



Making archival photographic observations accessible

The APPLAUSE database and PyPlate software

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Collaboration

- DFG project
 - Digitization of astronomical photographic plates and their integration in the international Virtual Observatory
- Dr. Remeis-Sternwarte Bamberg
- Hamburger Sternwarte
- Leibniz-Institut für Astrophysik Potsdam (AIP)



APPLAUSE database

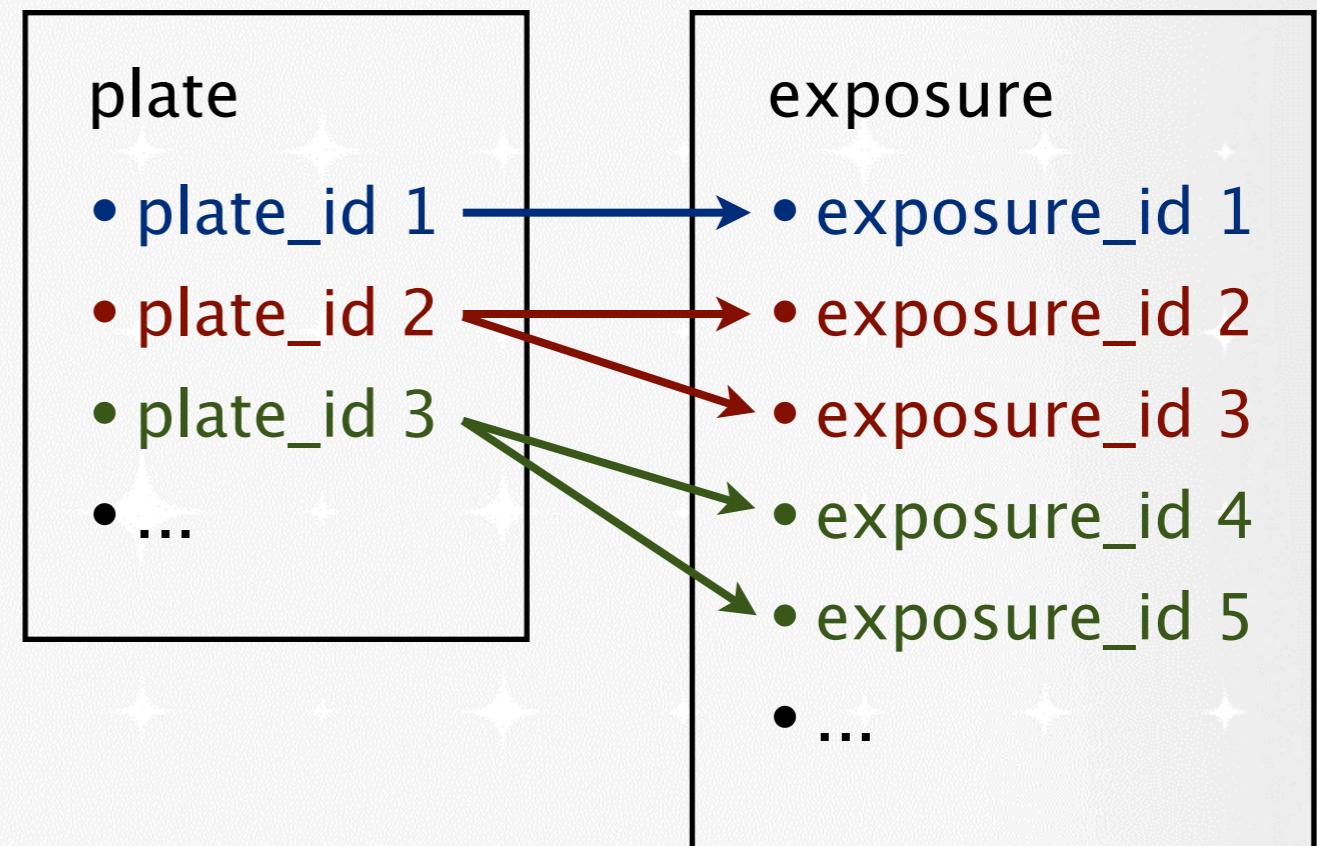
Archives of Photographic PLates for Astronomical USE

- Currently in beta stage
 - 4887 plate scans 40000 scanned plates
 - 127 million extracted sources ~1 billion sources
 - MySQL engine
 - Web interface using Daiquiri
- poster by J. Klar



How do we organize data?

