



OGLE-IV Transients Survey

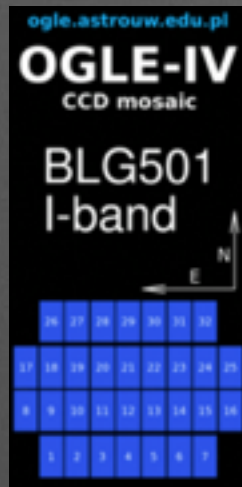
Zuzanna Kostrzewa-Rutkowska
Warsaw University Astronomical Observatory

OGLE

- operated since 1992
- OGLE-IV from 2010-now
- OGLE-IV - a billion stars
- 1.3-m Warsaw Telescope at Las Campanas
- <http://ogle.astrouw.edu.pl>
- From 2012: OGLE Transients Detection System:
<http://ogle.astrouw.edu.pl/ogle4/transients/transients.html>

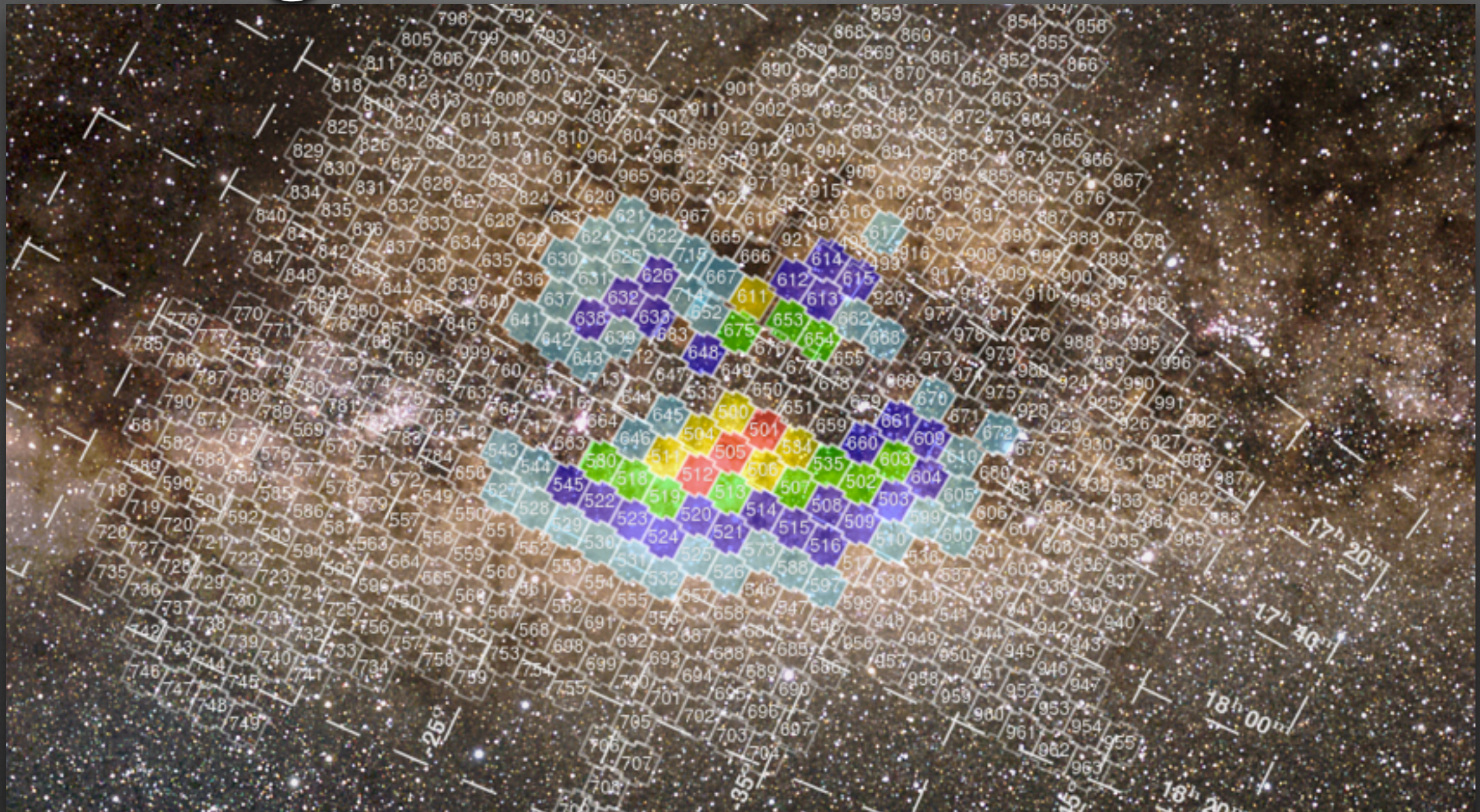


phot. by K. Ulaczyk & Ł. Wyrzykowski



- 32 chip mosaic camera
- 1.4 sq. deg. total field of view
- scale – 0.26"/pixel
- down to 21 mag in I-band
- 5-6 million stars every 2 minutes

Bulge



- half a billion stars
- some fields observed from 1992
- microlensing and variable stars

field cadence:

red: 10-30 per night

yellow: 3-10 per night

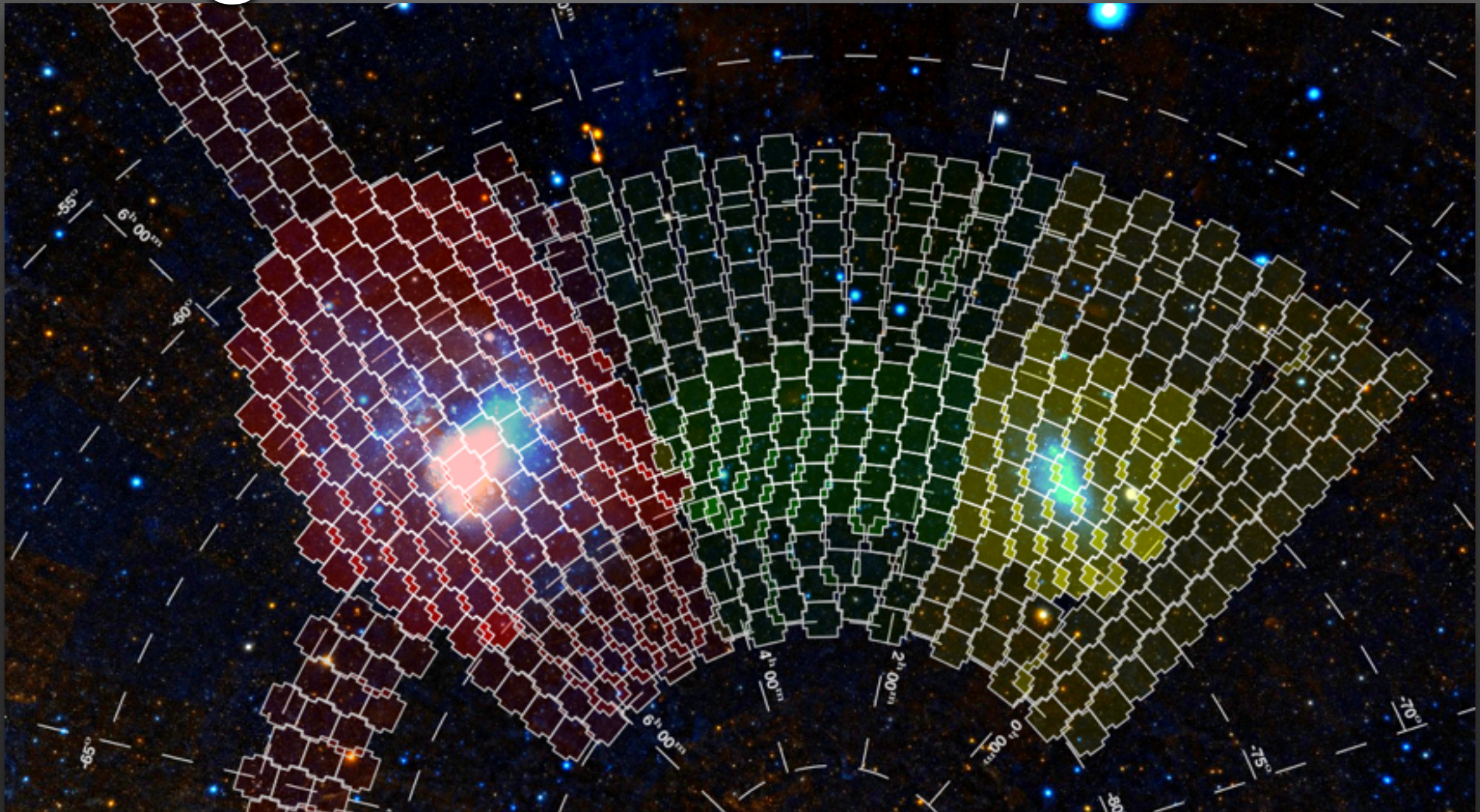
green: 1-3 per night

blue: 0.5-1 per night

cyan: less than 0.5 per night

transparent: observed occasionally

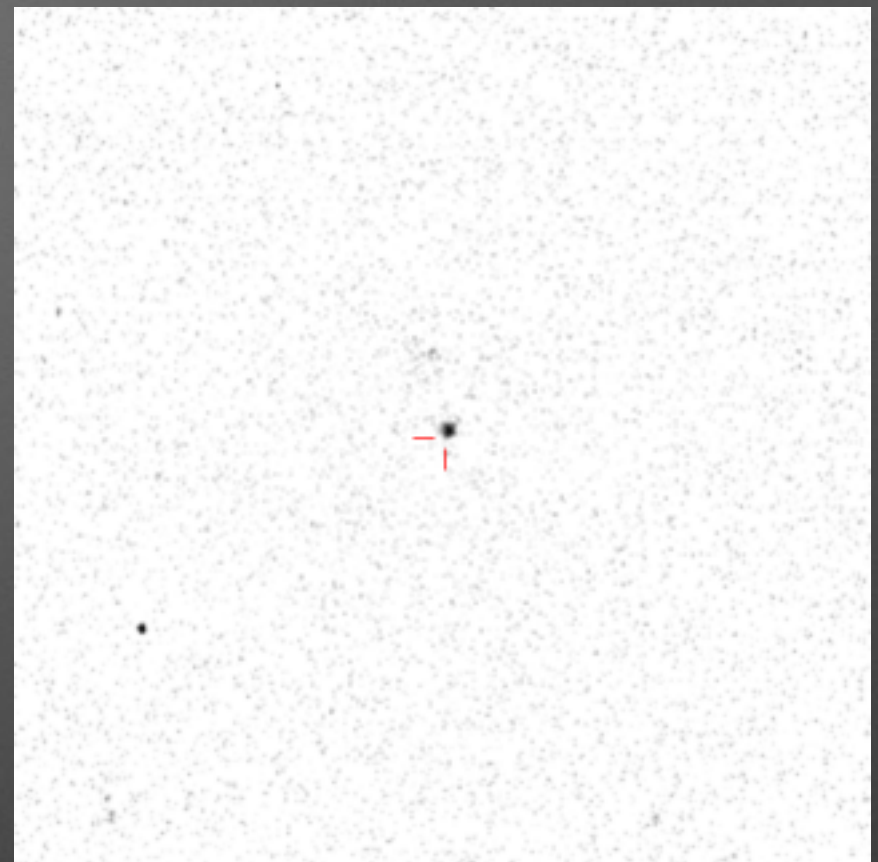
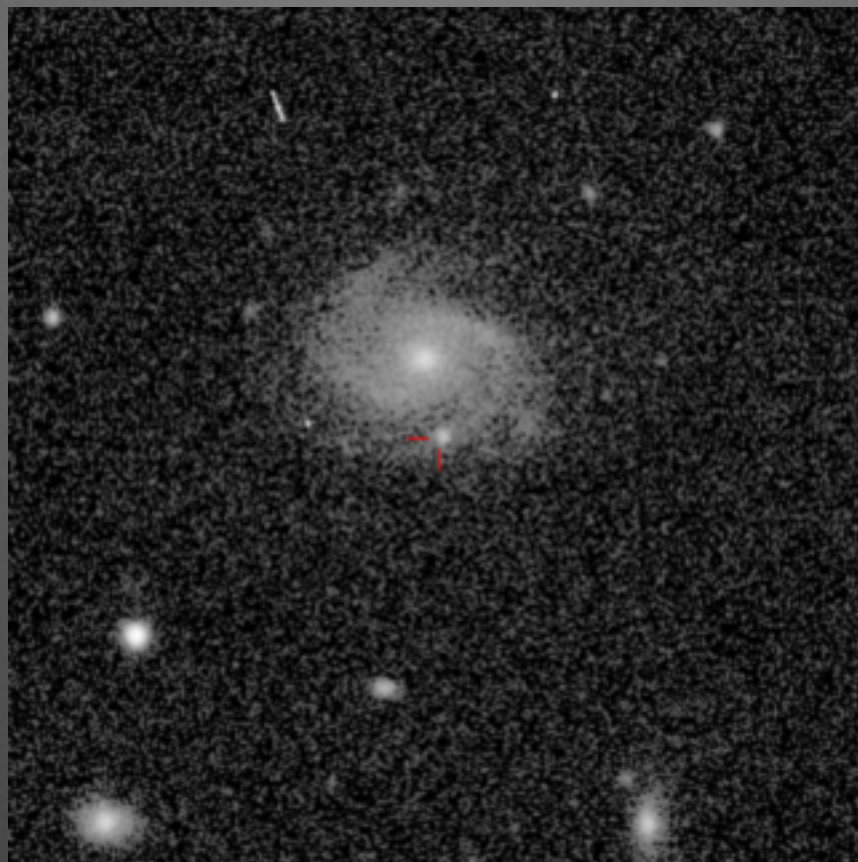
Magellanic Clouds



- LMC+MBR+SMC - 670 sq. deg
- some fields observed from 1997
- transients and variable stars

field cadence:
2-6 days

DIA



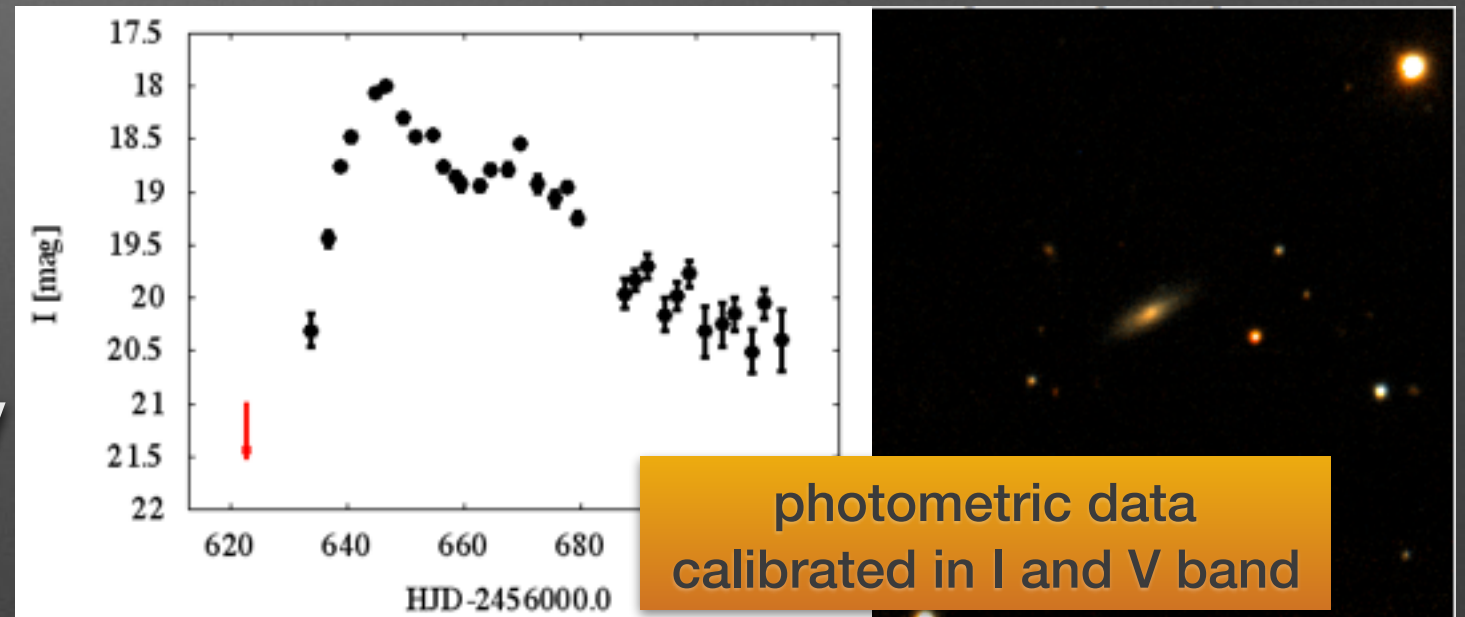
OGLE13-148

DIA accuracy - better than a fraction of a pixel
pixelsize ~0.26"

OGLE-IV Real-Time Transient Search

Ł. Wyrzykowski^{1,2}, Z. Kostrzewa-Rutkowska¹, S. Kozłowski¹,
A. Udalski¹, R. Poleski^{1,3}, J. Skowron¹, N. Blagorodnova², M. Kubiak¹,
M. K. Szymański¹, G. Pietrzyński^{1,4}, I. Soszyński¹, K. Ulaczyk¹,
P. Pietrukowicz¹, P. Mróz¹

- 2012/13 2013/14
- 238 transients
- 87 classified spectroscopically
- 49 SNe Ia
- 27 SNe II + a few Ib, Ibn, Ic
- redshift $z < 0.14$



<http://ogle.astrouw.edu.pl/ogle4/transients/archive2012-2014/>

Interesting results from 2012/13/14

Bright but slow – Type II supernovae from OGLE-IV –
Implications for magnitude limited surveys

Poznanski et al. 2015

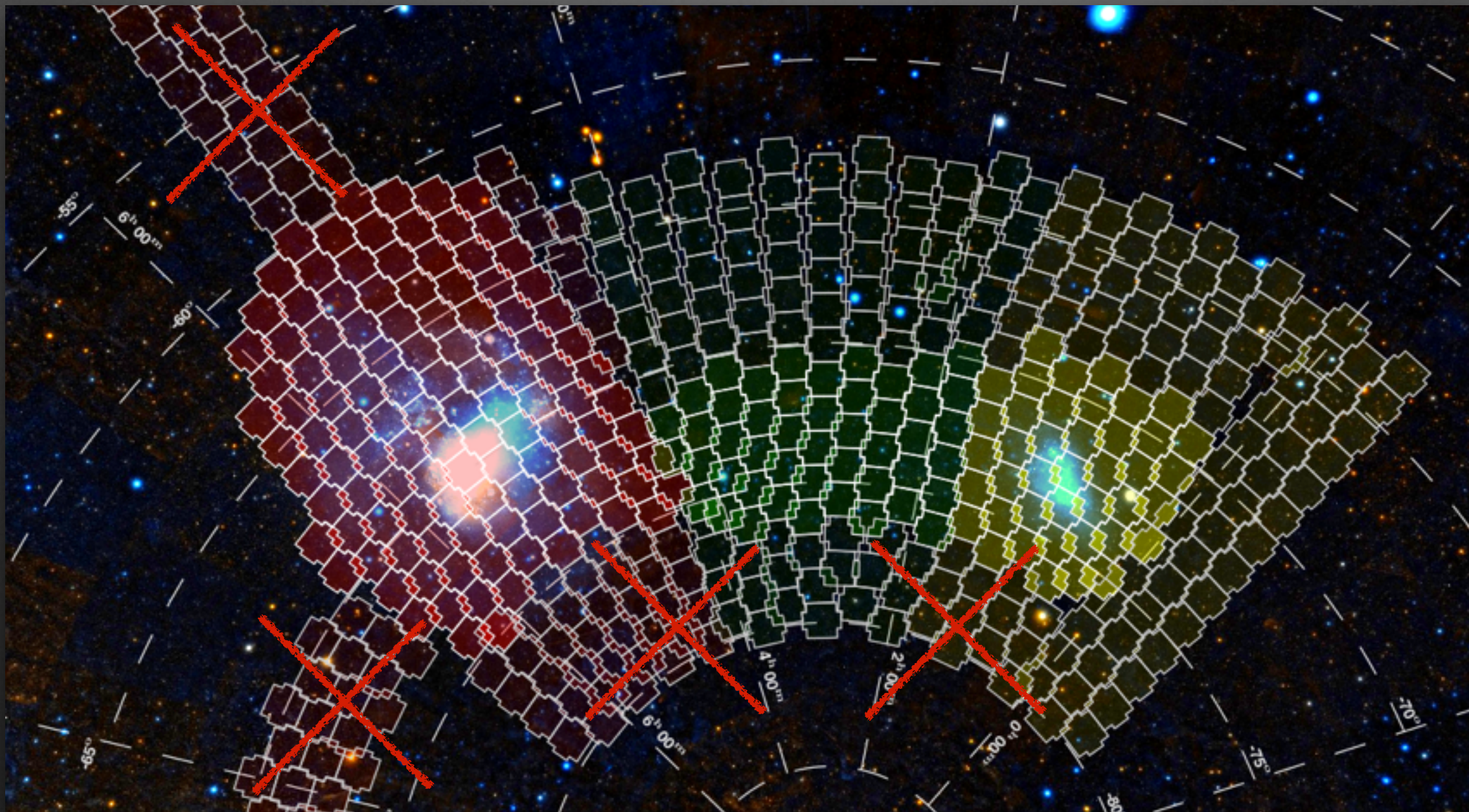
Massive stars exploding in a He-rich circumstellar
medium. V. Observations of the slow-evolving SN Ibn
OGLE-2012-SN-006

