Gaia Science Alerts
000

Role of DU459
00

Alerts
000000

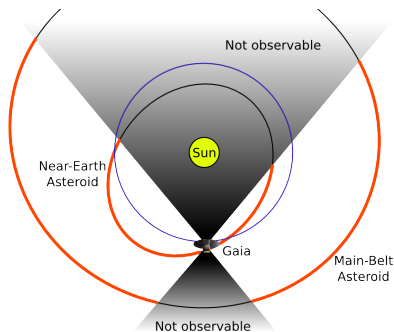Summary

Gaia Follow-up Network
Development of the SSO alerts

B. Carry, J. Berthier, P. David, W. Thuillot
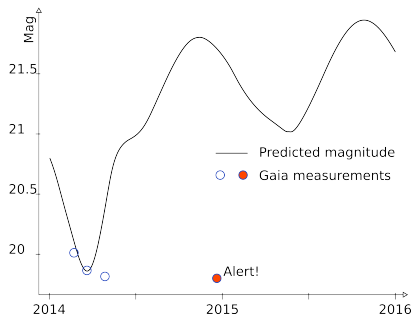
IMCCE, Paris Observatory

Only two cases of alerts considered by Gaia

1-Astrometry

2-Photometry

$\rightarrow$ NEAs

$\rightarrow$ Transient events

Astrometry alerts

- Why? Gaia **IS** a high-precision astrometry mission
  - ○ Astrometry alerts = **Only** for Solar System Objects
  - ○ **NEAs** (including PHAs)
  - ○ **Fast:** Apparent rate > 150–200″/h
  - ○ **Faint:** Apparent magnitude V>18

- **Responses** to astrometry alerts will be extremely **timely**
  1. Delay between Gaia observation and alert (24–48 h)
  2. **Strong** parallax Gaia-Earth
  3. Orbit error propagation
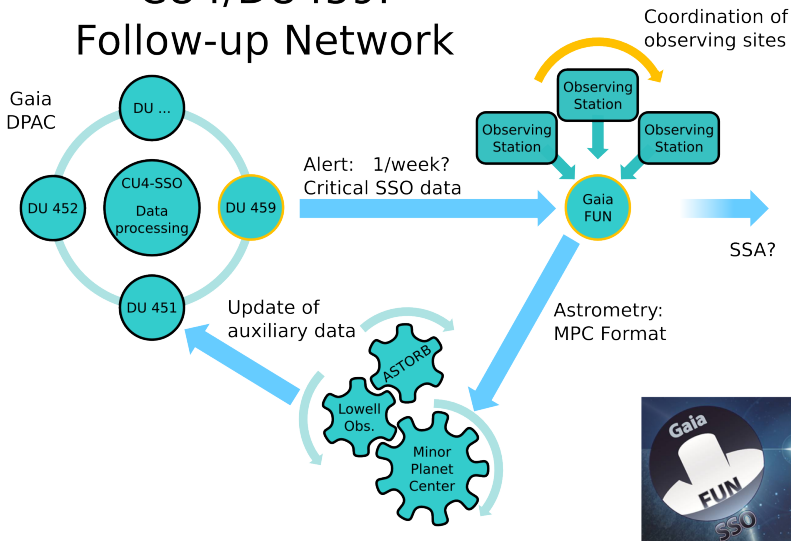 4. Low solar elongation

Photometry alerts

- Why? Gaia **IS** (also) a high-precision photometry mission
  - ○ Concerns **unexpected** apparent magnitude
  - ○ Scanning law is not adequate for transient events
  - ○ **Outbursts:** Cometary activity or collision
  - ○ **Lightcurves:** Eclipsing binaries