- Database tables
 - archive
 - plate
 - exposure
 - exposure_sub
 - scan
 - source
 - source_calib
 - logbook
 - logpage
 - plate_logpage





www.plate-archive.org

The screenshot shows the homepage of the APPLAUSE (beta) website. At the top, there's a navigation bar with links for Home, Database, Query, Contact, Wiki, and Login. Below the navigation is a large header image of an observatory dome under a blue sky. The main title "APPLAUSE (beta)" is displayed in blue text, followed by the subtitle "Archives of Photographic PLates for Astronomical USE". The page content includes a welcome message, information about the collection of photographic plates, details about the digitization project, and instructions for users. On the right side, there's a box containing a photograph of a photographic plate with handwritten text at the bottom: "8/7 Süd 3170 1963 XII. 10/II 8°-77°". A caption below the image reads "Example of a photographic plate."

APPLAUSE (beta)

Archives of Photographic PLates for Astronomical USE

Home Database Query Contact Wiki Login

Welcome to the APPLAUSE archives

German astronomical observatories own considerable collection of photographic plates. While these observations lead to significant discoveries in the past, they are also of interest for scientist today and in the future. In particular, for the study of long-term variability of many types of stars, these measurements are of immense scientific value.

There are about 85000 plates in the archives of Hamburger Sternwarte, Dr. Karl Remeis-Sternwarte Bamberg, and Leibniz-Institut für Astrophysik Potsdam (AIP). The plates are digitized with high-resolution flatbed scanners. In addition, the corresponding plate envelopes and observation logbooks are digitized, and further metadata are entered into the database. The work is carried out within the project "[Digitalisierung astronomischer Fotoplatten und ihre Integration in das internationale Virtual Observatory](#)", which is funded by the [DFG](#).

On this page, you can get access to the plate data that are processed so far. Please use the [registration form](#) to get a user account. Then you can [browse](#) the entire database or you can submit SQL queries or cone-search queries using the [query interface](#).

Also, as a result of the AstroPlate Meeting 2014 in Prague, the [Astroplate Wiki](#) has been started to share the relevant knowledge. Everyone is welcome to take part in it.

Recent News

September 18th, 2014 [APPLAUSE database updated](#)

The APPLAUSE database received a major update this month: the underlying structure was renewed and a large batch



APPLAUSE query interface

Query interface

JOBS	
V900_Sco	✓
NGC_6231_with_FITS	✓
NGC_6231	✓
Crux	✓
Plates_with_preview	✓
SMC_exposures_2	✓
SMC_exposures	✓
2014-09-20-1712-16-0517	✓
All_logpages	✓
Plates_in_archives	✓

SQL query

Plate cone search

Source cone search

SQL query

Place your SQL statement directly in the text area below and submit your request using the button.

```
1 SELECT p.plate_id,p.filename_preview,e.raj2000,e.dej2000,s.filename_scan
2 FROM `applause`.`plate` AS p
3 JOIN `applause`.`exposure` AS e USING (plate_id)
4 LEFT JOIN `applause`.`scan` AS s USING (plate_id)
5 WHERE p.filename_preview IS NOT NULL
6 AND angdist(e.raj2000, e.dej2000, 253.5, -41.8) < 5
7 ORDER BY p.plate_id;
```



Example Queries

- [Number of plates in the archives](#)
- [Select all logbook pages](#)
- [Select all plates](#)
- [Select plates with preview images and full scans](#)

Database browser

DATABASES	TABLES	COLUMNS
applause	logbook logpage plate plate_logpage scan source source_calib	plate_id archive_id plate_num plate_num_orig wfpdb_id series plate_format
plates_user_taavi		

A double click will paste the database/table/column identifier into the query field.

Example queries



Database browser





Query interface

JOBS	
V900_Sco	✓
NGC_6231_with_FITS	✓
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Crux	✓
Plates_with_preview	✓
SMC_exposures_2	✓
SMC_exposures	✓
2014-09-20-1712-16-0517	✓
All_logpages	✓
Plates_in_archives	✓

Results
table

SQL query Plate cone search Source cone search Job Details Results Table Plot

Download

Search First Previous Next Last Reset Page 1 of 5 Show 10 rows ▾

Plate_id	Filename_preview	Raj2000	Dej2000	Filename_scan
156508	005633_1964_l.png	255.5908	-38.0469	005633_1964_h.fits
156496	005621_1964_l.png	255.5908	-38.0469	005621_1964_h.fits
156490	005615_1964_l.png	255.5908	-38.0469	005615_1964_h.fits
156418	005543_1964_l.png	255.5914	-38.047	005543_1964_h.fits
156400	005525_1964_l.png	255.5914	-38.047	005525_1964_h.fits
156394	005519_1964_l.png	255.5914	-38.047	005519_1964_h.fits
156346	005471_1964_l.png	255.5915	-38.047	005471_1964_h.fits
156082	005207_1964_l.png	255.5921	-38.047	005207_1964_h.fits
156040	005165_1964_l.png	255.5927	-38.0471	005165_1964_h.fits
155579	004704_1964_l.png	255.5934	-38.0471	004704_1964_h.fits

To download all files in one or more rows, please select the corresponding rows by mouse click. In order to download all files in a particular column, please select the column by a mouse click on the column's title.

