STOA – Script Tracking for Observational Astronomy

Peter Hague - University of Cambridge

My OBELICS Goals

- WP 3.3 D-INT (Data integration) - Development of **STOA** to provide workflow system for current and future projects

- WP 3.4 D-ANA (Data analysis) – Next generation source finding and characterisation for radio astronomy - **BaSC**

Progress

Now

Source matching → STOA

STOA → VO service?

Source finding → BaSC

BaSC → VO service?

BaSC → Paper

Leads to
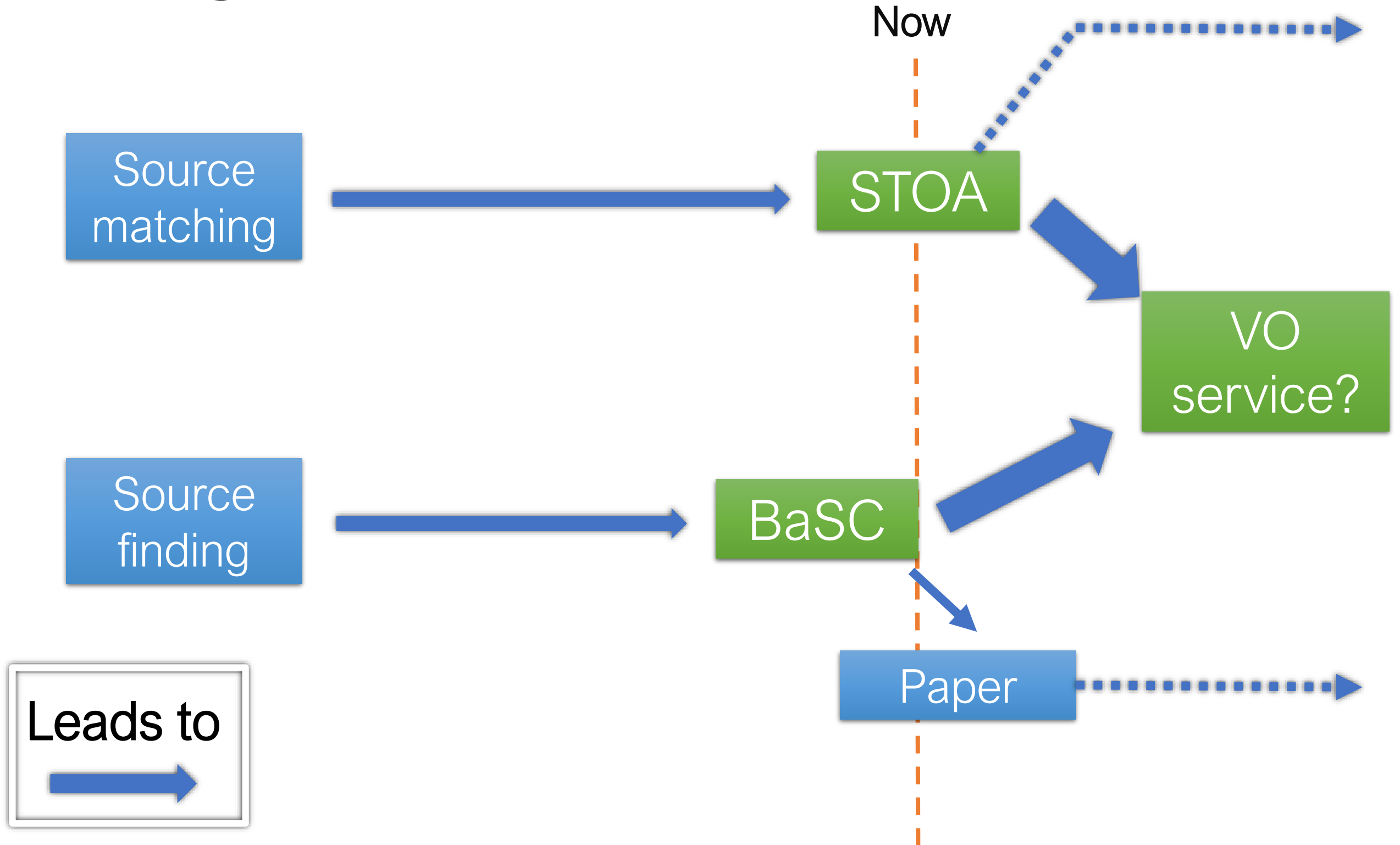
BaSC - Background

From the SExtractor manual:

