VLA Archive Image Pilot

Pilot to create images from VLA archive data

Loránt Sjouwerman
National Radio Astronomy Observatory

Past Legacy:

- ☐ 25+ years of VLA observations (!)

- ☐ Images not readily available
  - ■ Journals do not archive (FITS) images
  - ■ Not everything useful, or published
  - ■ PI's may have backups somewhere..
    And may have submitted to NRAO and/or NVO

- ☐ If so, image quality not constant
  - ■ Imaging techniques/algorithms have evolved

Obtaining a VLA image:

- ☐ Ask the PI, check NVO, NRAO gallery
  - ■ You never know; you may be lucky !
  - ■ May not be in FITS format (IRAF, ds9, AIPS, etc.)

- ☐ If you/co-I familiar with interferometry:
  - ■ Get raw data from the NRAO archive
    (http://archive.nrao.edu) and *do-it-yourself*
    (e.g., install AIPS, use *VLARUN* procedure, ..)

- ☐ If not, at the moment: *learn, or die..*

Pilot to supply VLA images:

- ☐ Help **non-radio-expert** astronomers:
  - ■ No steep learning curve
    (interferometry or data reduction packages)
    - ☐ Risk of misinterpretation (e.g. missing short-spacings)
  - ■ Quick, good-enough, easy to find FITS image
    (overlay for structure, position, approximate flux)
    - ☐ Best science may require reprocessing (but see above!)

- ☐ Nice for expert radio astronomers too

Pilot setup:

- ☐ Well defined chunk of VLA archive
  - ■ Continuum, 5 and 8 GHz Stokes 'I' only
  - ■ B-configuration
  - ■ Recent and all public; 1999/2000
  - ■ About 300 multi-source data sets

- ☐ Must be scientifically useful
  - ■ Anticipate NVSS-like usage
    (position, structure, flux, image quality)
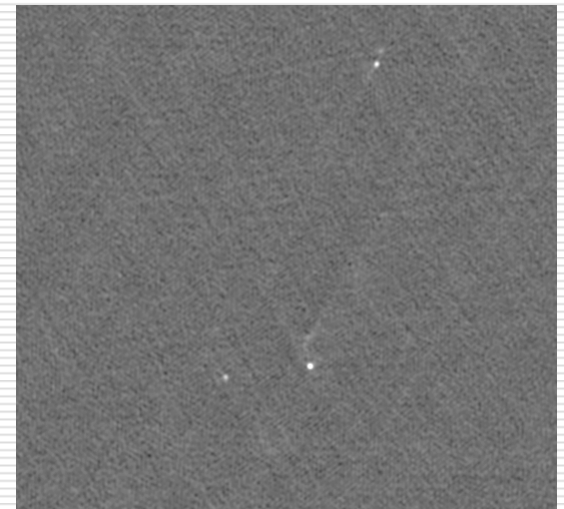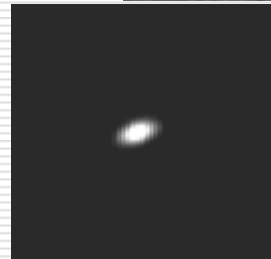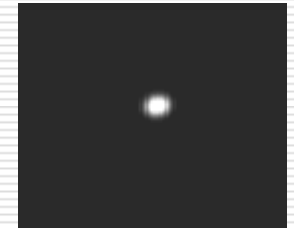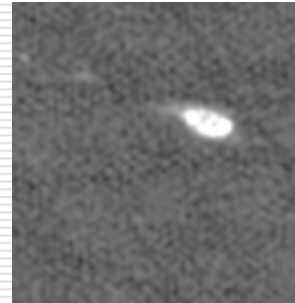
VLA archive image pipeline:

- ☐ Procedure *VLARUN* exists in AIPS (31DEC06)
  - ■ Check it out yourself... several user options

- ☐ Archive pipeline: AIPS driven by UNIX/Perl

- ☐ No astronomical knowledge needed
  - ■ Select data set; quality requirements met ?
  - ■ However cannot correct for failed observations

VLA archive image pipeline:

- ☐ Typical data set:
  - ■ Point-like calib's
  - ■ Target source(s)
    - ☐ Is it there ?
    - ☐ Structure ?
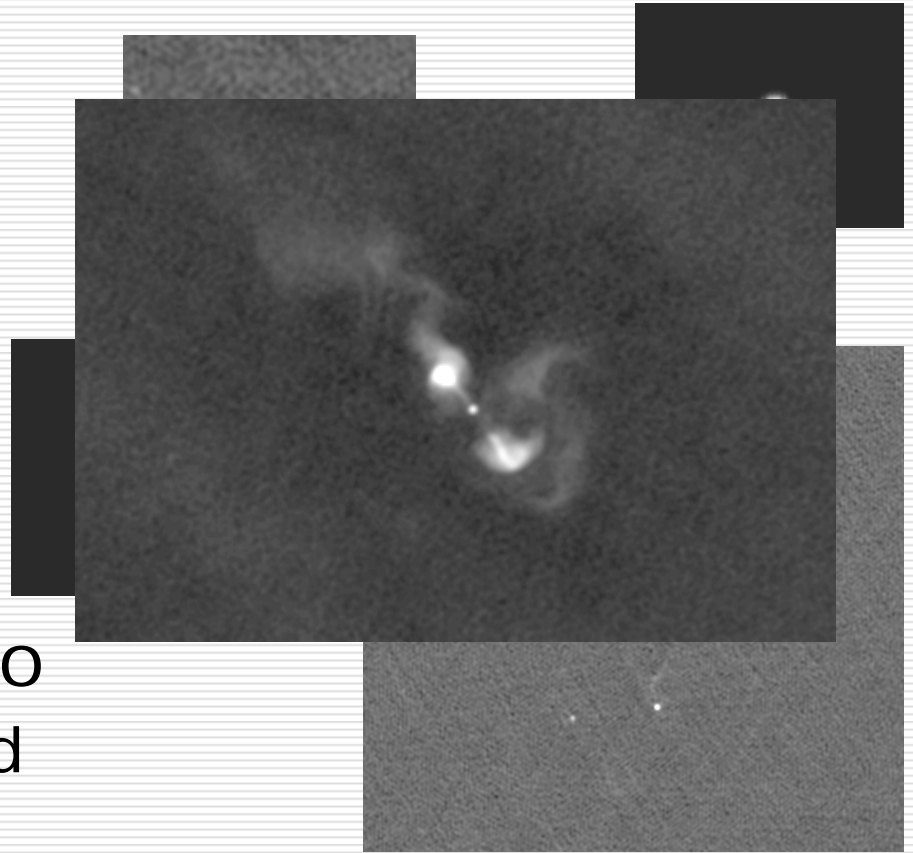   - ☐ Measurements

- ☐ A-typical tried too
  - ■ Usually discarded

VLA archive image pipeline:

- ☐ Typical data set:
  - ■ Point-like calib's
  - ■ Target source(s)
    - ☐ Is it there ?
    - ☐ Structure ?
    - ☐ Measurements

- ☐ A-typical tried too
  - ■ Usually discarded

VLA archive image pipeline:

- ☐ Get raw data from VLA archive into AIPS
    - ■ Assign AIPS number, to J2000, check calibrators

- ☐ Heart of pipeline: ***VLARUN*** (demo in break)

- ☐ Get data from AIPS into NRAO/NVO archive
    - ■ Final, full field of view images (FITS and GIF)
    - ■ Calibrated FITS (u,v)-data sets

Aim for final images:

- ☐ Image all sources at full field of view
  - ■ Clean sources in side lobes (NVSS catalog)
  - ■ Correct for primary beam attenuation

- ☐ Cleaned to few times theoretical noise

- ☐ Improvements with self-cal ?
  - ■ Still fragile, not fully automated yet

Current status:

- ☐ Almost every qualifying data set tested
  - ■ Smoothing out last kinks in the pipeline
  - ■ Limited hands-on seems very encouraging
  - ■ Some data sets do fail (several reasons, disregard)
  - ■ Web tools to search position and browse files

- ☐ Improving images/pipeline with self-cal
  - ■ Current images will be redone with latest pipeline

- ☐ Check out *VLARUN* demo during the break !