Download all files from column 'filename_preview'

Download files from selected row(s)

Register with SAMP

← Download files



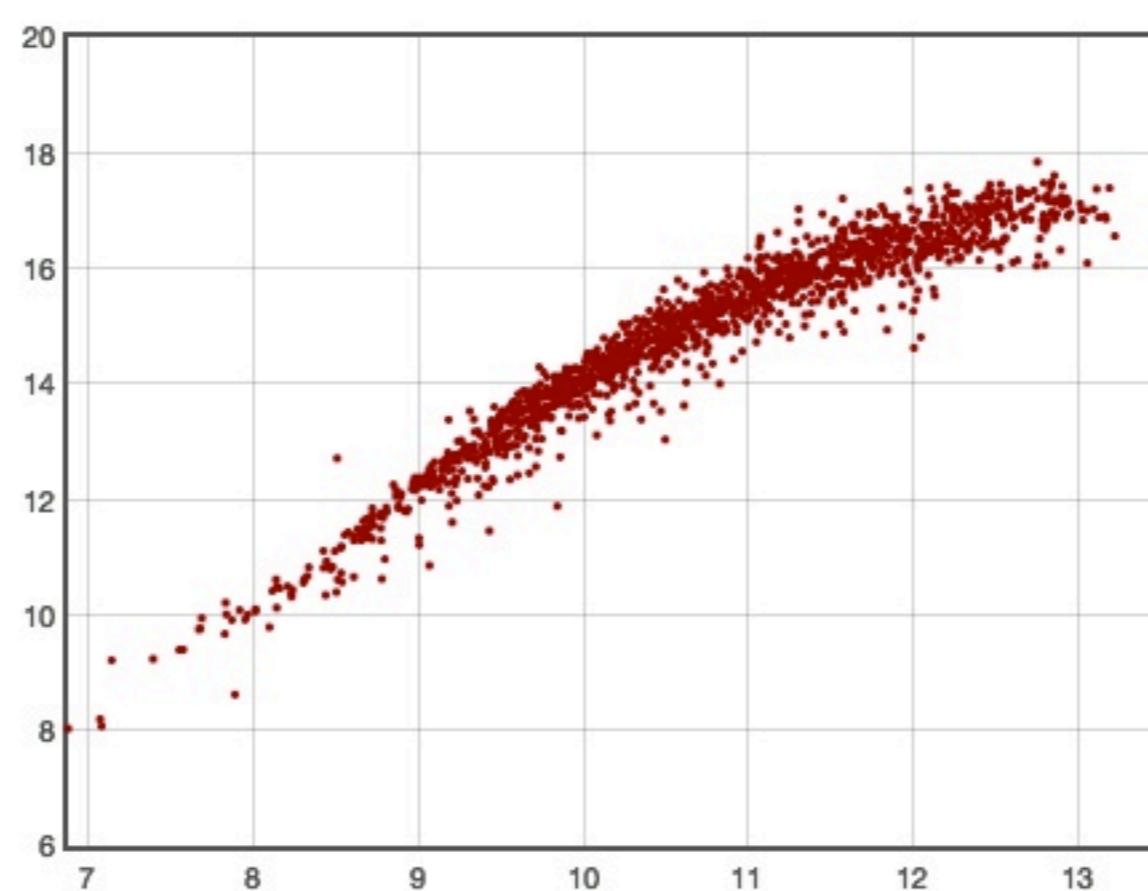
APPLAUSE: plot data

Query interface

JOBS	
CdC	✓
2013-09-13T15:03:01:0713	✓
2013-09-13T15:06:03:6602	✓
2013-09-13T15:10:38:3468	✓
2013-09-13T15:20:58:8170	✓
2013-09-13T15:44:01:2294	✓
2013-09-13T15:56:25:4528	✓
All_plates	✓
All_logs	✓
OP_plate_scans	✓
All_OP_plates	✓
Comparison_star_1	✓
All_plates_2	✓