DETECT_TYPE	CCD	*keyword*	Type of device that produced the image:
	CCD		– linear detector like CCDs or NIC-MOS,
	PHOTO		– photographic scan.

https://www.astromatic.net/pubsvn/software/sextractor/trunk/doc/sextractor.pdf

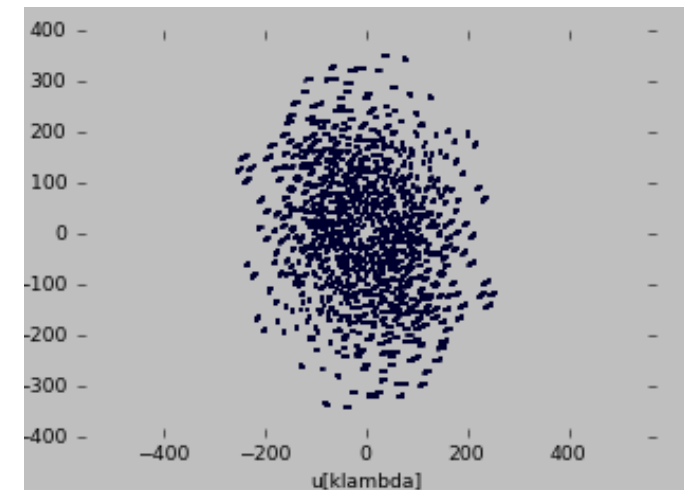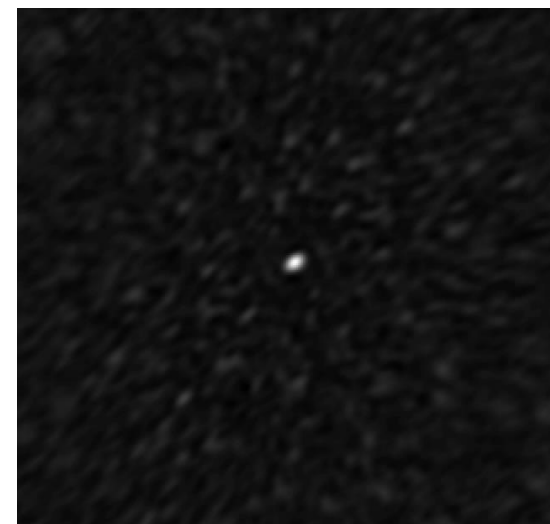# BaSC - Background

