

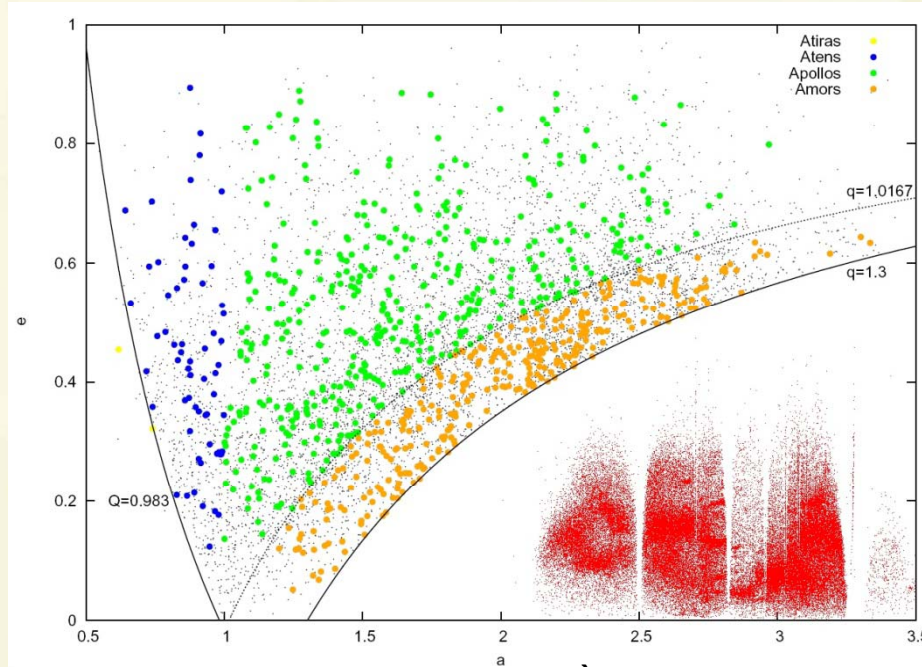
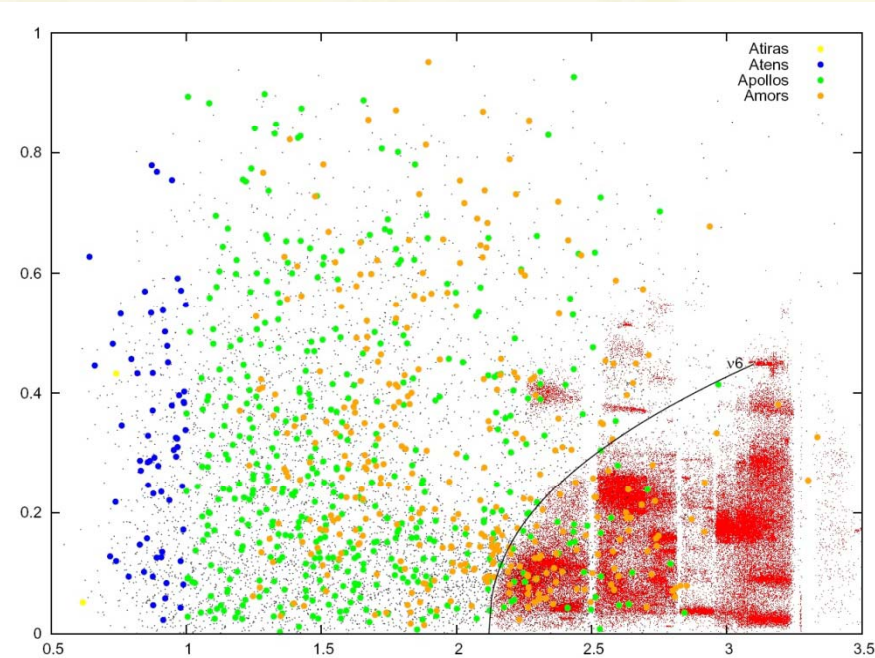
Near-Earth Asteroids Data mining on Astronomical Databases: Euronear experience.