Plate cone search Source cone search SQL query Job Details Results Table Plot

Download



Select Columns for plot

Column for X axis:

rawmag

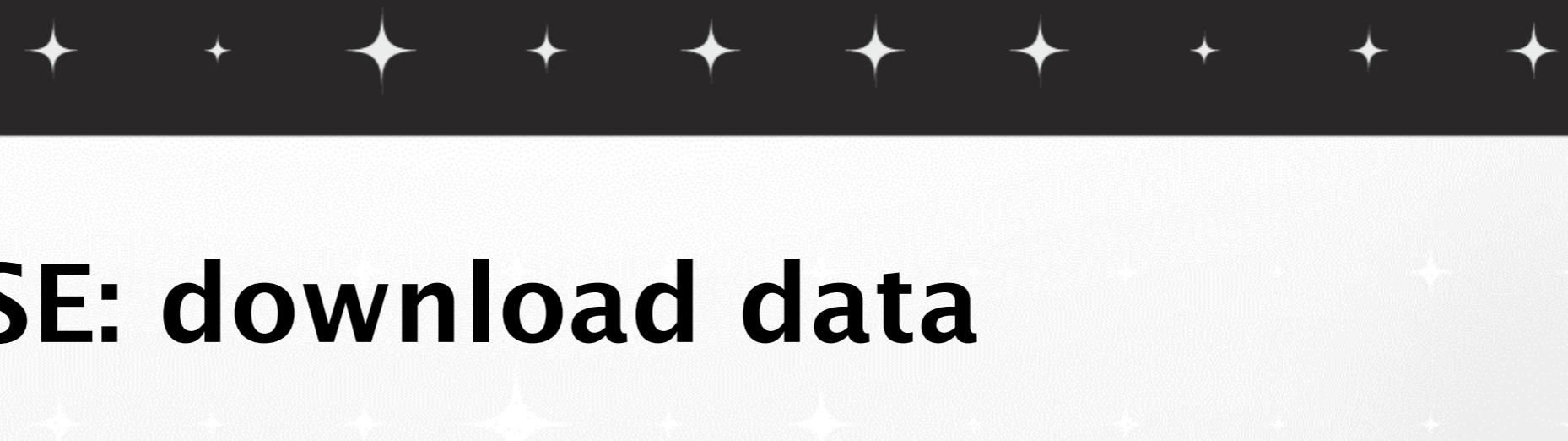
Column for Y axis:

ucac4_bmag

Number of rows to plot:

2000

Create Plot



APPLAUSE: download data

Query interface

JOBS	
CdC	✓
2013-09-13T15:03:01:0713	✓
2013-09-13T15:06:03:6602	✓
2013-09-13T15:10:38:3468	✓
2013-09-13T15:20:58:8170	✓
2013-09-13T15:44:01:2294	✓
2013-09-13T15:56:25:4528	✓
All_plates	✓
All_logs	✓
OP_plate_scans	✓
All_OP_plates	✓
Comparison_star_1	✓
All_plates_2	✓

Plate cone search Source cone search SQL query Job Details Results Table Plot

Download

Download table

Please select the format for your download:

Select format:

IVOA VOTable XML file - BINARY 1 Forma

Download

Downloaded data

Analysis
Cross-matching with
other catalogues



PyPlate software

- www.plate-archive.org/pyplate
- Install
 - pypi.python.org/pypi/pyplate
 - pip install pyplate
- Documentation
 - pythonhosted.org/pyplate – work in progress
- Development
 - github.com/astrotuvi/pyplate
- Modules
 - image, metadata, solve, database, pipeline, conf



pyplate.metadata

- Read metadata in various formats
 - WFPDB format (VizieR: VI/90)
 - CSV files
 - FITS headers
- Convert timestamps and coordinates
 - sidereal time, local time → UT, JD
 - original coordinates → J2000 coordinates
- Create FITS headers
- Write metadata to a MySQL database