Each pair of antennas gives a component
of the Fourier transform of the sky brightness
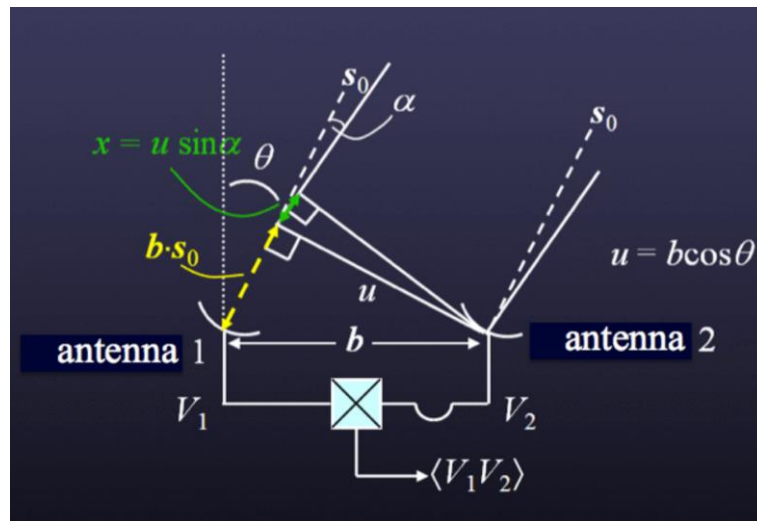
Use many antennas to
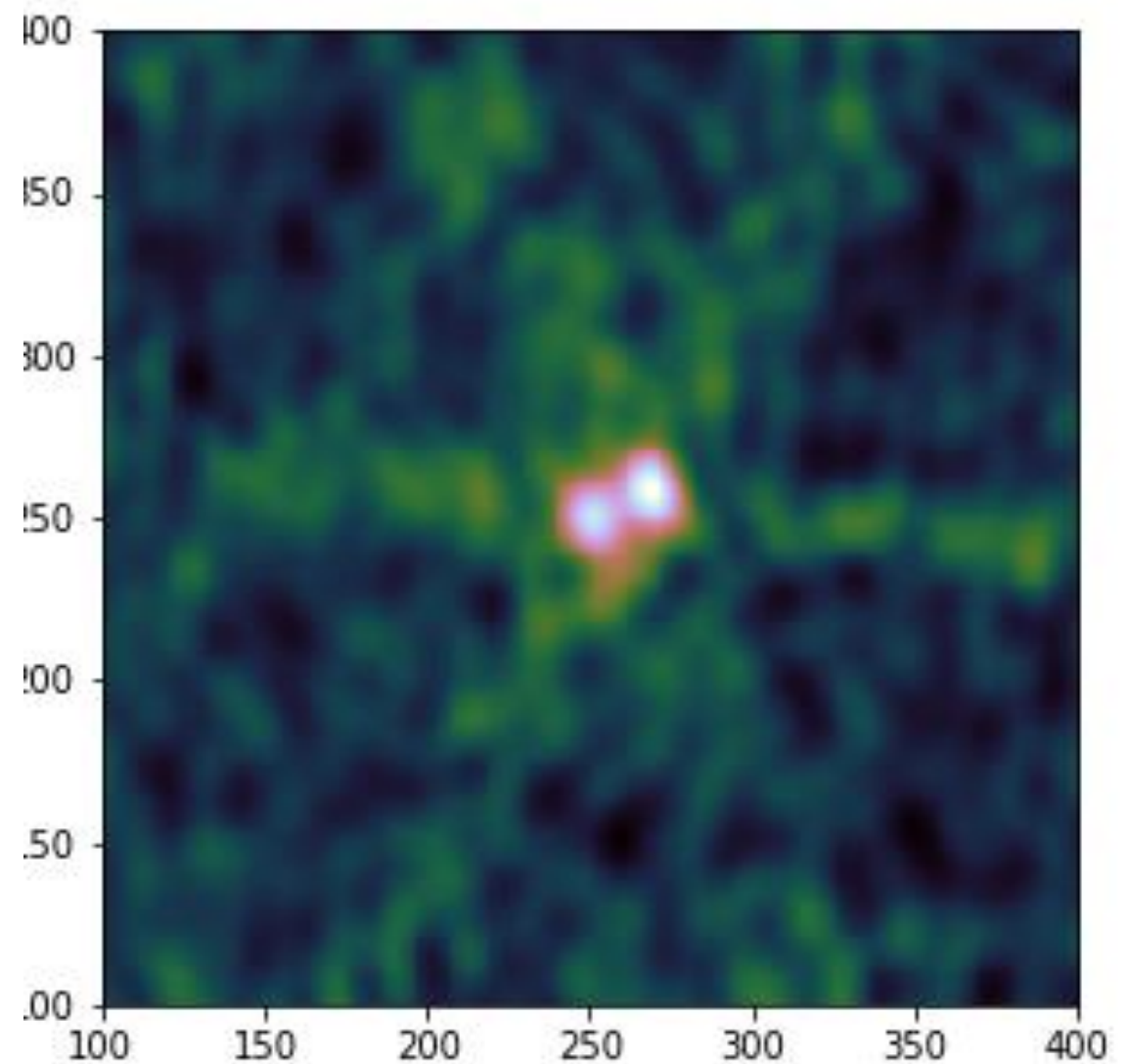get good coverage…

And invert it to get a
map of the sky

BaSC - Background

- Missing information causes a complicated points spread function (PSF)

- Two possible approaches – deal with it as is, or try to reprocess the image to make it look friendlier

- The latter approach exemplified by the CLEAN algorithm

BaSC

- **BaSC** is a Bayesian method of finding the sources in a dirty map.

- Uses a likelihood function proven correct for the visibilities (even though for speed it works on the map)

- An efficient MCMC process with variable model size

- Available at
  http://www.github.com/petehague/BASC

- Contact me if you need help!