Mirel Birlan

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CNRS UMR 8028, Observatoire de Paris,**

Many thanks to: O. Vaduvescu, M. Popescu, L. Curelaru,
I. Comsa, A. Tudorica, R. Toma, A. Paraschiv, O. Suciuc,
A Nedelcu

Near-Earth Asteroids



THÈSE A. NEDELICU(2010)

Amor

$a > 1 \text{ u.a. et } 1,0167 < q \leq 1,3 \text{ u.a.}$

Apollo

$a \geq 1 \text{ u.a. et } q \leq 1,0167 \text{ u.a.}$

Athen

$a \leq 1 \text{ u.a., } Q \geq 0,983 \text{ u.a.}$

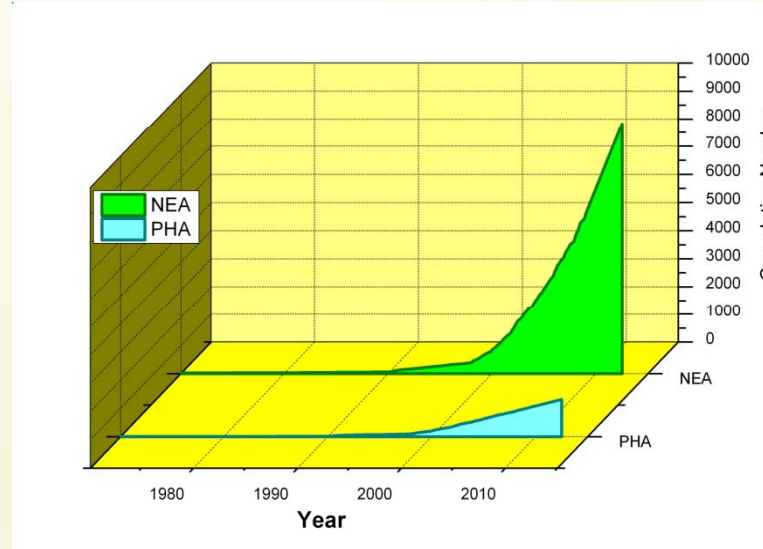
Atira

$Q < 0,983 \text{ u.a. et } a < 1 \text{ u.a.}$

a – semi-major axis

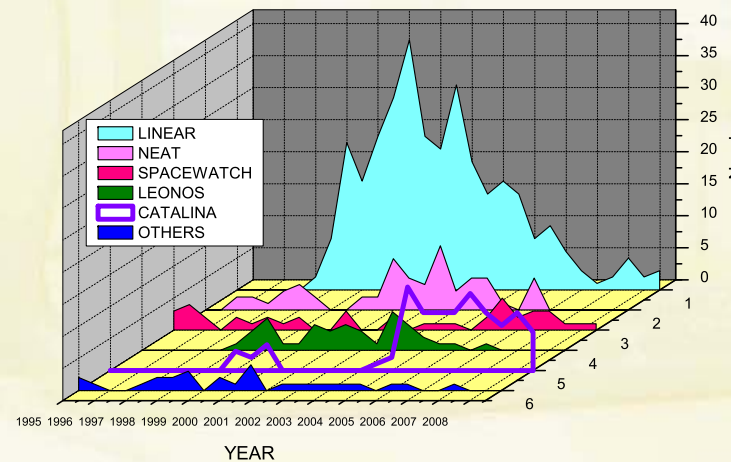
q – perihelion distance

Q – aphelion distance



EUROpean Near-Earth Asteroids Research

dedicated to study Near Earth Asteroids (NEAs) and Potentially Hazardous Asteroids (PHAs) using existing telescopes available to its network and hopefully in the future some automated dedicated 1-2 metre facilities.