Pastorello et al. 2015

OGLE-2013-SN-079: A LONELY SUPERNOVA CONSISTENT
WITH A HELIUM SHELL DETONATION

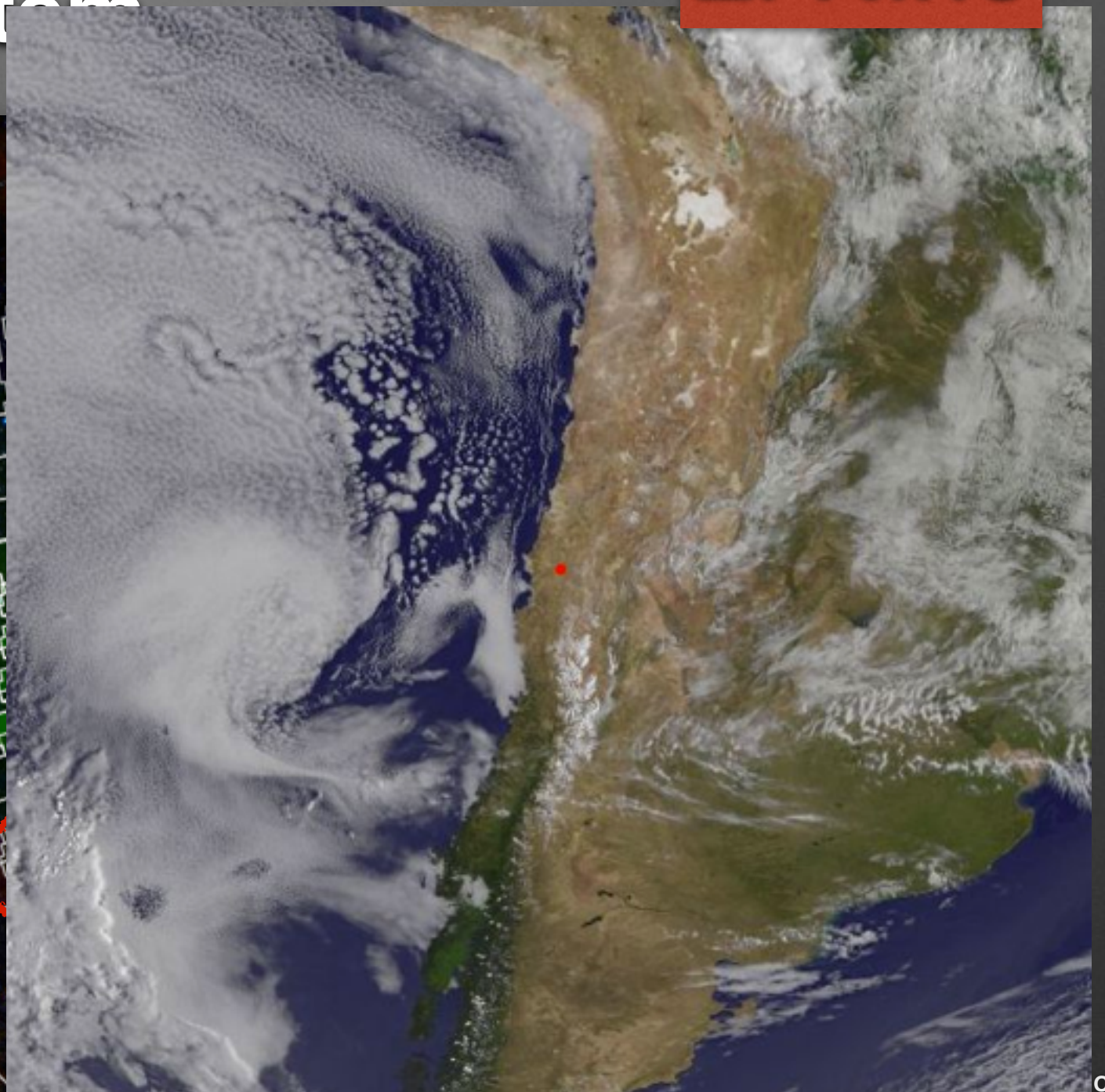
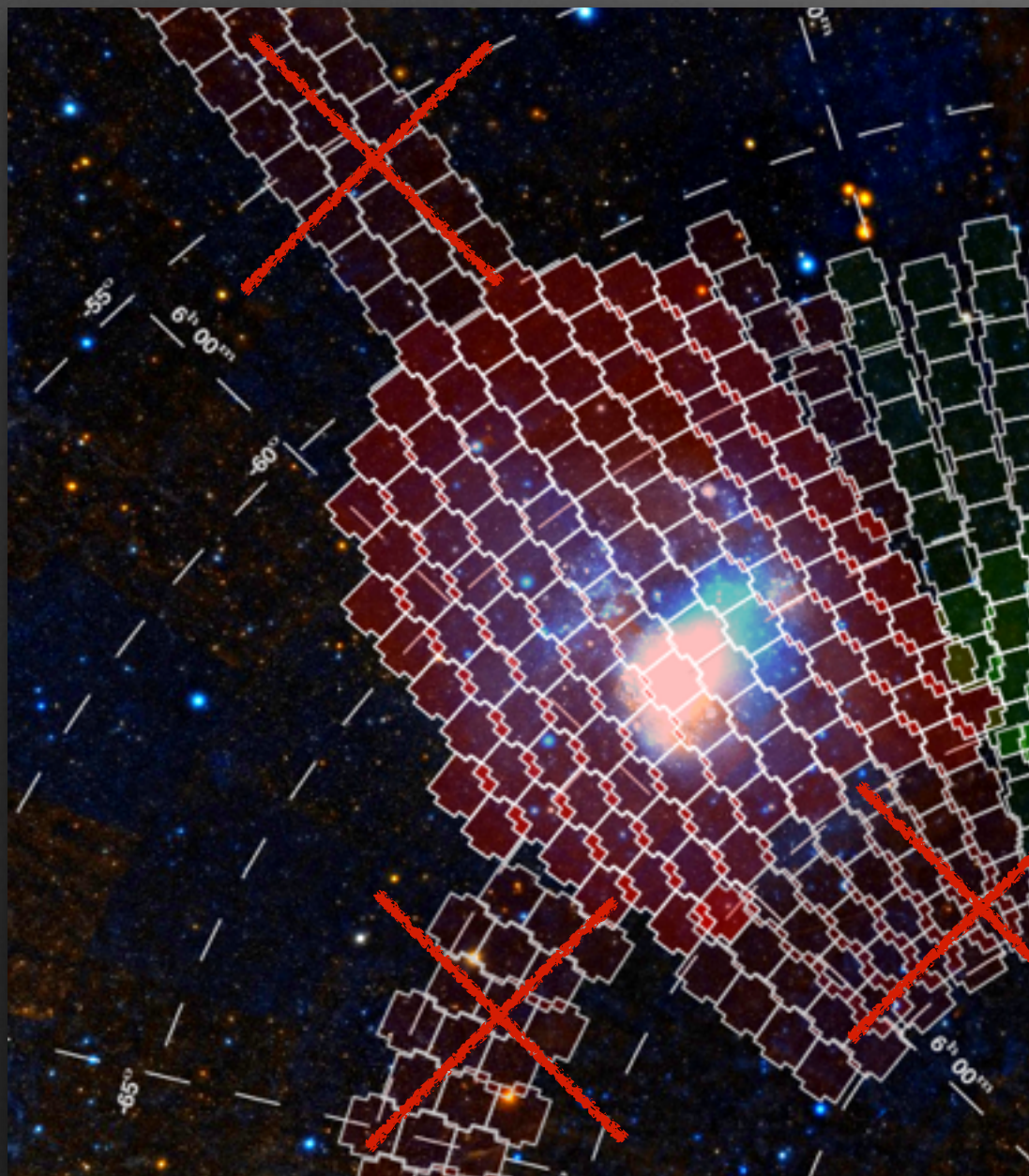
Inserra et al. 2015

From **2015B**:
trimmed regions (550 sq. deg),
cadence 2-4 days,
rapid detection system



From **2015B**:
trimmed regions (550 sq. deg),
cadence **2-4 days**,
rapid detection system