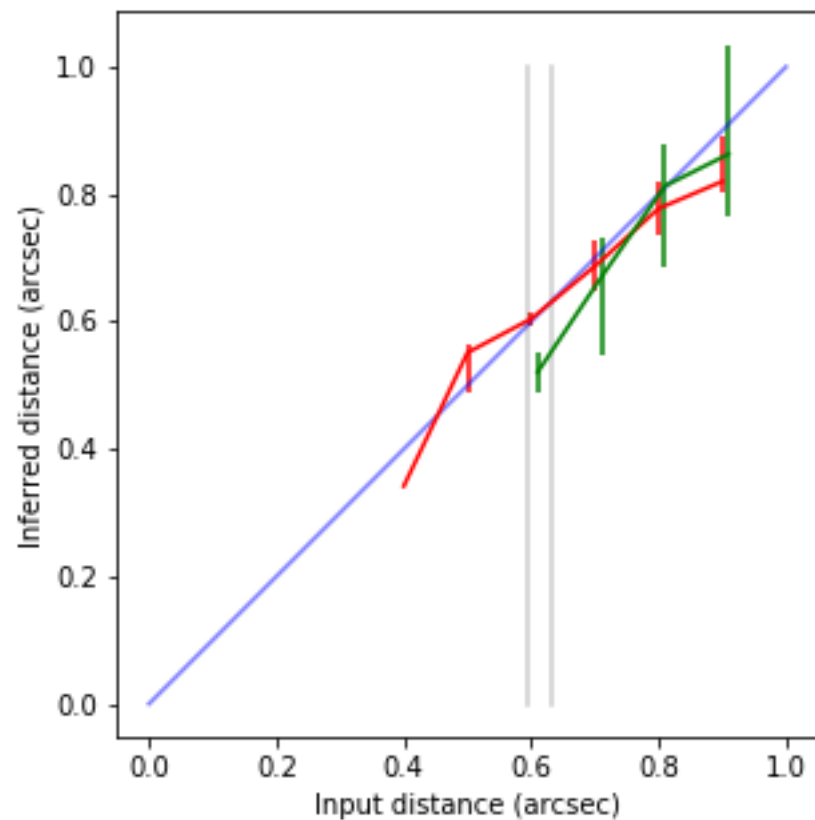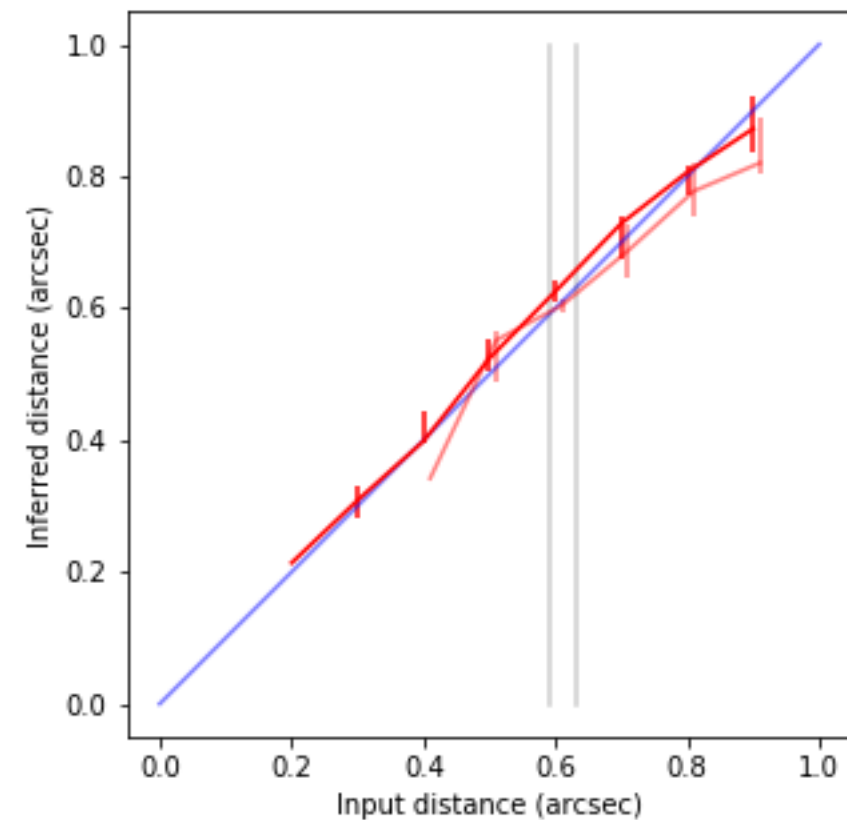# BaSC - Comparison