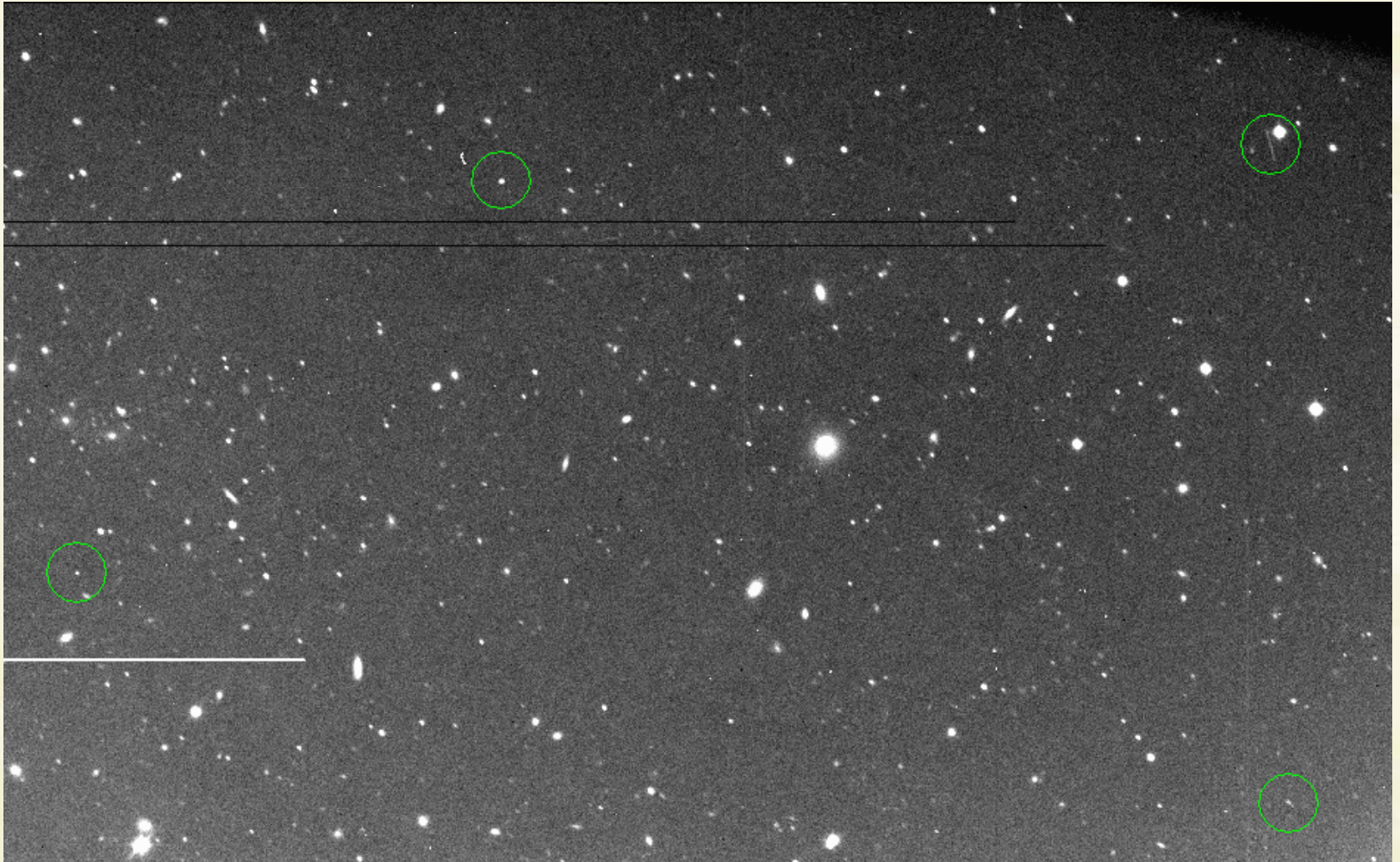




Goals

- 1. Follow-up and recovery of NEAs orbit (astrometry).**
Focus on newly discovered objects and NEAs with large uncertainties in osculating elements.
- 2. Photometry, spectroscopy of targets among NEAs**
providing scientific priorities (doubles, elongated shape...).
- 3. Data mining for recovery/precovery of NEAs**
- 4. Astrometry of Main Belt Asteroids.**
- 5. Discovery of NEAs and MBAs.**

ESO-La Silla MPG/WFI 2.2 m telescope (12 Mars 2008)



Credits:



Mirel BIRLAN - NAROO,
Paris, June 20-22, 2012



NETWORK: professional and amateurs from: Fr, UK, Cz, It, Esp, D, Fi



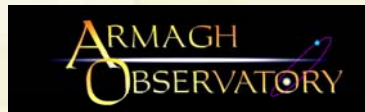
Kick-off: Summer 2006



SARM
URSEANU, (Ro)