El Niño



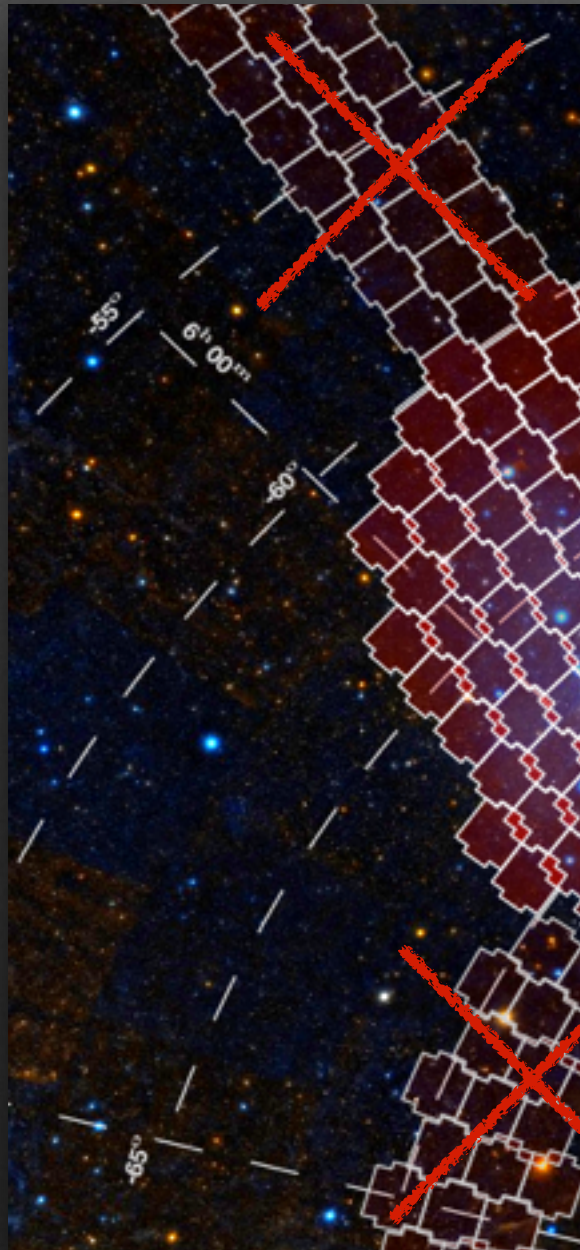
151105 1145 UTC

NASA GSFC GOES Project

com/

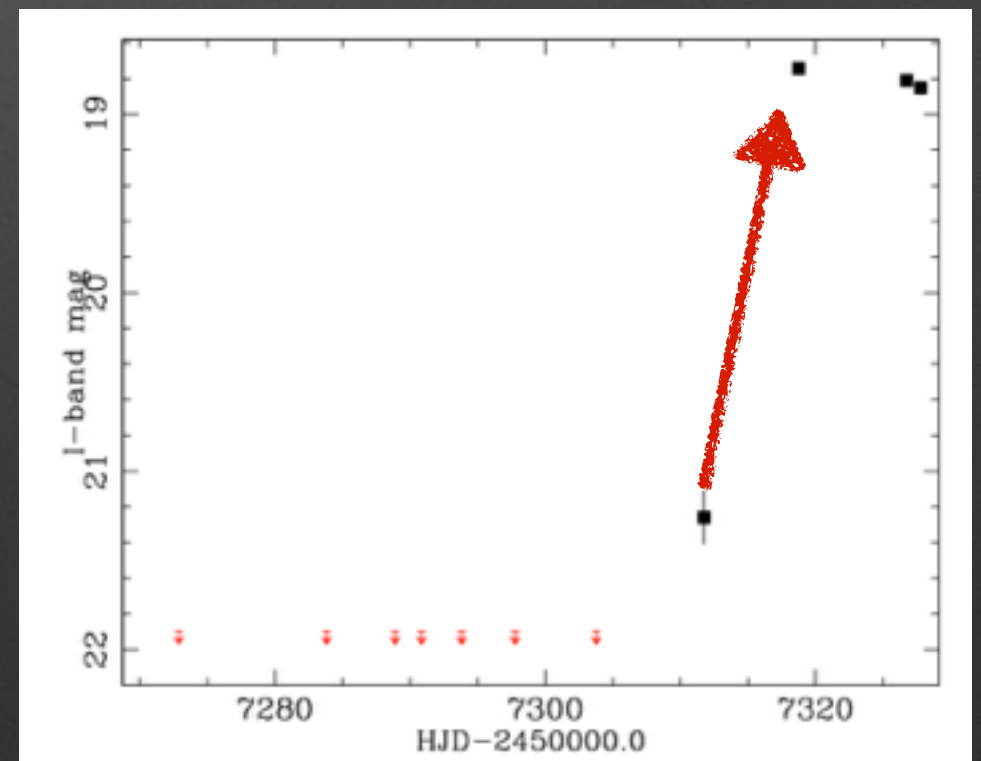
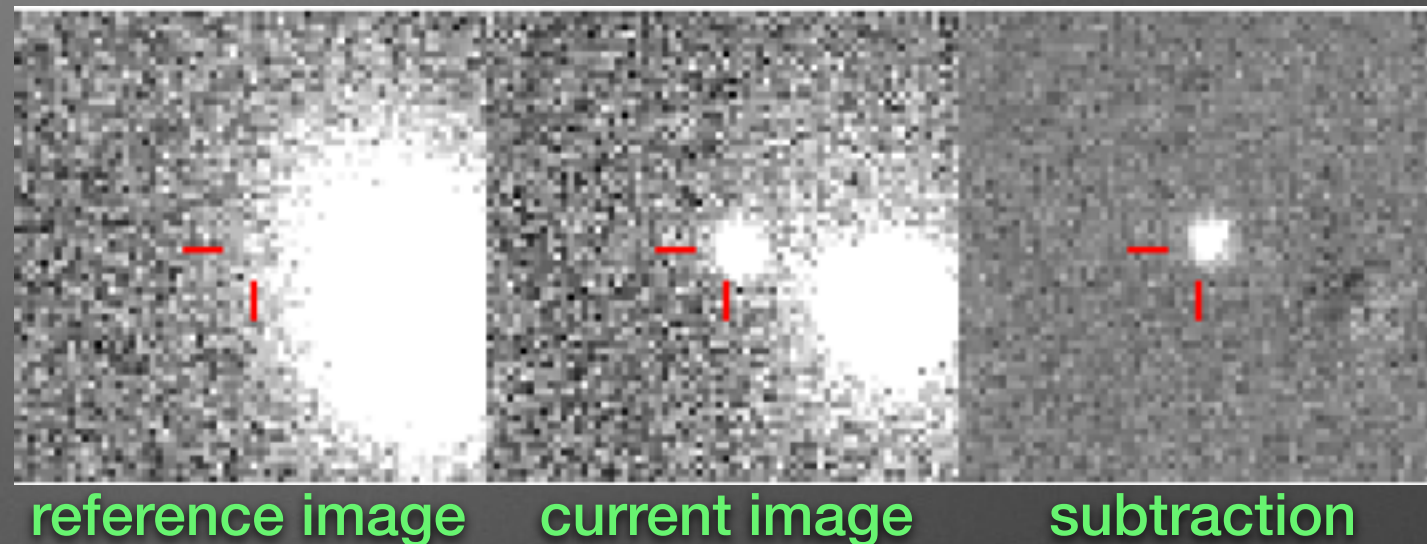
From **2015B**:
trimmed regions (550 sq. deg),
cadence **2-4 days**,
rapid detection

El Niño



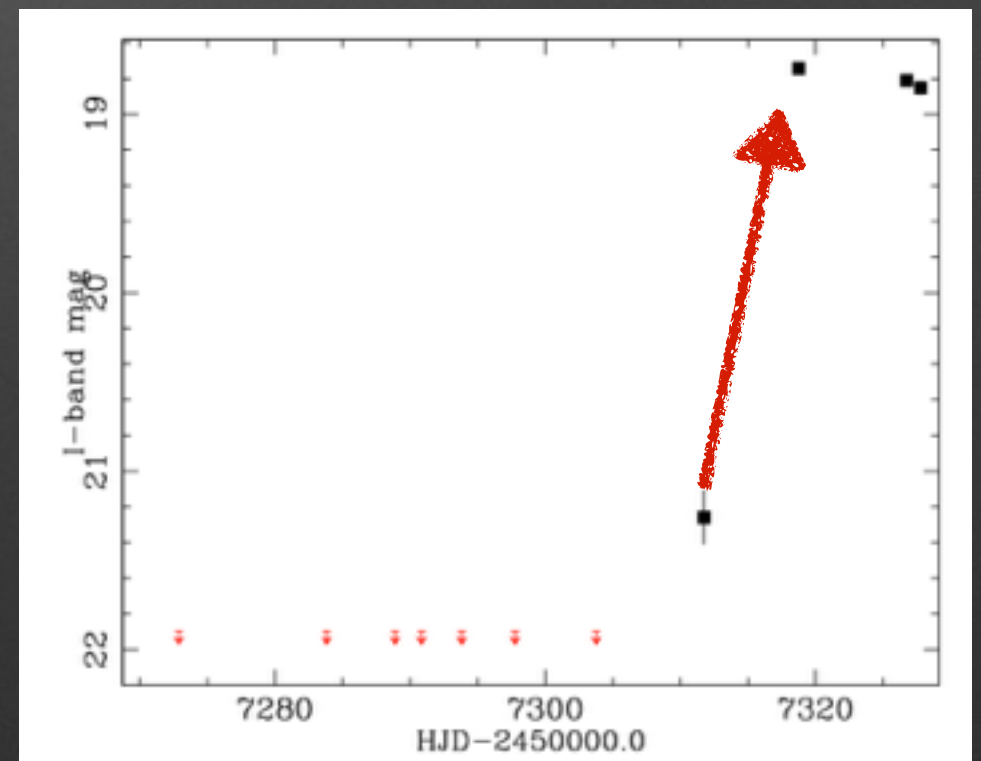
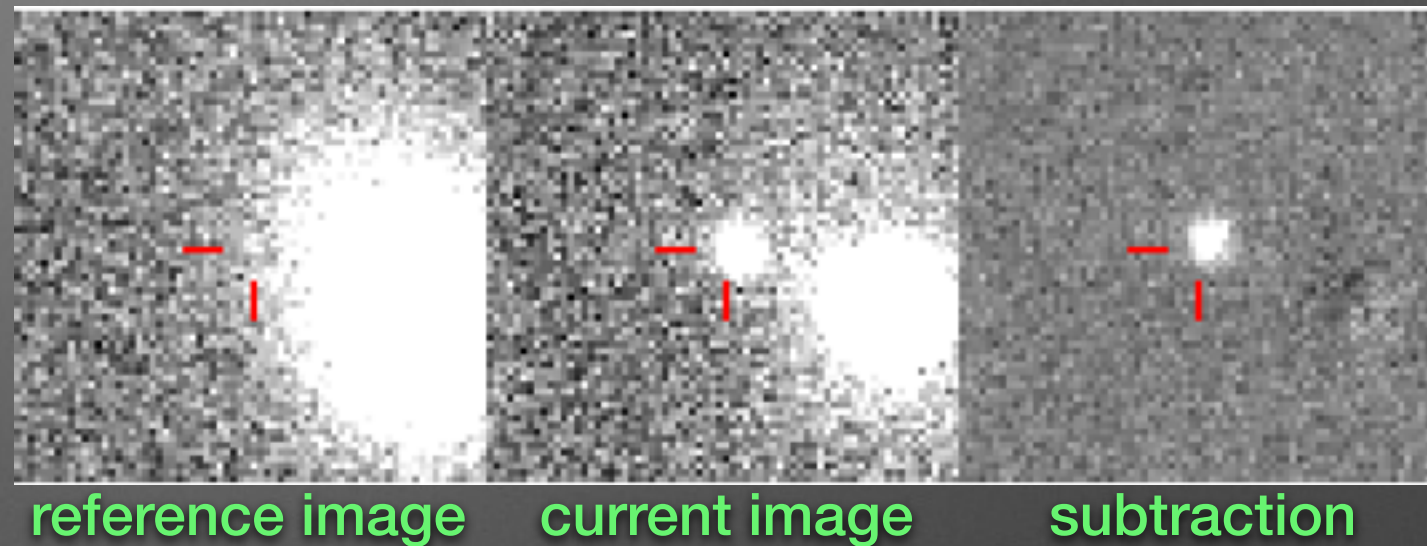
Rapid detection system