Dirty
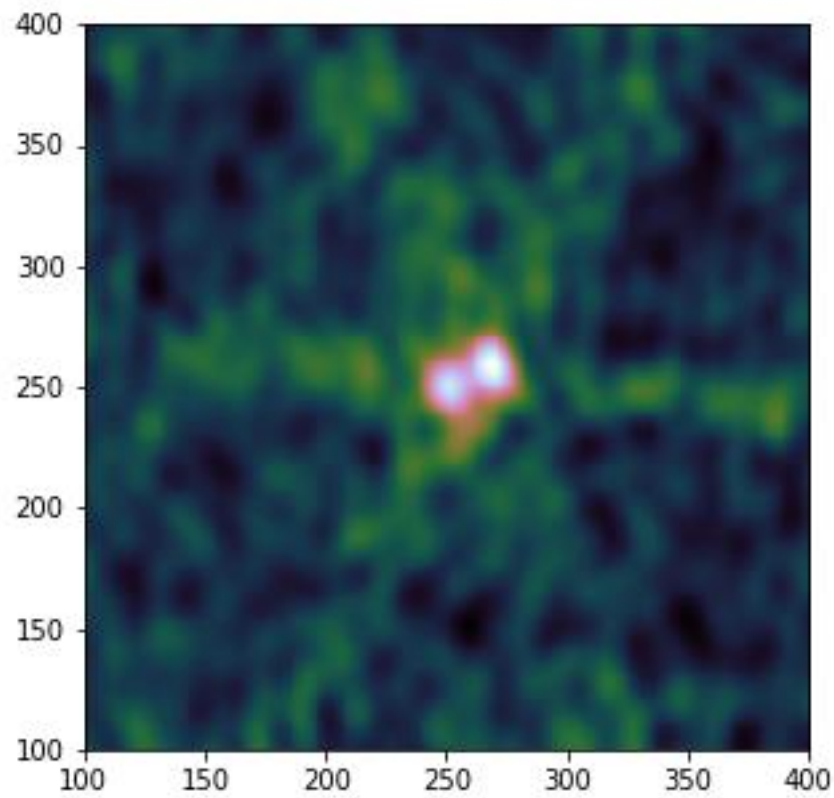
CLEANed
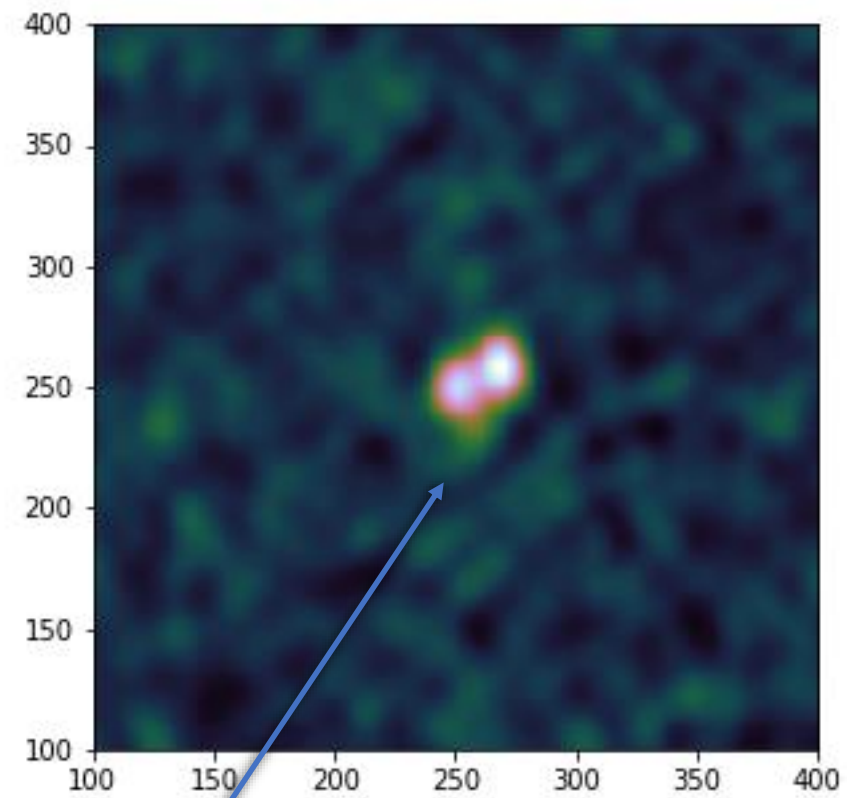
Should not be there!