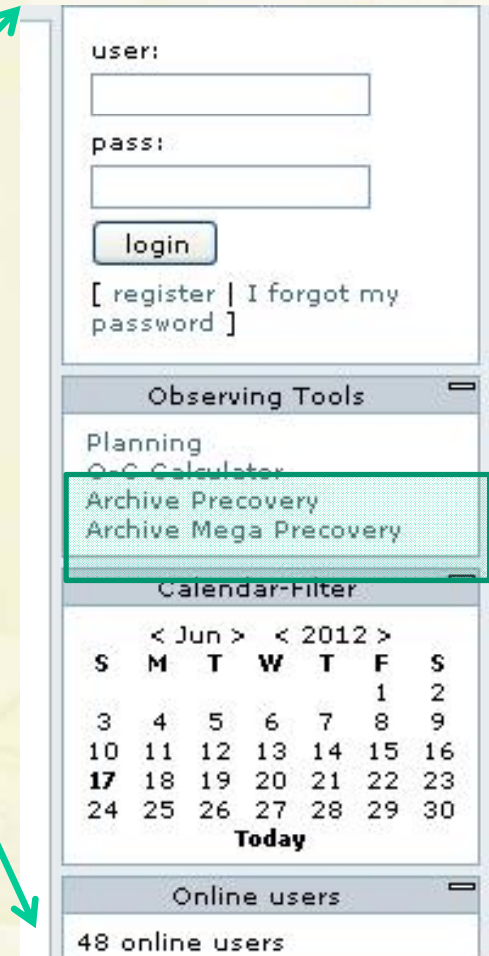
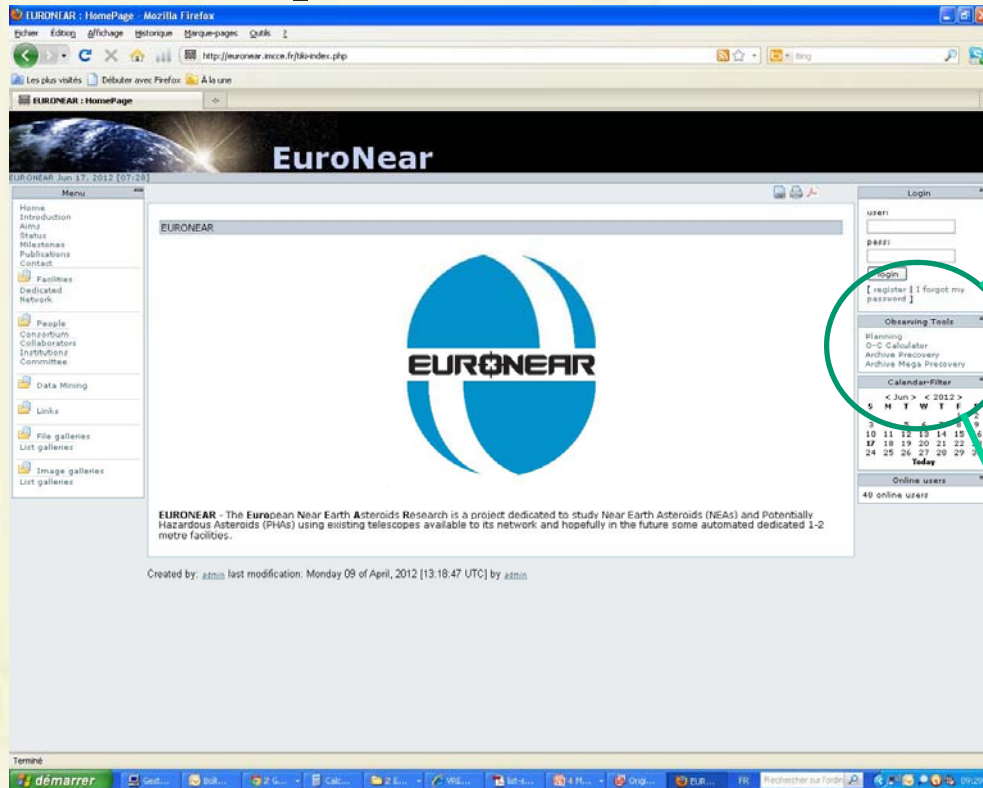
INSTITUTIONS

Astronomical Associations
(Amateurs)