- one night 150 sq. deg observed in I-band
- cadence 2-4 days
- data reduction + new object detection after 15 min
- decision with 1 point (limit 19.2 mag)
- true transients - 1-5 per night
- false detections - mostly cosmics
- <http://ogle.astro.uw.edu.pl/ogle4/transients/rapid/rapid.html>

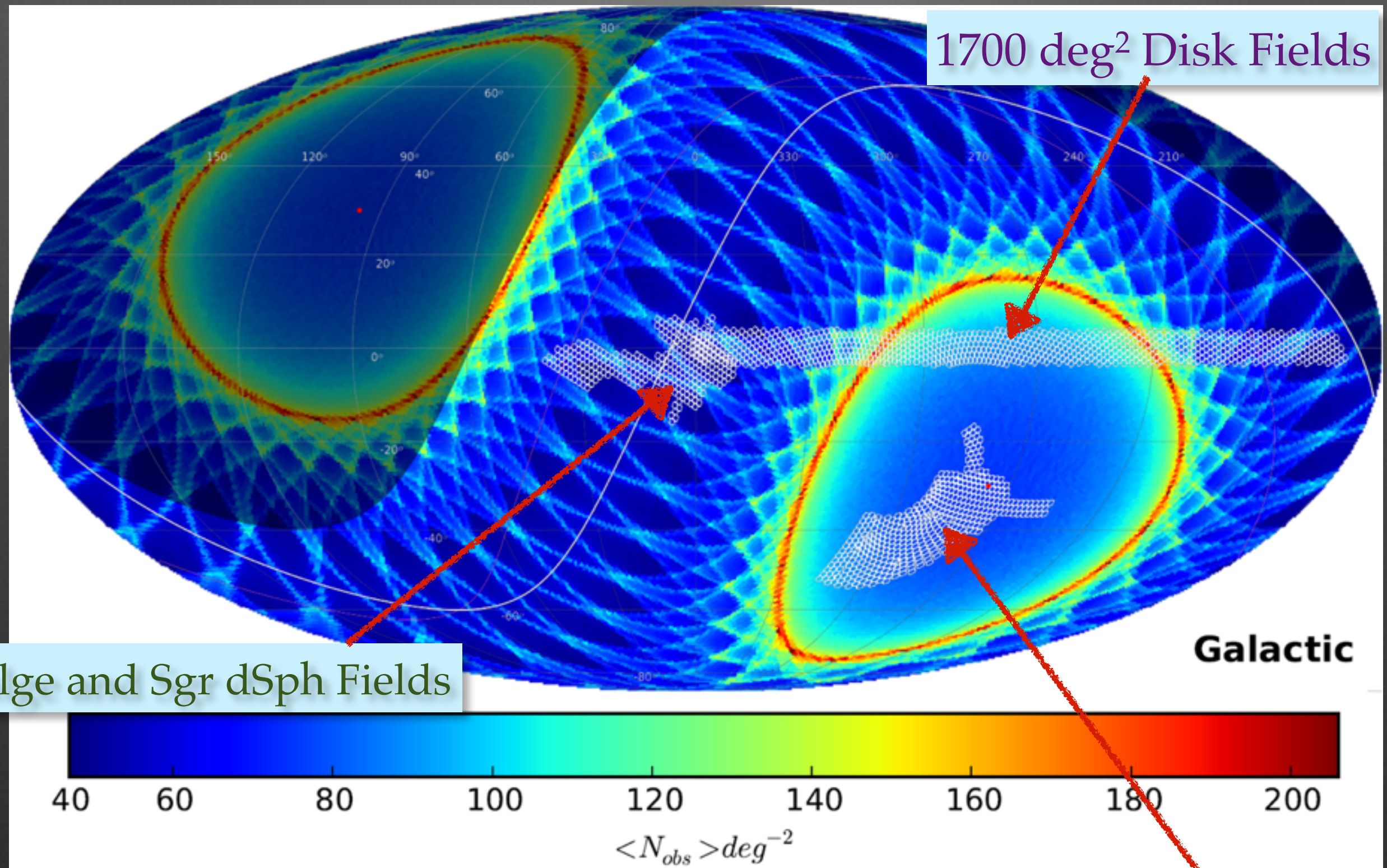


Rapid detection system

- using Self Organised Maps to classify
- search for hosts in galaxy catalogue
- WISE colours to exclude AGNs
- history of previous variability from last 10 frames
- <http://ogle.astrouw.edu.pl/ogle4/transients/rapid/rapid.html>