BaSC - Comparison

Point source discrimination

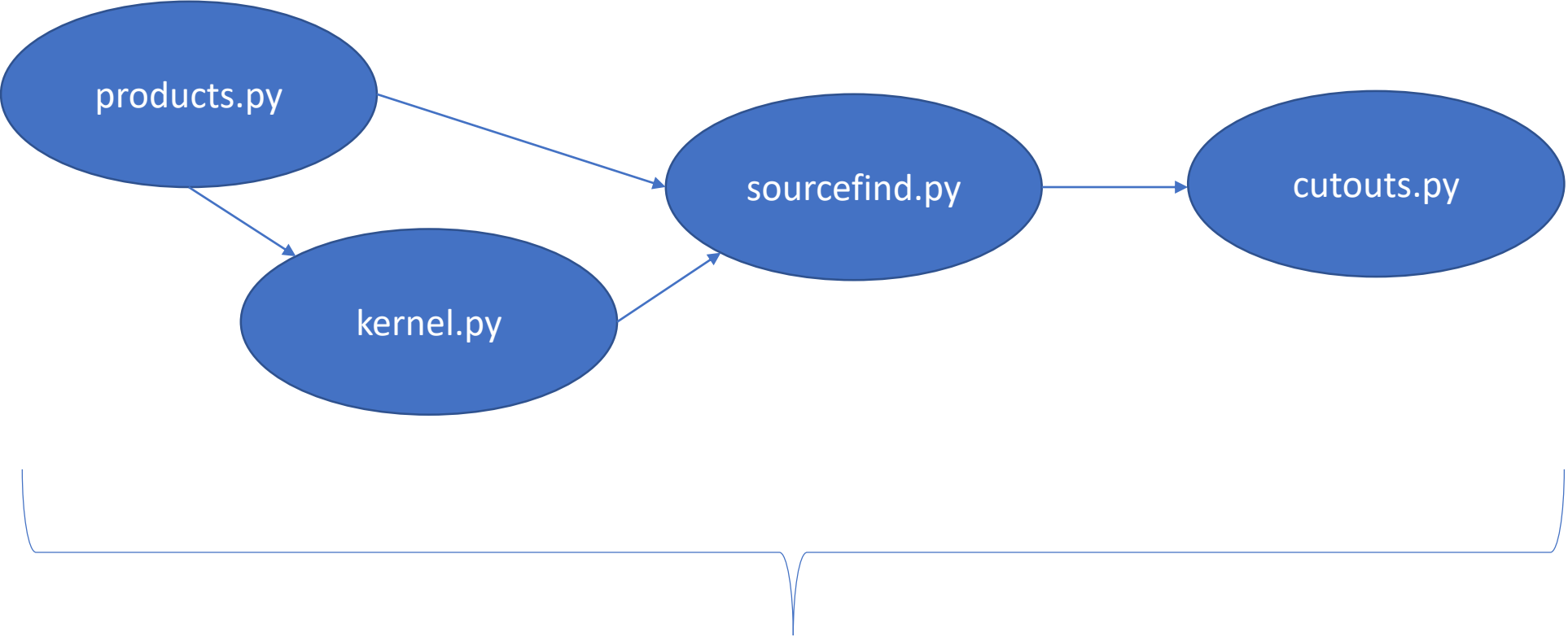vs. CLEAN+SExtractor   40x difference in flux

Hague et al in preparation

STOA - Background

- **BaSC** and other projects required batch operations on ALMA archive

- **STOA** emerged from my efforts to streamline and automate these operations

- Now a standalone web application: https://github.com/petehague/stoa

STOA - Workflows

STOA - Worktables

- Each row is an execution of the workflow

- Changing inputs automatically triggers a minimal recomputation of the outputs

- Software tracks status (e.g. if currently shown outputs correspond to inputs or if new outputs are pending)

- Can connect worktables in relational style; automatically triggering recomputation

| *	Inputs	Outputs

* Hidden fields – tracking processing status etc.

STOA - Worktables

- **STOA** allows access to a worktable as Owner, Collaborator, and Reader.