MAIN STRATEGY OF WORK: WEBPAGE ACTIVITY

<http://euronear.imcce.fr>





DATA-MINING ACTIVITY

Photographic (AIRA-Ro) and

CCD (CFHT-LS, INT-WFC,

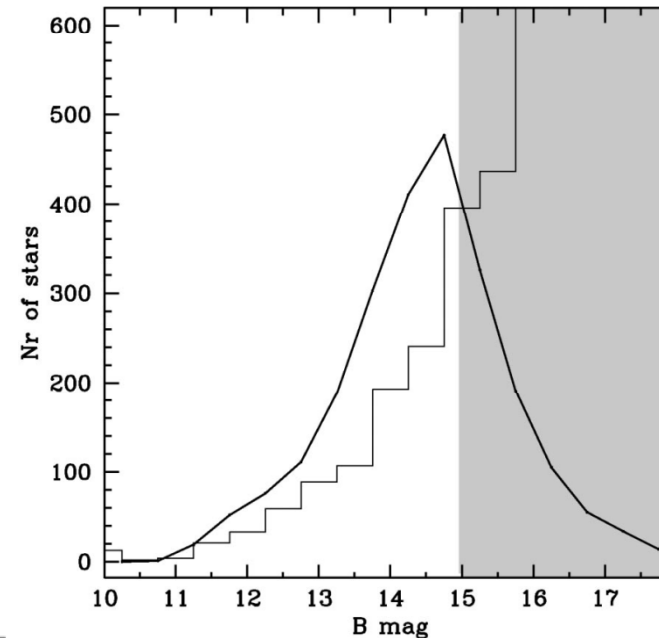
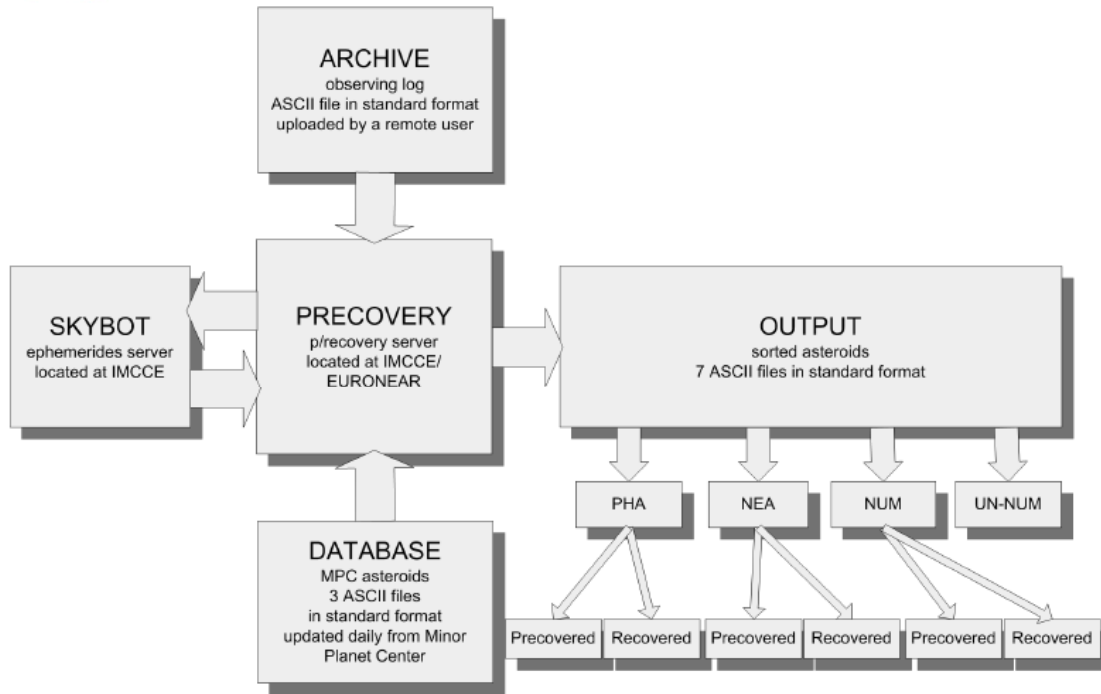
ESO/MPG –WFI,

SUBARU-SUPRIME-Cam) archives

References: Vaduvescu et al, Astron. Nach. (2009),
Vaduvescu et al. Astron. Nach. (2011), Vaduvescu et al
Astron. Nach. (2012 under revision)



