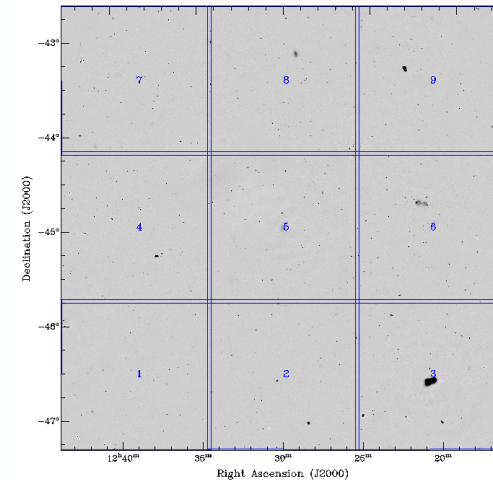
Current status of ASKAP source finding

Current prototype pipelines feature source-detection

- Based on *Duchamp* source-finder
- Additional features aimed at distributed processing and continuum source extraction

New features available for testing via Selavy source-finding service

- Connection details on POSSUM & SUP redmine wikis
- Development continuing and Selavy will be updated periodically (soon!)
- New features specified by SSTs to be incorporated



Thank you

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