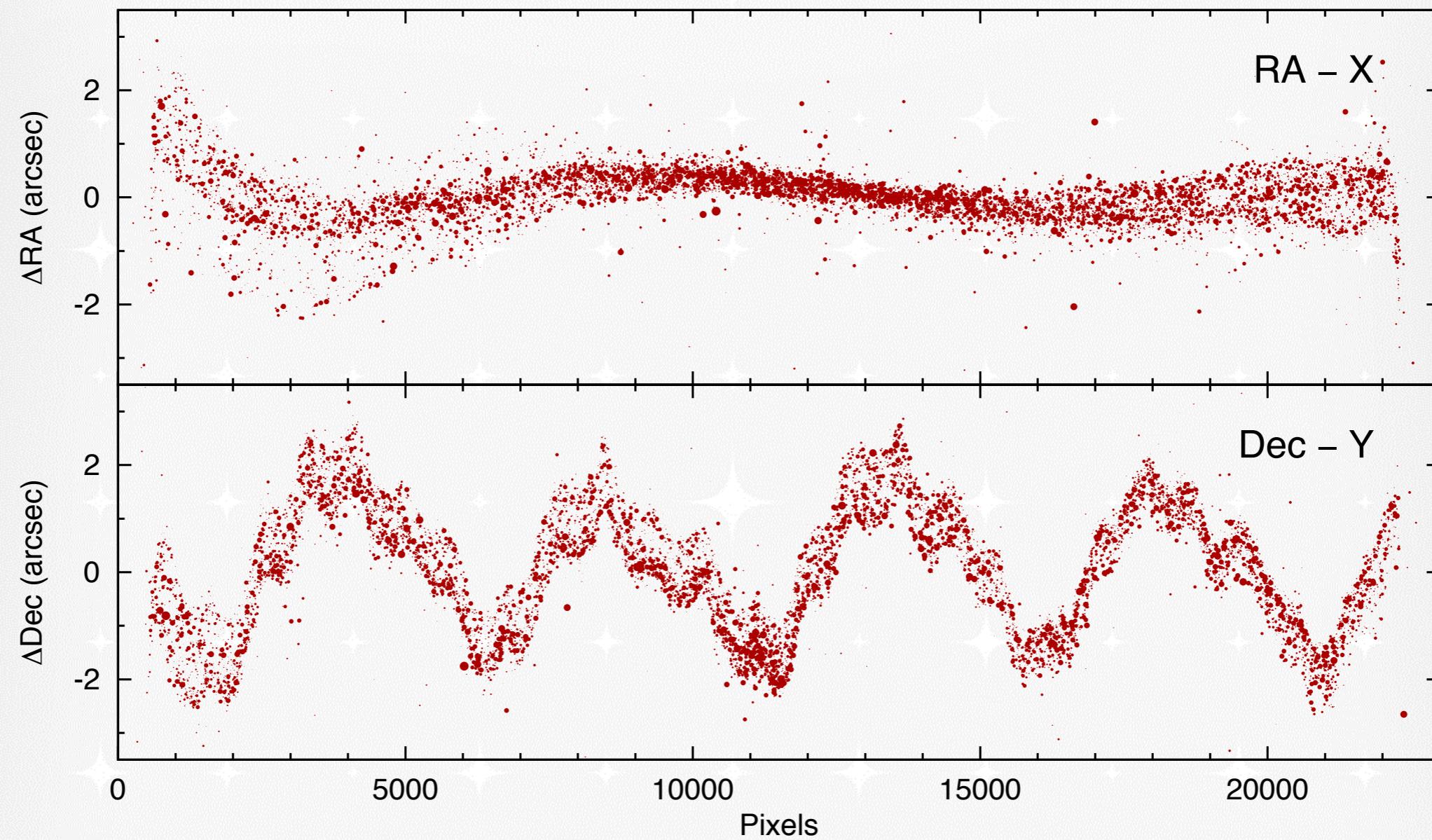


pyplate.solve

- Extract sources ([SExtractor, PSFEx](#))
- Access astrometric catalogs (Tycho-2, UCAC4)
- Solve astrometry for the whole image ([Astrometry.net](#))
 - Output: World Coordinate System (WCS)
 - Assign initial RA/Dec to every source
- Solve astrometry in sub-fields ([SCAMP](#))
 - Assign improved RA/Dec to every source