NEAs on AIRA-Ro photographic archive (see A. Nedelcu's talk), ~13,000 plates

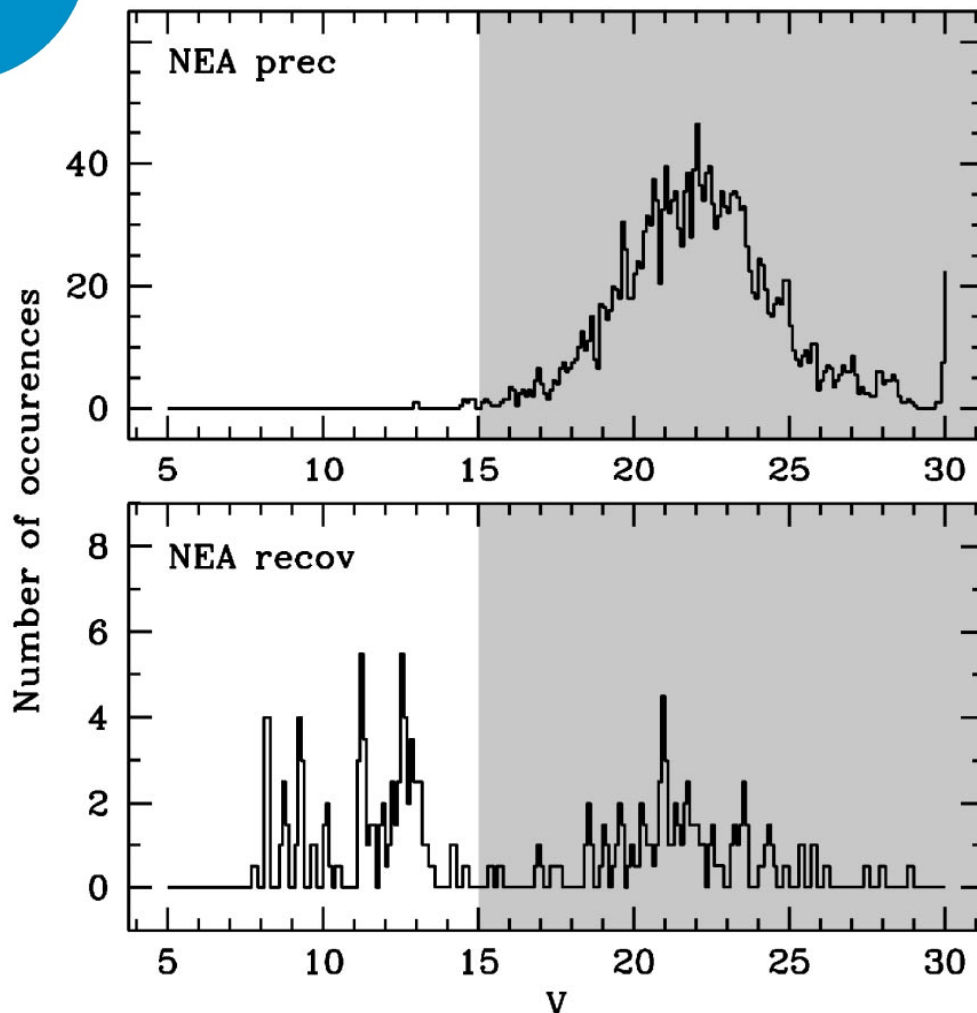


Limiting magnitude
of the stars on plates

Workflow chart of data-mining for AIRA-Ro



RESULTS

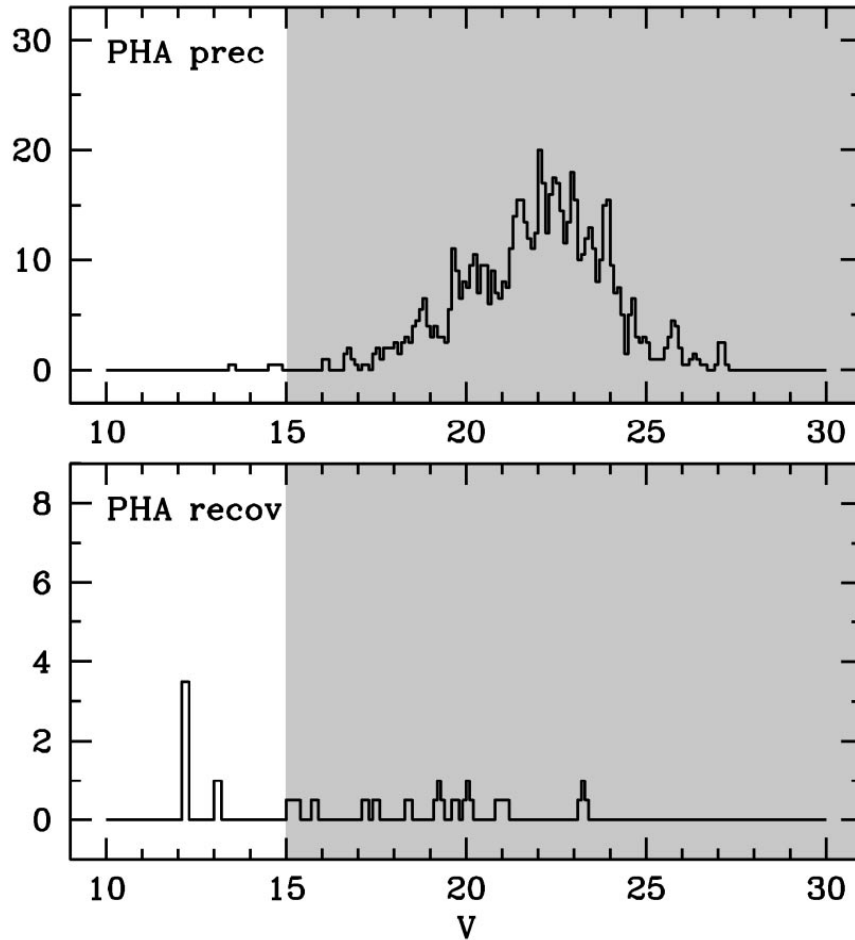


Nb of possible occurrences in the field of photographic plates.