OGLE - Gaia SKY

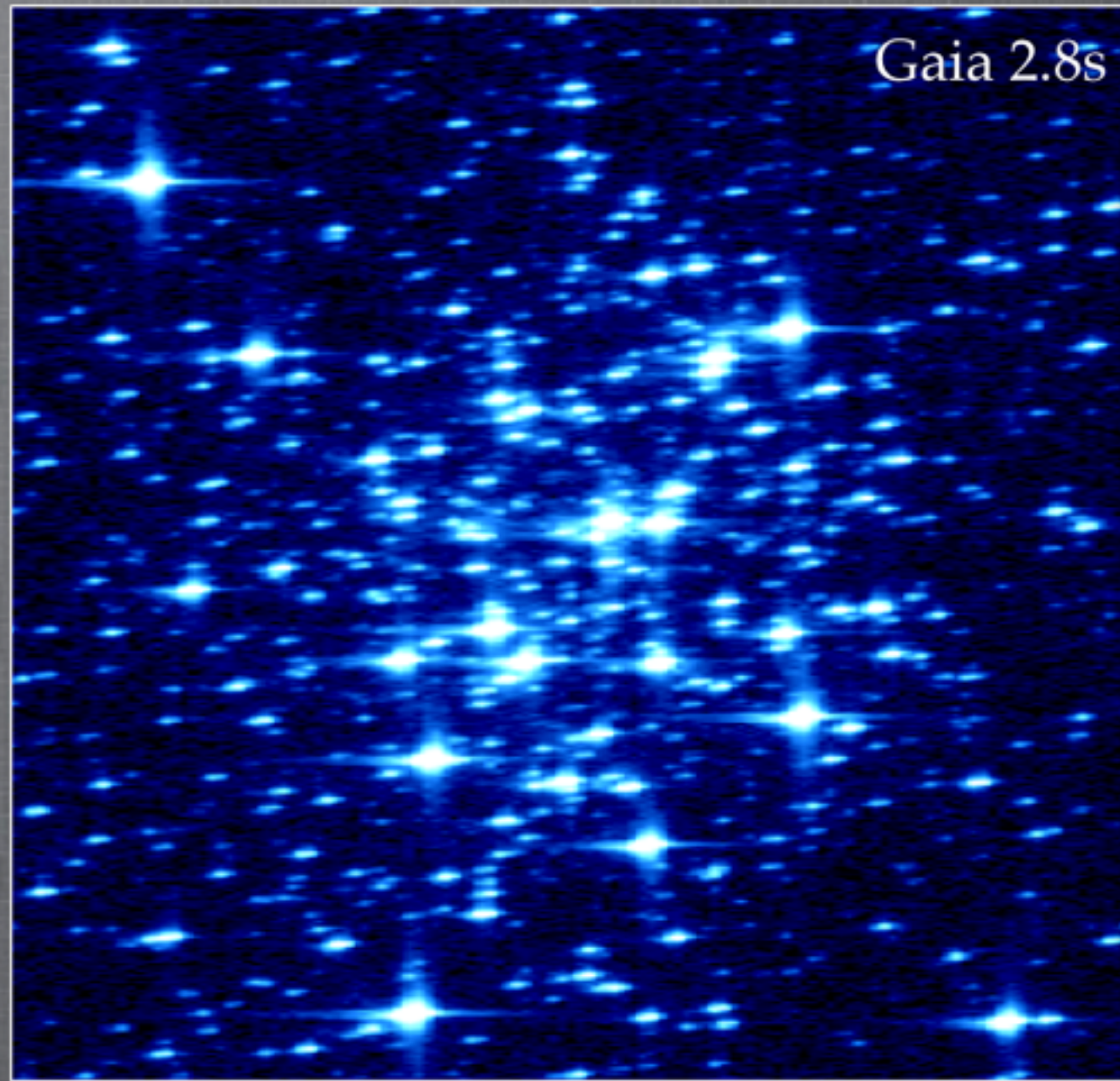
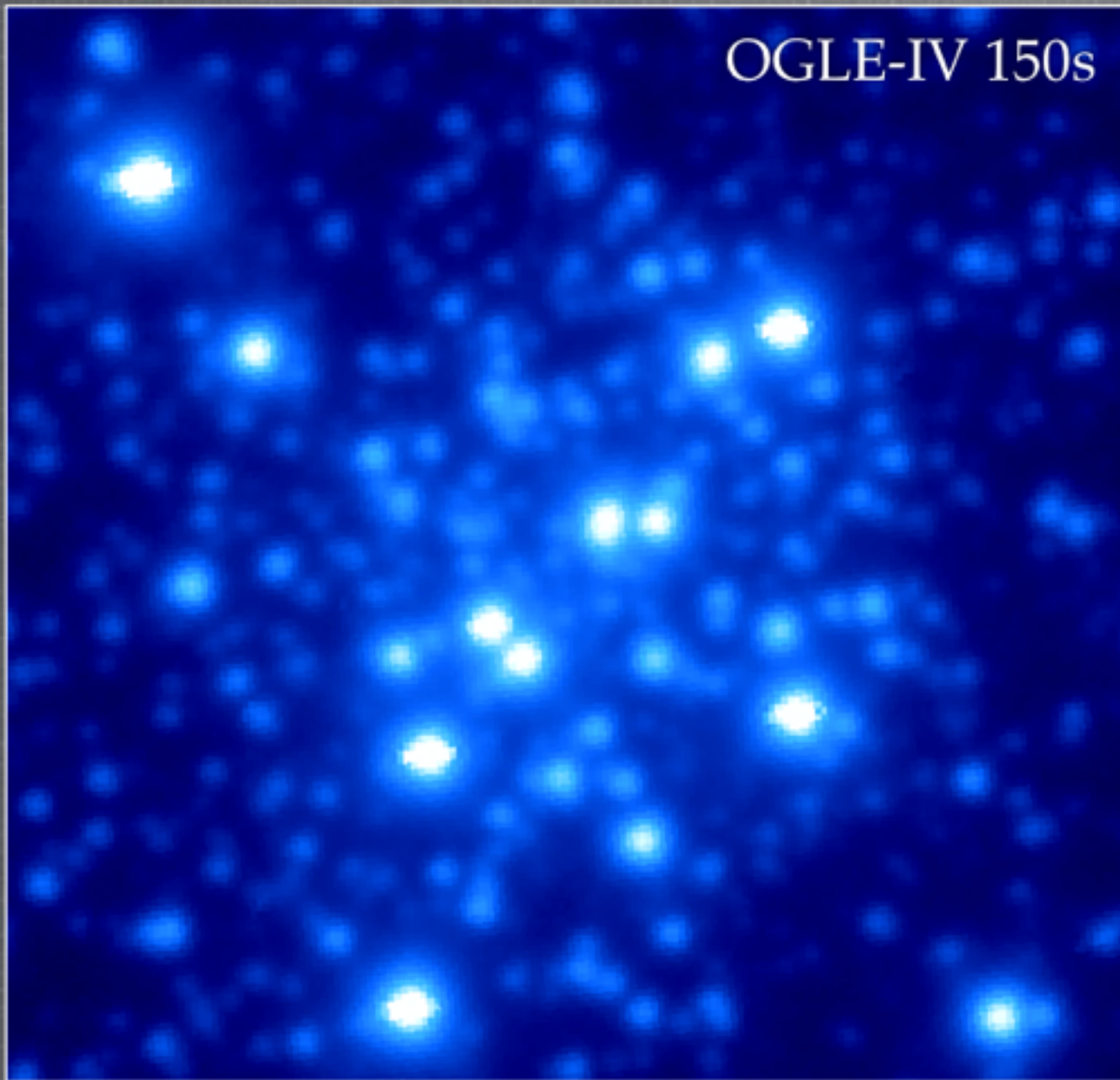


Magellanic Clouds and SEP

NGC 1818

OGLE-IV 150s

Gaia 2.8s



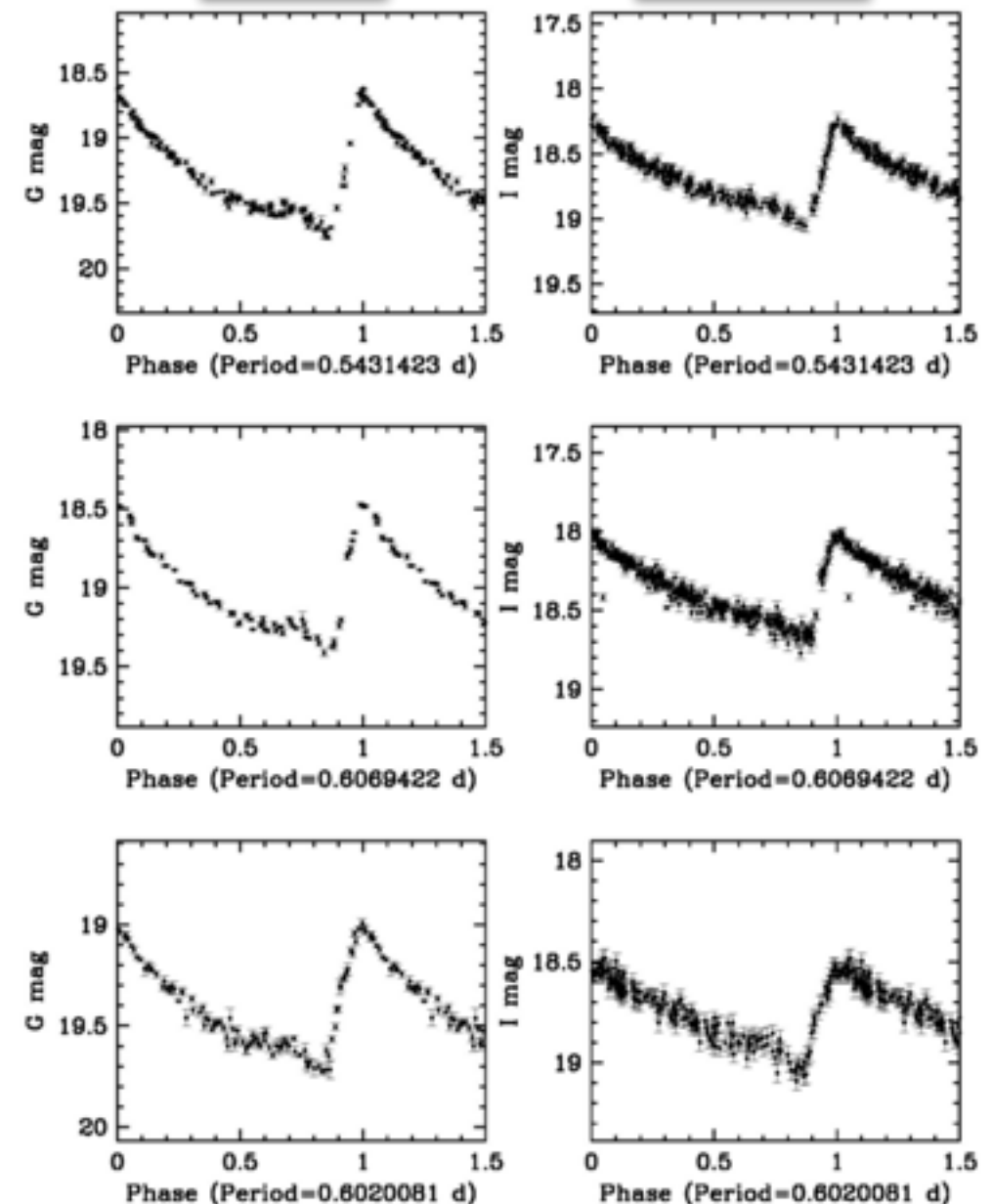
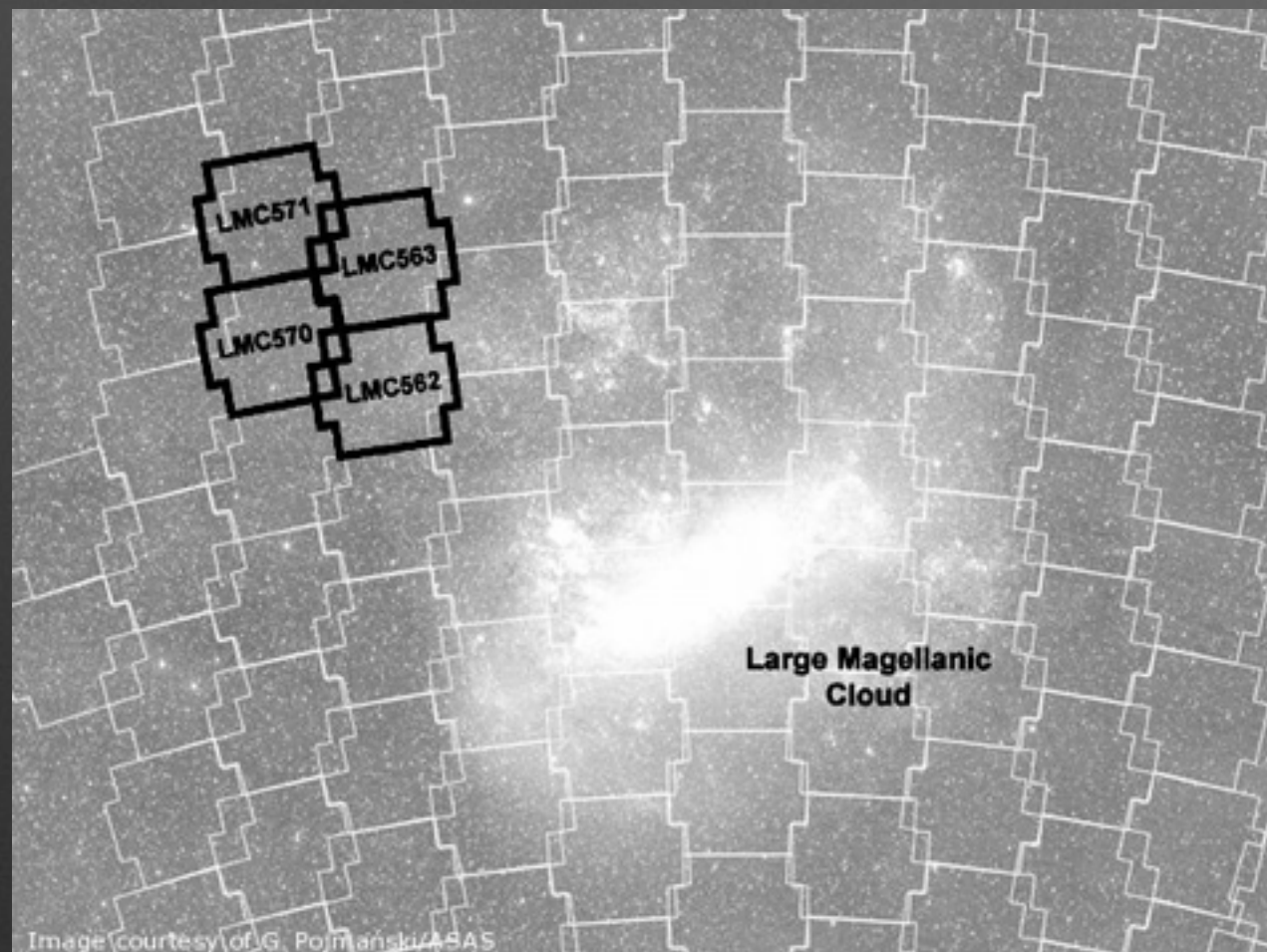
GSEP variables