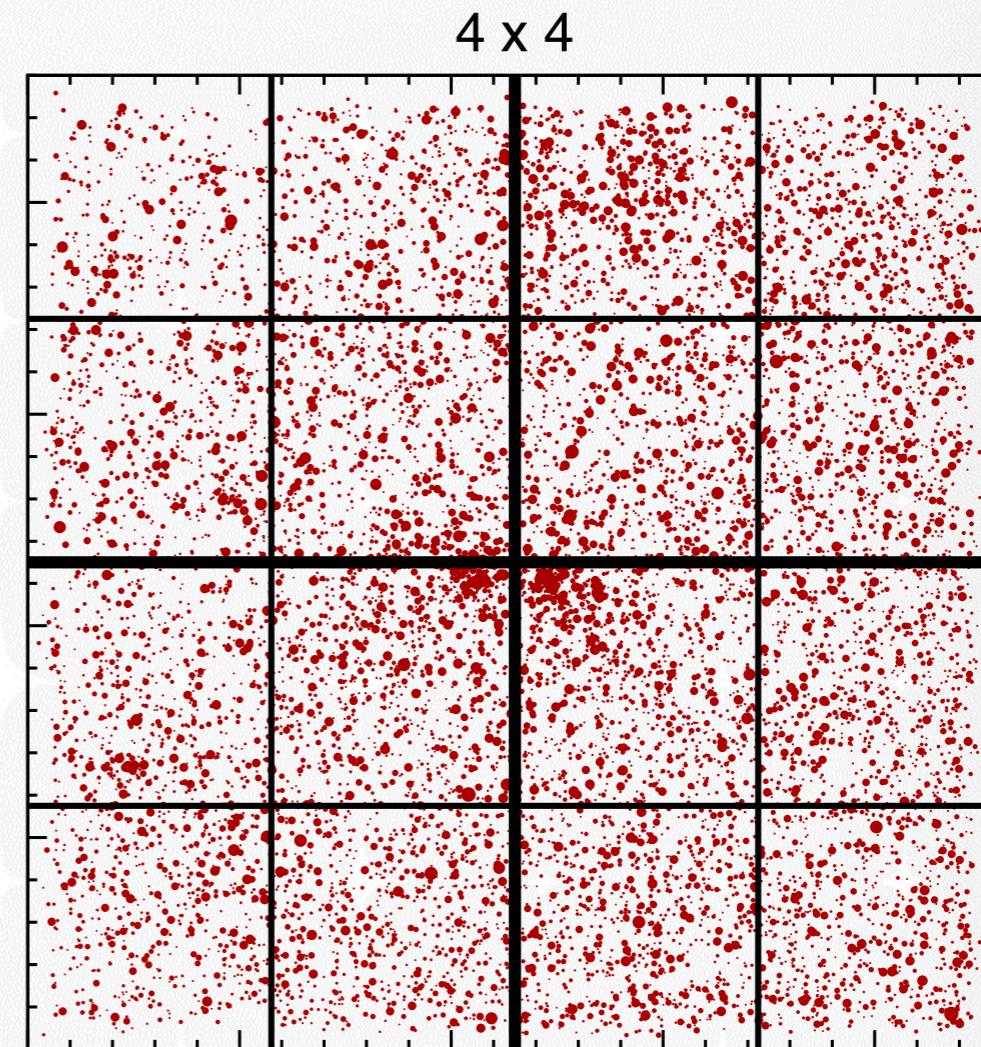
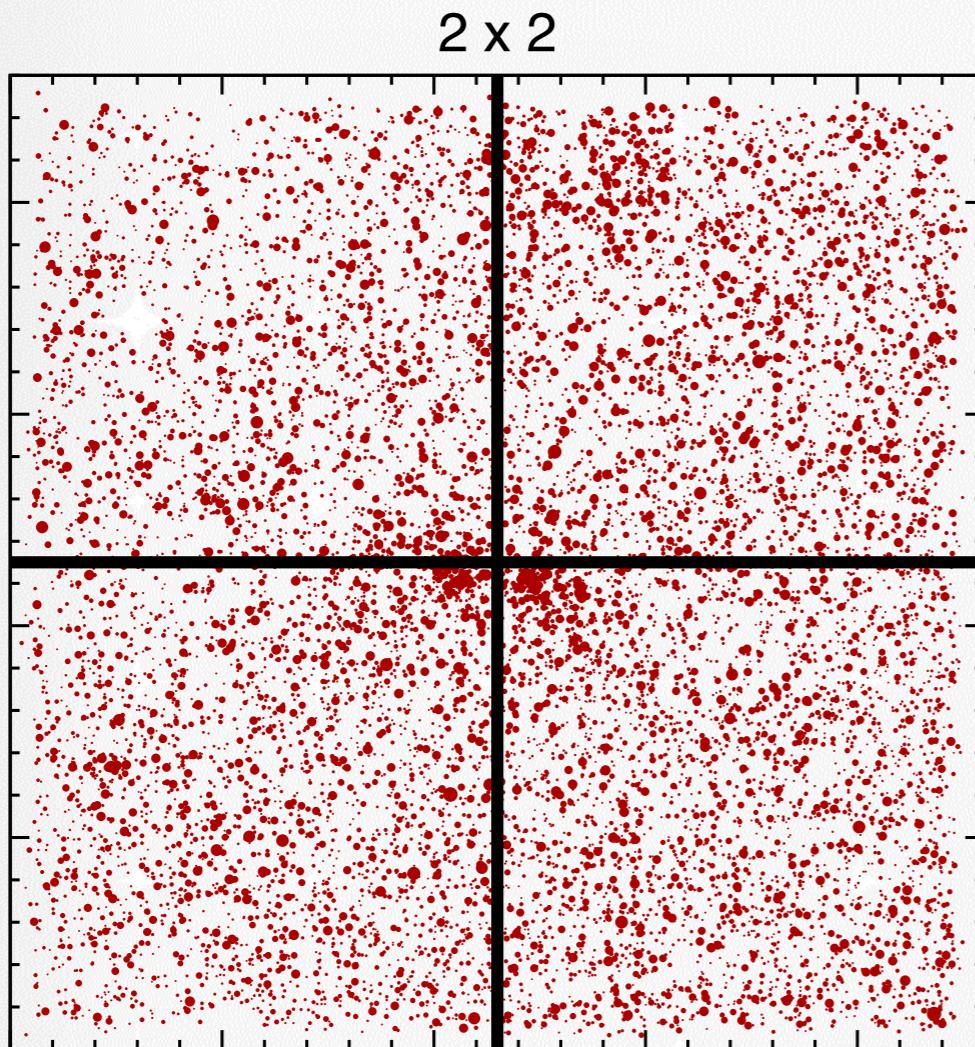
Global astrometric solution