Recoveries astrometry was already published

RESULTS –

Precoveries and recoveries for PHAs



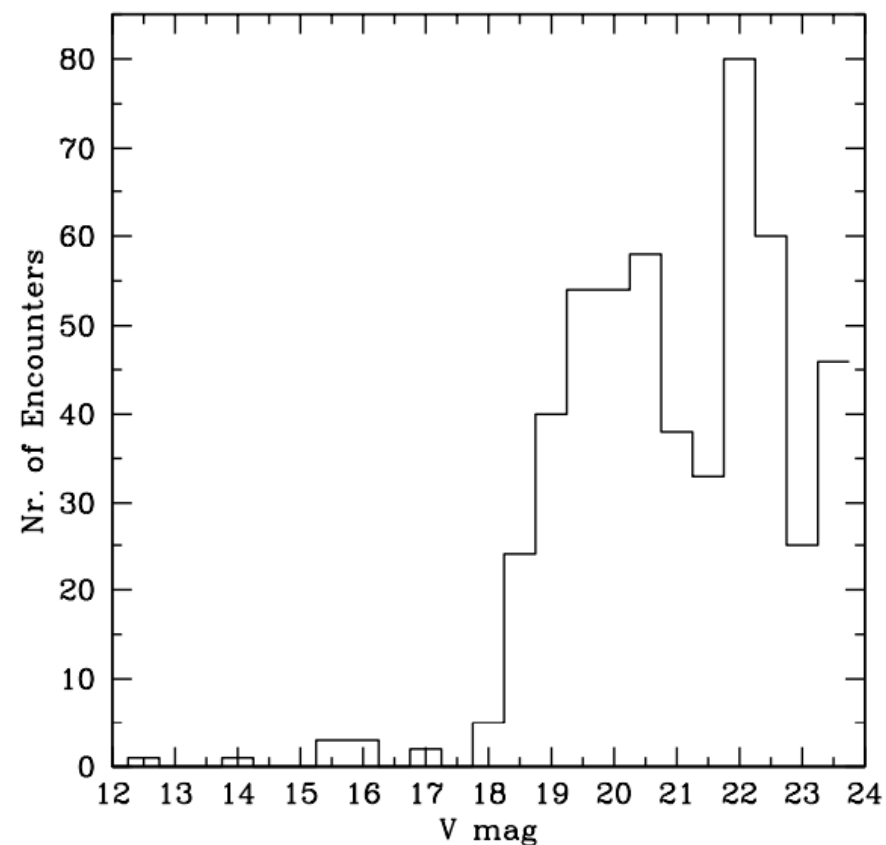
Asteroid Class	Total Nr. Findings	Candidate $V \leq 15$ Findings
PHA prec	715	3
PHA recov	24	9
NEA prec	2 088	8
NEA recov	167	85
NUM prec	385 913	248
NUM recov	39 977	7 734
UNNUM (prec+rec)	349 753	3

OCCURENCES

NEAs – moving objects
NO asteroid was
precovered/recovered



CFHT Legacy Survey for known Near Earth Asteroids



25,000 MegaCam images

Same protocol

Results:

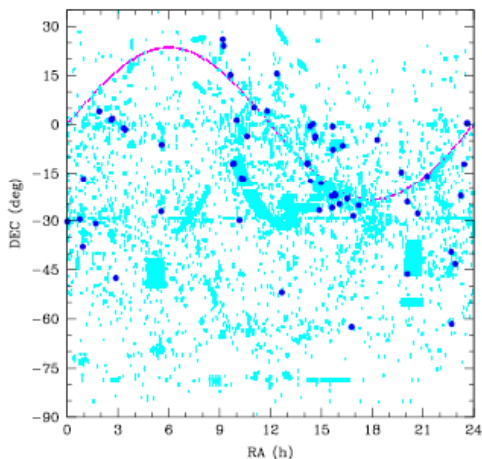
143 asteroids
(109 NEAs and 34 PHAs)

Candidates in 508 fields

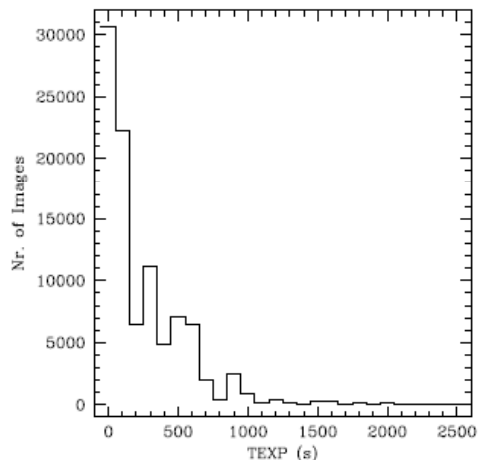


ESO WFI and INT WFC archives (330,000 images).