- **Threshold** for photometry alerts still to be **defined**
  - ○ Average shape-induced lightcurve ≈ 0.3 mag
  - ○ 19% of asteroids have lightcurve ≥ 0.5 mag
  - ○ How to detect **unexpected** apparent magnitude?
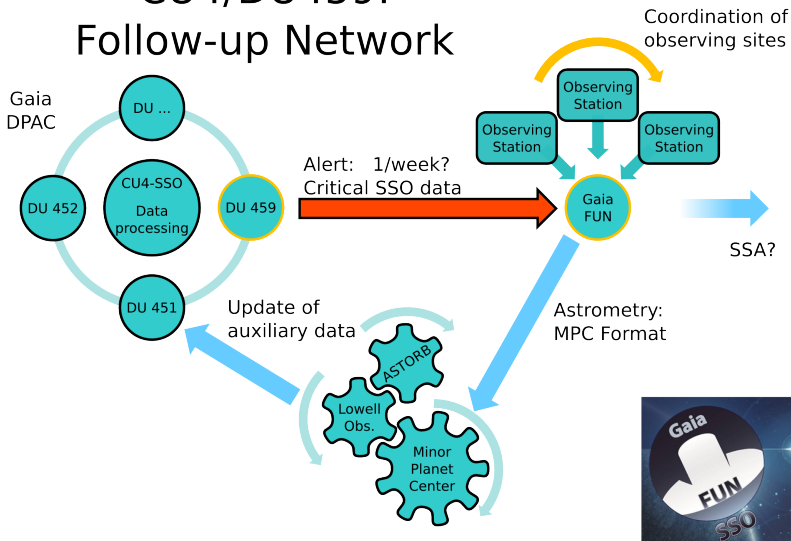 - ▶ Maybe third channel of alert: **non point-like source**?

Gaia Science Alerts
ooo

Role of DU459
●o

Alerts
oooooo

Summary

DU459: Organization flow

CU4/DU459: Follow-up Network

DU459: Organization flow

DU459: Tasks summary

1. **Analysis** of preliminary orbits (D. Bancelin)
   - Receive beams of orbits from DU456
   - Decode & convert into ephemeris
   - Short term prediction of positions

2. **Selection** of targets
   - Candidate for photometry or astrometry?
   - Criteria to be discussed and tested
   - Visibility?

3. **Release** of alerts to **you**
   - Calls for observations
   - Who, What, Where, When, How, Why, ?
   - Let's discuss how to share them

DU459: Tasks summary

1. **Analysis** of preliminary orbits (D. Bancelin)
   - Receive beams of orbits from DU456
   - Decode & convert into ephemeris
   - Short term prediction of positions

2. **Selection** of targets
   - Candidate for photometry or astrometry?
   - Criteria to be discussed and tested
   - Visibility?

3. **Release** of alerts to **you**
   - Calls for observations
   - Who, What, Where,When, How, Why...?
   - Let's discuss how to share them

DU459: Tasks summary

1. **Analysis** of preliminary orbits (D. Bancelin)
   - Receive beams of orbits from DU456
   - Decode & convert into ephemeris
   - Short term prediction of positions

2. **Selection** of targets
   - Candidate for photometry or astrometry?
   - Criteria to be discussed and tested
   - Visibility?

3. **Release** of alerts to **you**
   - Calls for observations
   - Who, What, WhereWhen, How, Why,...?
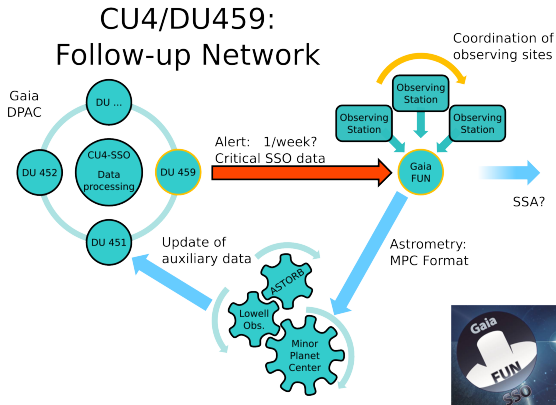   - Let's discuss **how** to share them

Possible formats of alerts

▷ **Tools considered**
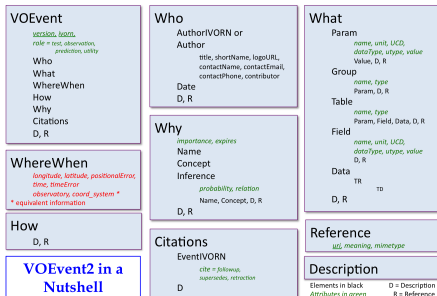- VOEvent streams
- RSS/Jabber feeds

▷ **Providing**
- Visibility charts
- Sky maps in Aladin
- Ephemeris
- Ancillary data

▷ **Avail. on web pages**

CU4/DU459:
Follow-up Network
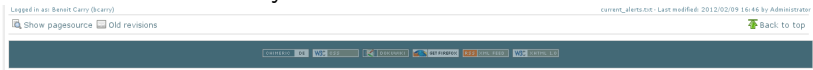
Alerts: VOEvent

voevent.org

- Information packet (VO)
  - What, Where...

- Drive robotic telescopes
  - TAROT, Zadko, ...