The Optical Gravitational Lensing Experiment. Gaia South Ecliptic Pole Field as Seen by OGLE-IV*

I. Soszyński¹, A. Udalski¹, R. Poleski¹, S. Kozłowski¹,
Ł. Wyrzykowski^{1,2}, P. Pietrukowicz¹, M.K. Szymański¹,
M. Kubiak¹, G. Pietrzyński^{1,3}, K. Ulaczyk¹ and J. Skowron^{4,1}

Gaia

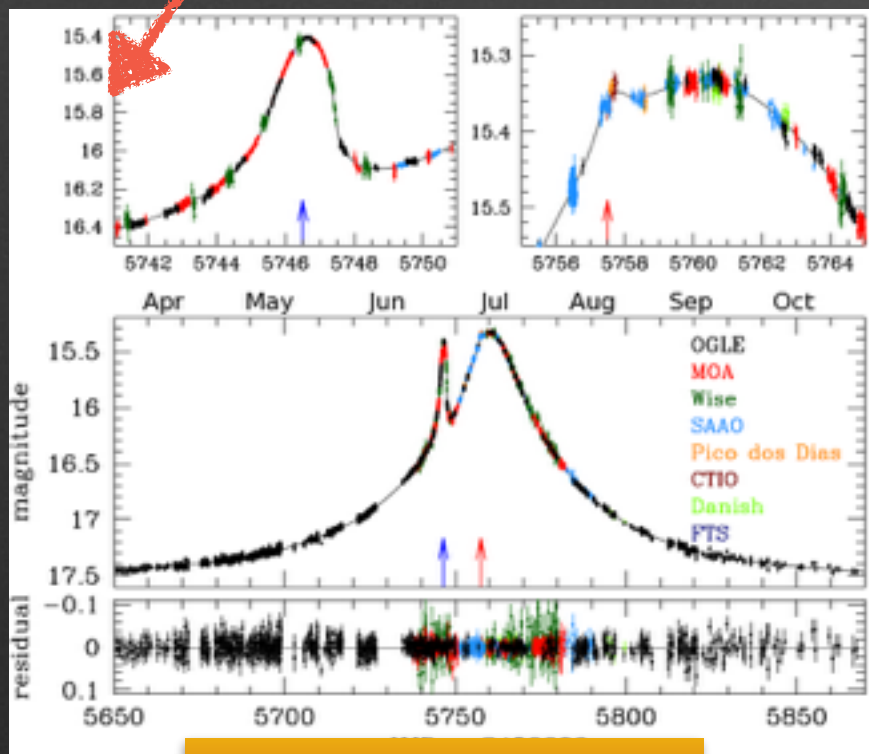
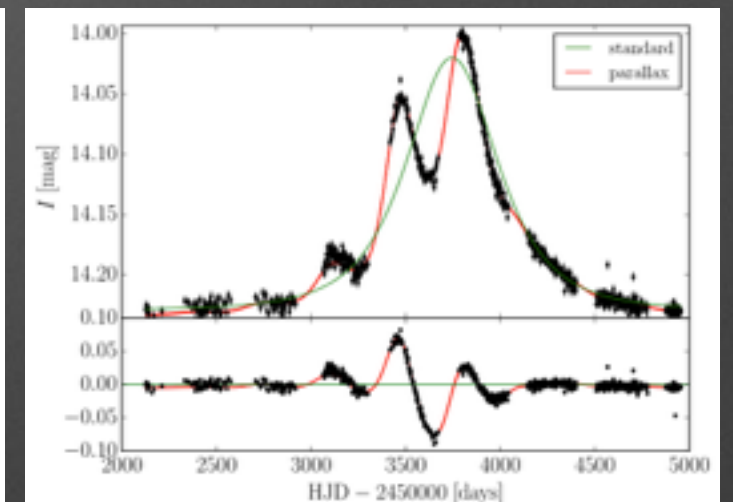
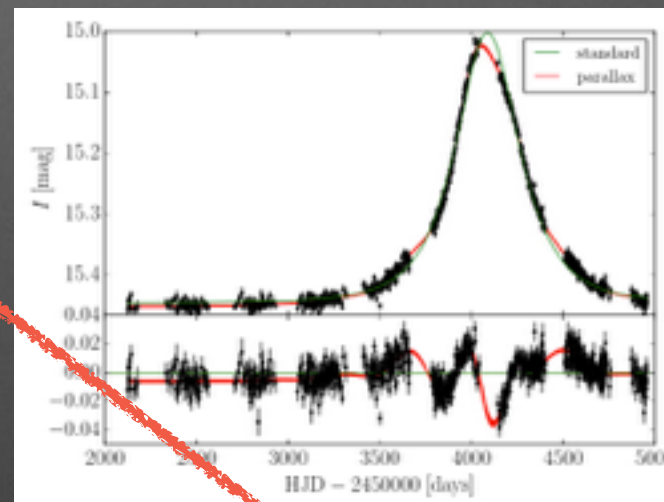
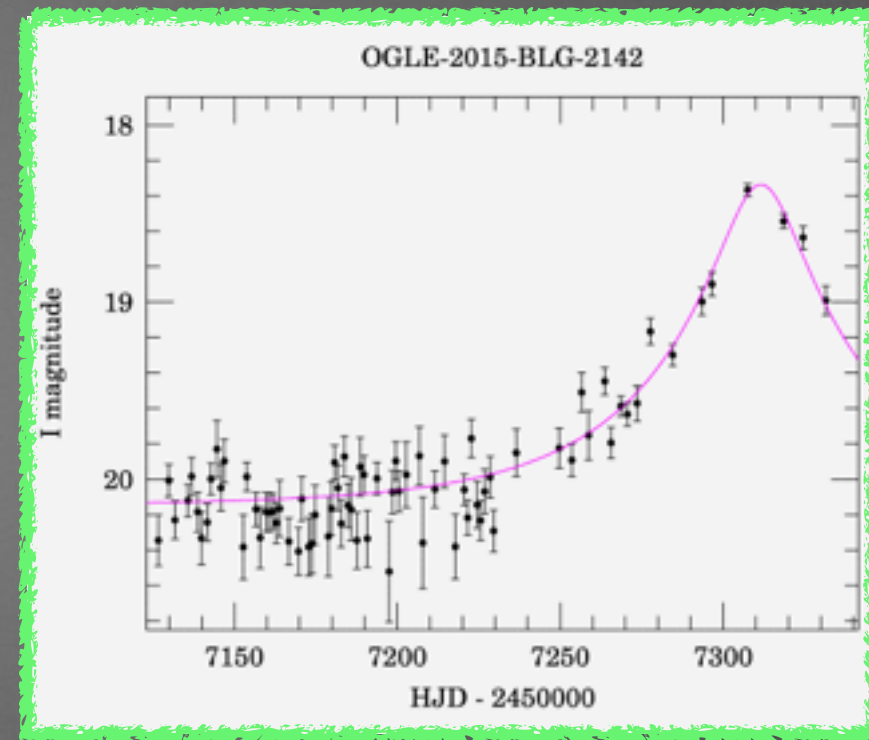
OGLE