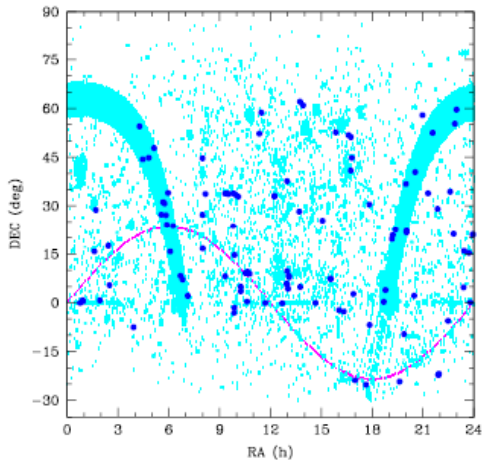
ESO WFI Archive 1999–2009



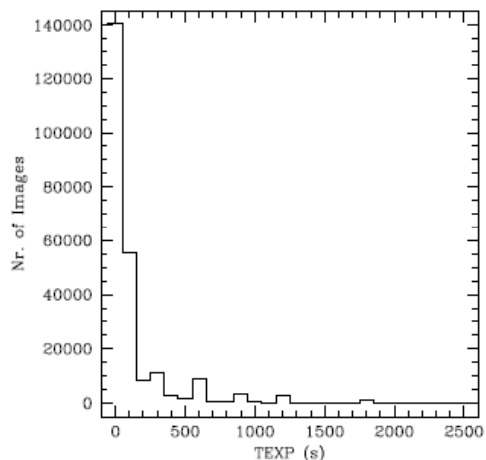
ESO WFI Archive



INT WFC Archive 1998–2009



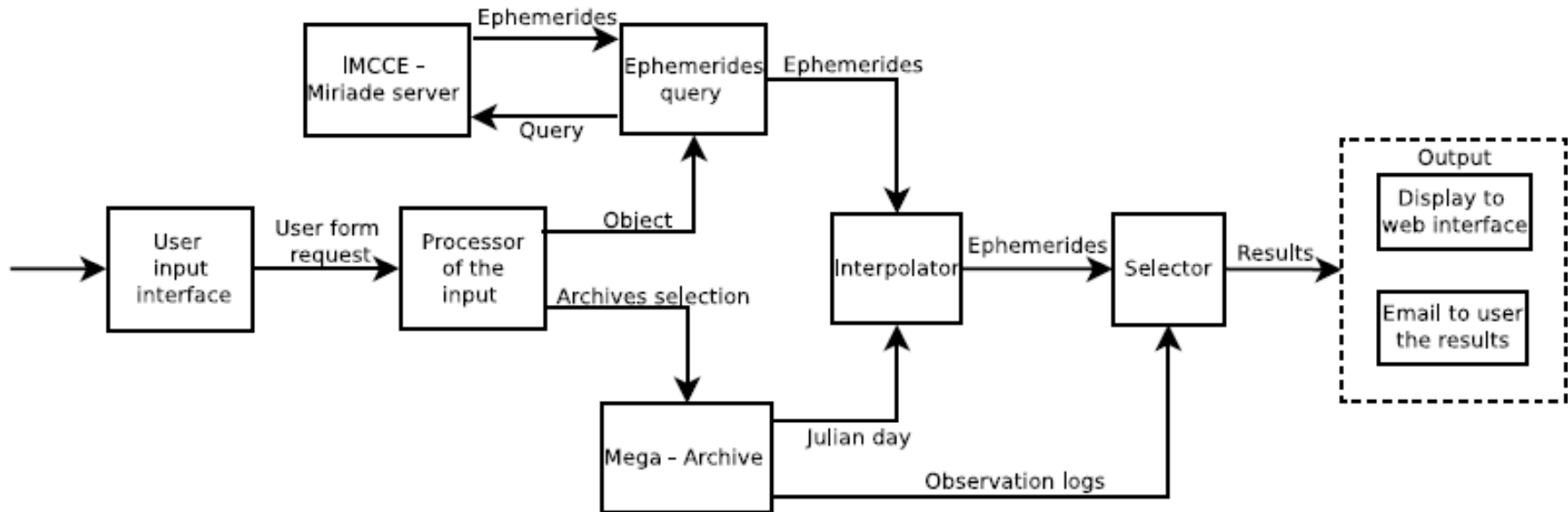
INT WFC Archive



Results: astrometry for
152 asteroids
(108 NEAs and 44 PHAs)



Mega-Precovery Software – required for these new archives



New algorithms, high speed, big threads

Accomplishments and question marks



- Mining a lot of images
- Publication of results
- Work inside a network
- Works professionals and amateurs
- Outreach/visibility of activities



- Still difficult to valorize because of « classical » topic
- Work inside a network
- Need versatility and creativity in stimulating the interest
- Difficulties in rising funds