Residuals after the initial solution with Astrometry.net software



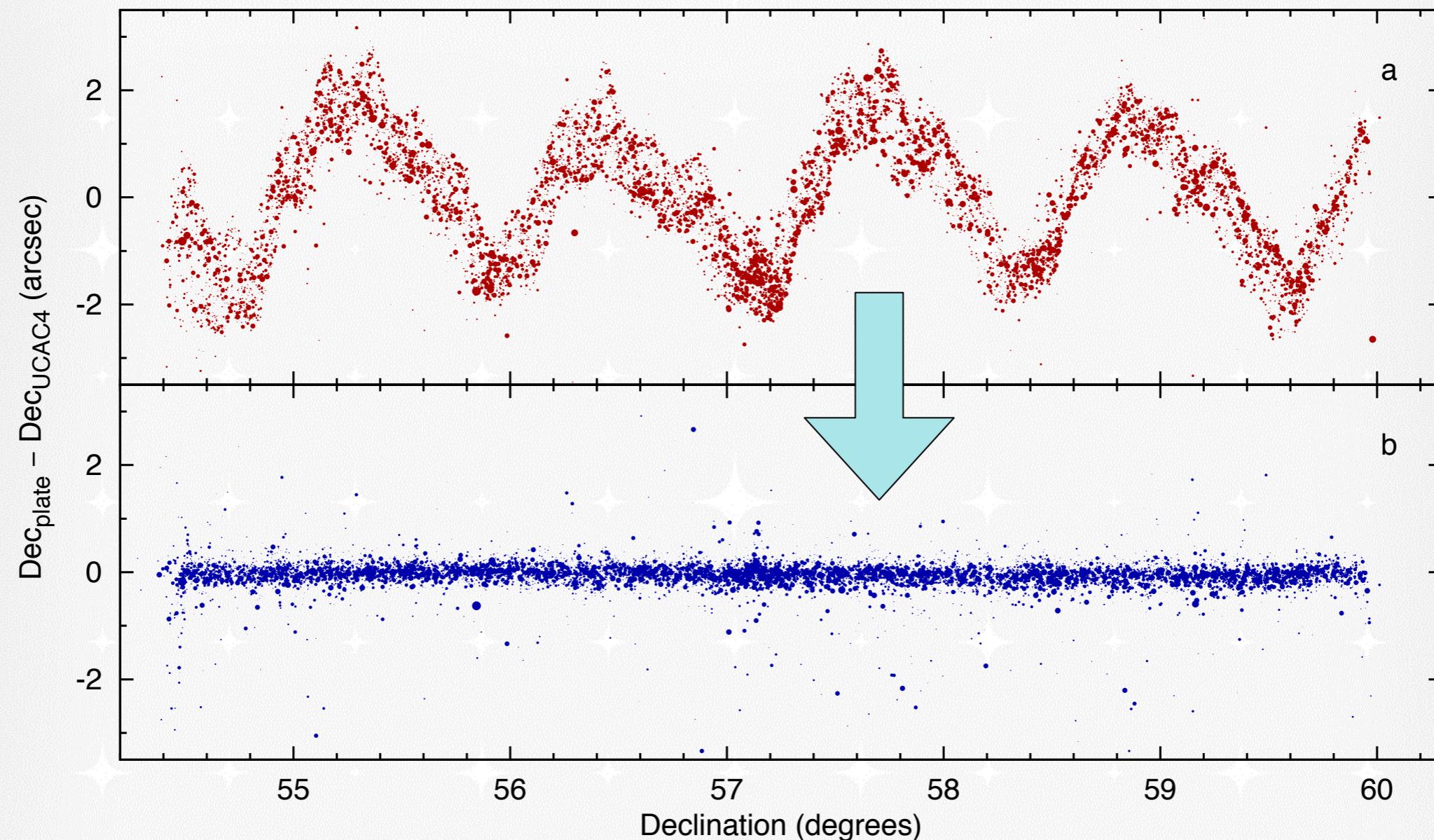
Astrometric solution in sub-fields



Improving solution with SCAMP software in sub-fields



Improved source coordinates

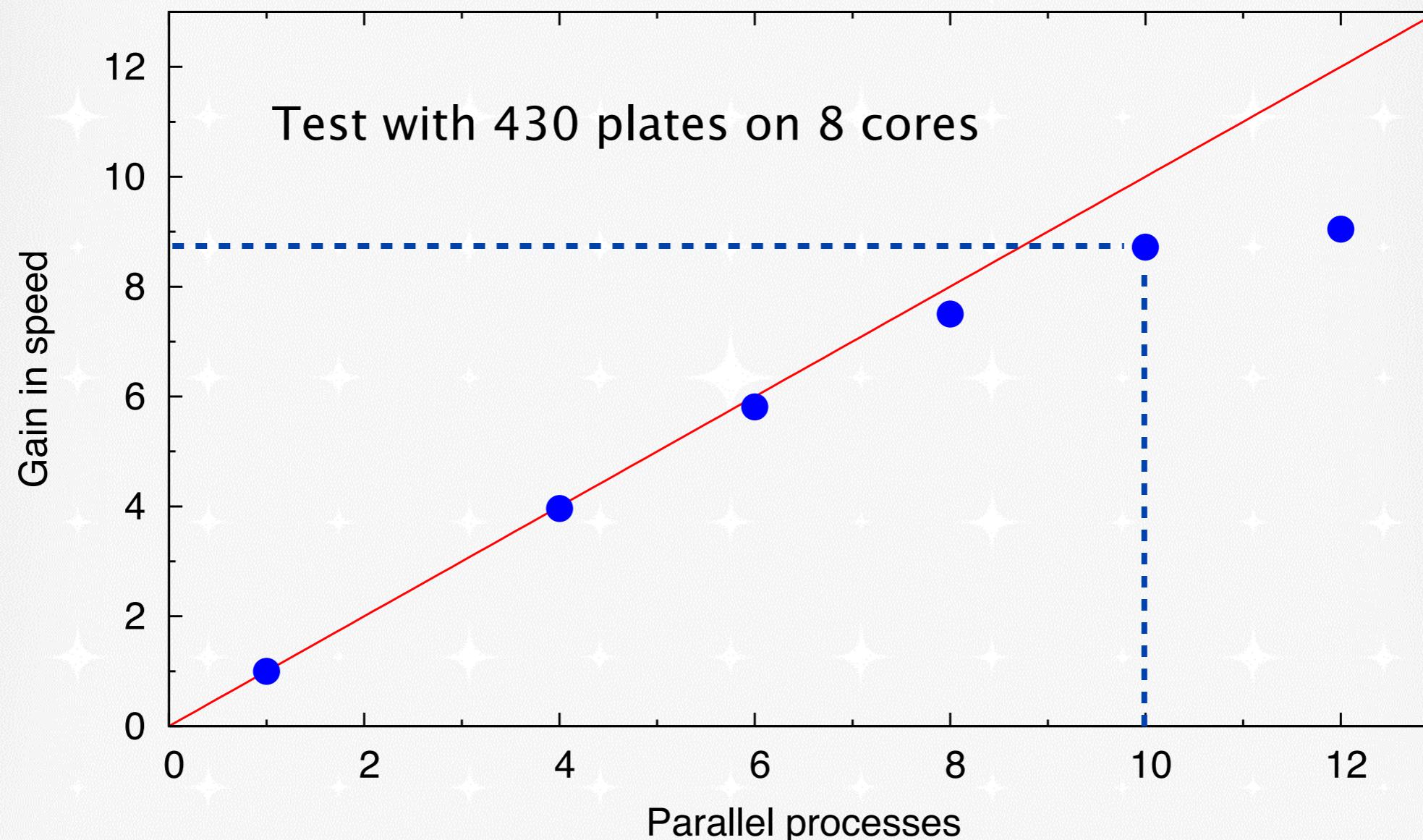


Residuals after improved solution with SCAMP



pyplate.pipeline

- Parallel processing of plate images





Open issues

- Photometric calibration
- Matching sources in crowded fields
- Identification of transient sources
- Multiple-exposure plates
 - Finding multiple astrometric solutions
 - Association with exposure data
- Extraction and calibration of spectra



Join the community

- Astroplate Wiki
 - www.plate-archive.org/wiki
- Astroplate mailing list (announcements)
Contact [taavi.tuvikene @ to.ee](mailto:taavi.tuvikene@to.ee)