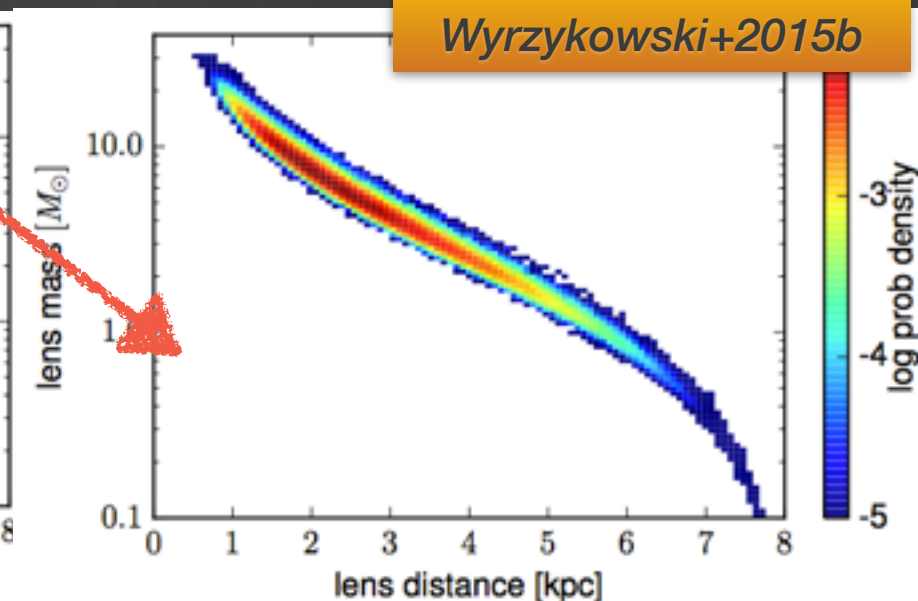
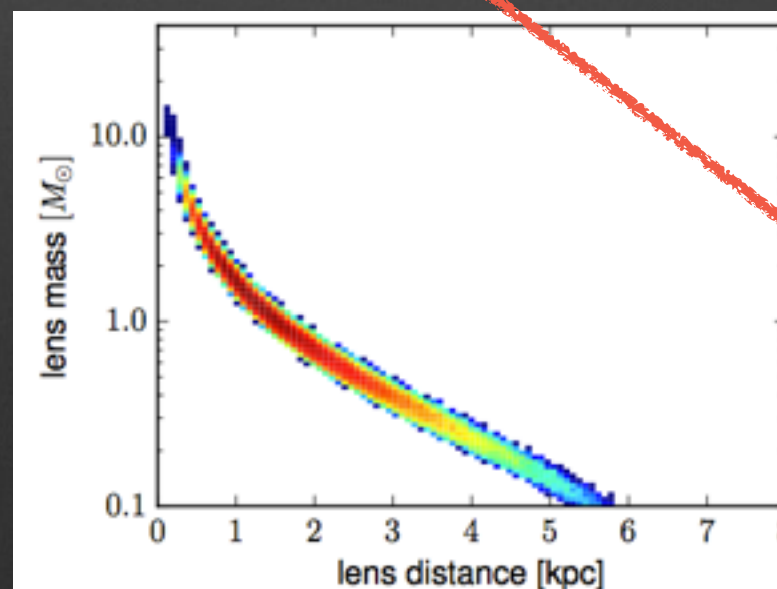
Microlensing

From 1993: >10000 events

dark matter
planets
galactic structure
stellar remnants



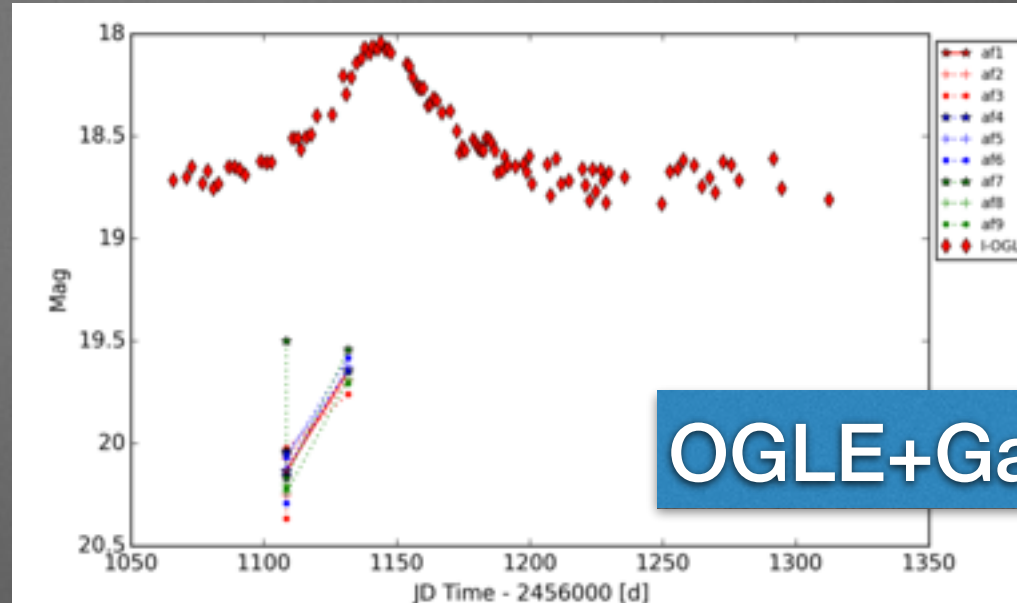
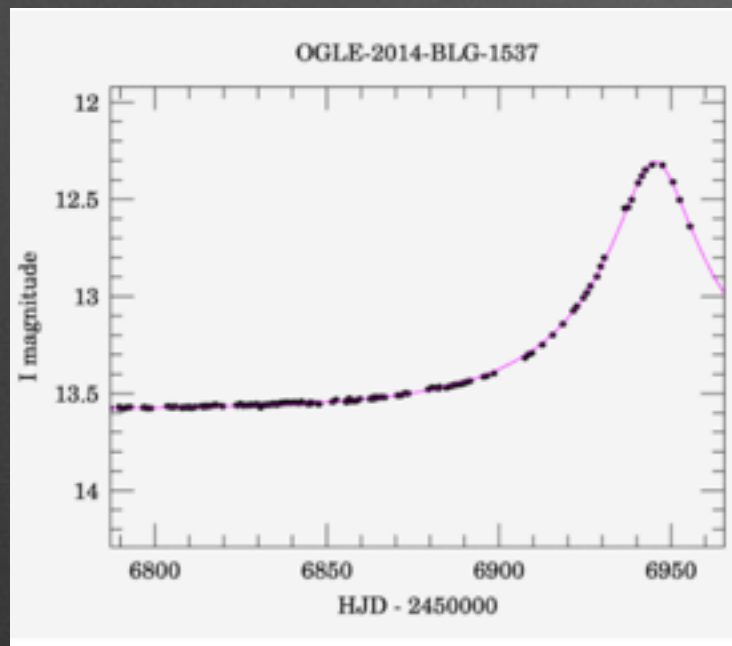
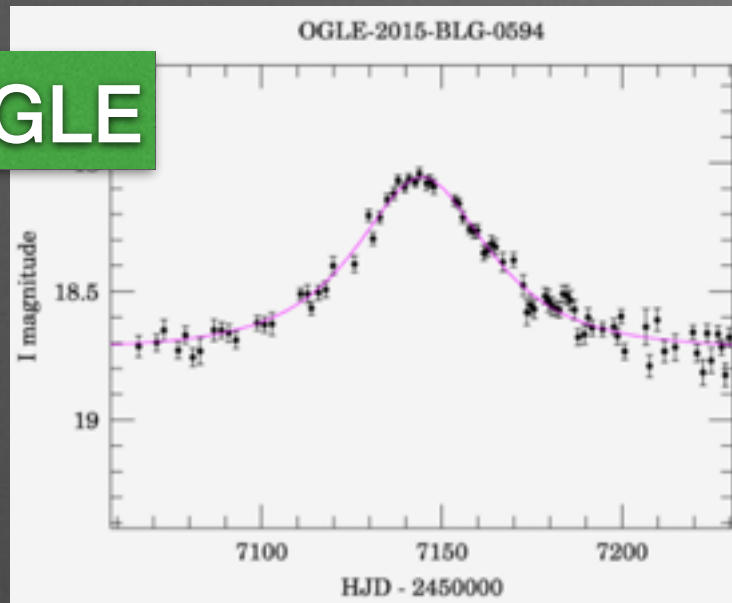
Skowron+2015



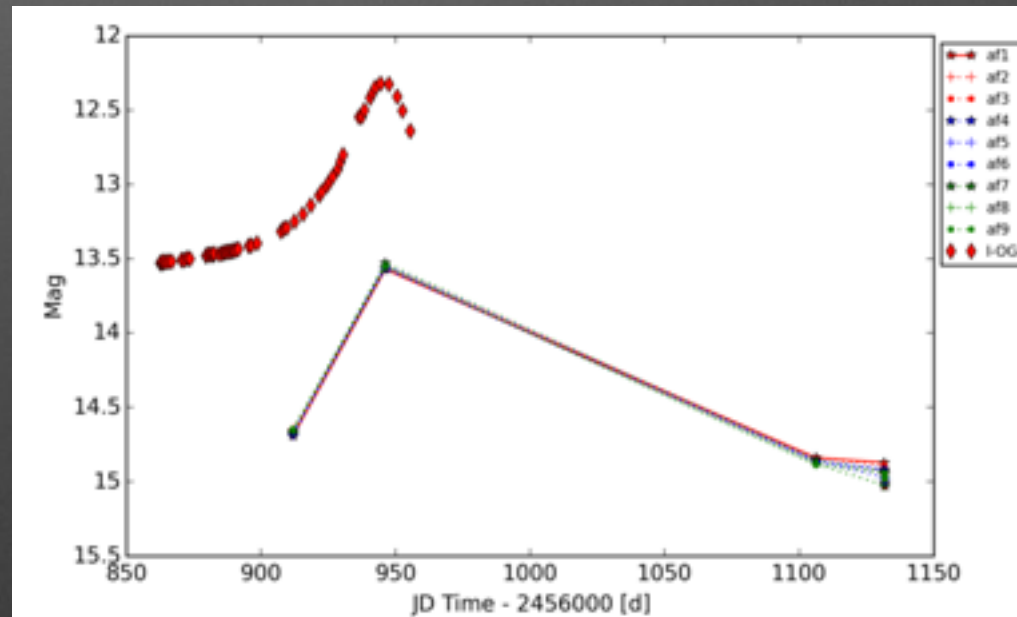
Wyrzykowski+2015b

Microlensing

OGLE



OGLE+Gaia



- EWS 2014, 2015
- >4000 microlensing events
- some should be seen by Gaia

Kris Rybicki's talk
about astrometric microlensing
from Gaia and OGLE

Future

- rapid survey mode
- catalogue of OGLE galaxies ($z < 0.2$)
- catalogue of QSOs+lensed QSOs
- photometric redshifts
(OGLE I,V-bands + 2mass + WISE)
- spectroscopic follow-up
- nuclear transients & TDEs
- Galactic disk survey -
transient search from 2016