- Owner can initiate computation, collaborator can flag rows and add comments, and reader sees worktable as a simple read only table

- Objective is to use worktables to generate data to be served through VO

- Currently provides facilities for web access, downloading as in fits format, or SAMP bridging to push to TOPCAT (a bit flaky)

STOA - Provenance

Provenance recorded by keeping workflow with data

Existing provenance standards

?
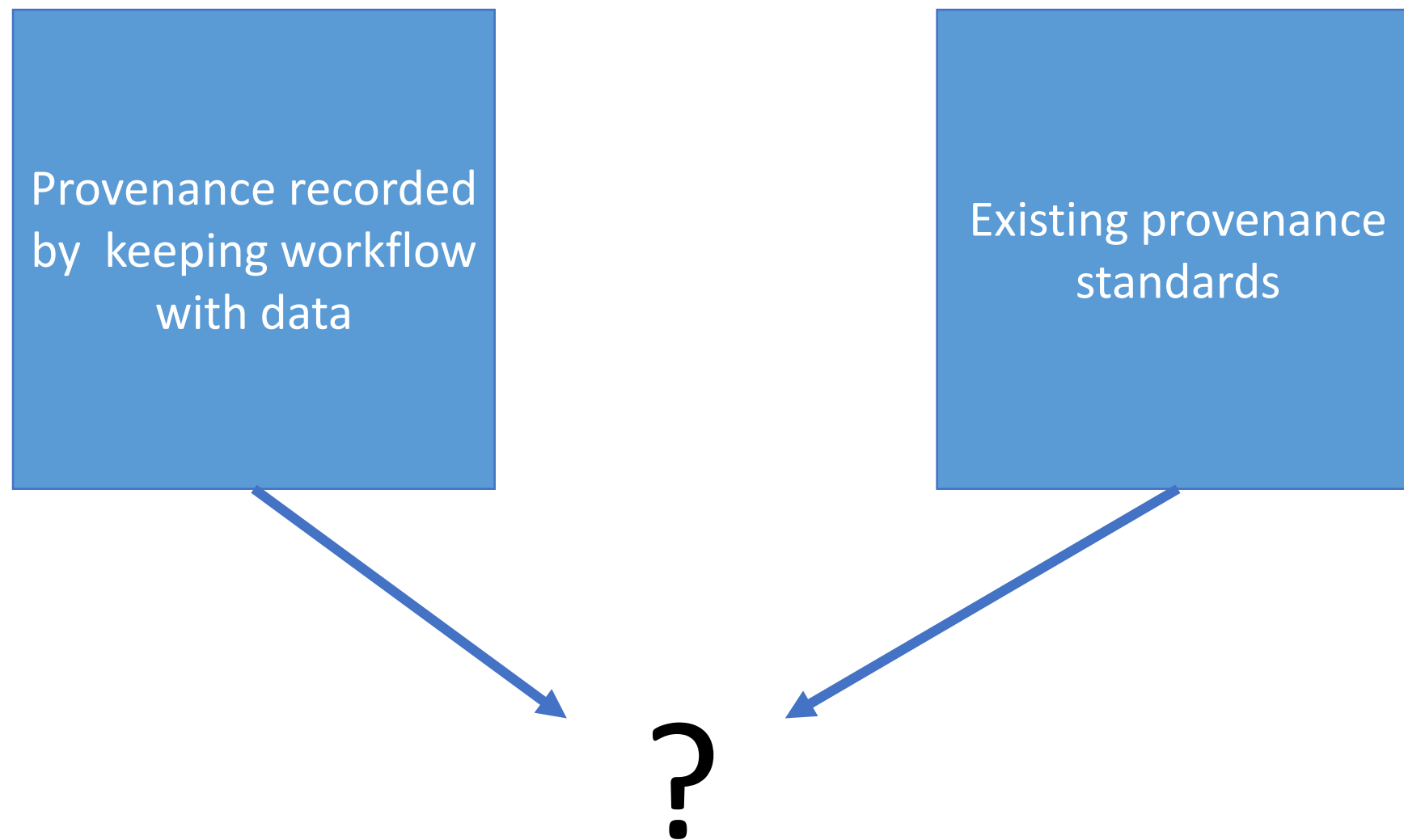
Summary

BaSC

Advanced source detection for interferometers
https://www.github.com/petehague/BASC

STOA

Workflows + tables = worktables
https://www.github.com/petehague/STOA

Contact: prh44@cam.ac.uk