- Machine-readable
  - Basis for other formats
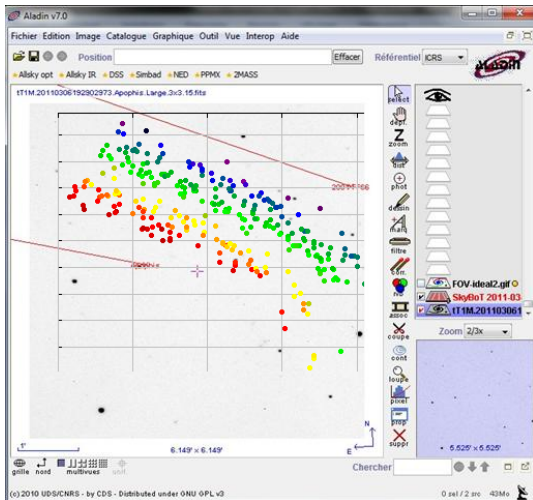 - Web pages
  - Timeline

Alerts: RSS/Jabber feeds

- SSO-FUN Wiki already has a RSS feed

- RSS allows dynamic updates of pages
  - Stream of incoming alerts
  - Removal of past alerts
  - Add observations, comments, news, ...

- You can use RSS clients to keep up to date
  - Firefox, Chrome, Internet explorer...
  - No need to connect to wiki
  - Avoid missing new alerts
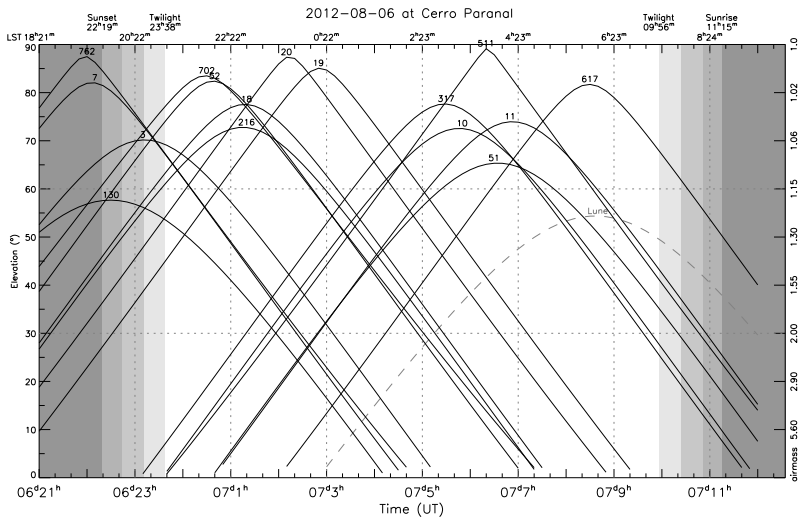
Alerts: sky maps

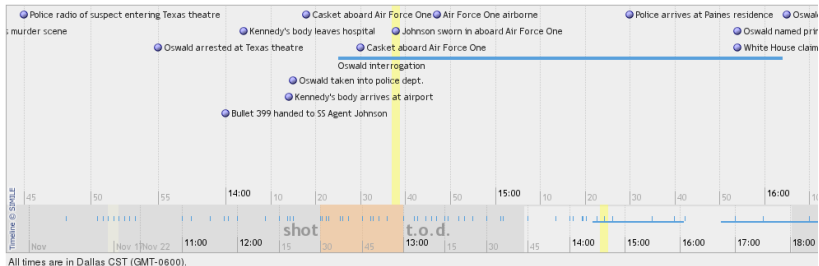
Aladin   Google Sky

Alerts: visibility charts

One-click generation for current alerts

Alerts: web pages

- **Alerts summary**
  - Sortable list (V, rate, time)
  - Timeline of alerts
  - Links to visibility charts
  - Links to individual alerts

- **Alert-dedicated pages**
  - Summary information
  - Timeline (validity, obs.)
  - Links to ephemeris, skymaps

Summary of SSO alerts development at IMCCE

▷ Analysis of Gaia preliminary data

- Mostly complete, some details to fix (D. Bancelin)
- Orbit probability from DU456

▷ Selection of targets needing alerts

- **Astrometry** alert $\approx$ straightforward
- Criteria for **photometry** alerts? (F. Mignard, L. Wyrzykowski)

▷ Selection of feasible alerts

- Time window & geometry (esp. solar elongation)
- Sky area to cover & orbit uncertainty

▷ Release of alerts

- Still to be developed