Gaia DPAC CU9: GACS, GDR1 and Alerts integration

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11 November 2015

Acknowledgements

- Gaia ESA Project
- Gaia DPAC
- DPAC CU5 Alerts team: See Hodgkin Talk earlier
- DPAC CU9
- As mentioned in earlier talks, a lot of people are involved directly or indirectly in the 'Alerts' activity

Gaia Data Release 1 (summer 2016) will come with the set of main journal reference papers





The Gaia Sky simultaneous astrometric, photometric and spectroscopic observations – typically 70 observations over 5 years



The Gaia Sky – as observed by Gaia



Credits: ESA/Gaia / Edmund Serpell



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Gaia

Photometric Science Alerts Published during the Validation Phase

Scan coverage on 30 Jul 2015



As of 9 June 15: 274 alerts of which 80 SN (confirmed or candidate)



7 Aug 2015

Nic Walton - GaiaAlerts @ Div A/IAU2015



Publishing Gaia Photometric Alerts http://gsaweb.ast.cam.ac.uk/alerts/alertsindex

Index to Gaia Photometric Alerts

These are all the alerts raised to date. You might wish to view or download th

See the foot of the table for an explanation of the columns.

| Name | Observed | Published | RA (deg.) | Dec. (deg.) | Magnitud |
|-----------|------------------------|------------------------|-----------|----------------|----------|
| Gaia15agm | 2015-06-01 14:51:25 | 2015-06-09 11:27:39 | 358.98623 | -43.72412 | 17.35 |
| Gaia15agl | 2015-06-01 20:34:37 | 2015-06-09 11:27:39 | 337.79327 | -37.82735 | 18.71 |
| Gaia15agk | 2015-06-03 02:38:28 | 2015-06-09 11:27:39 | 337.70660 | -43.04732 | 18.80 |
| Gaia15agj | 2015-06-03 05:29:29 | 2015-06-09 11:27:39 | 147.74682 | 37.96674 | 18.49 |
| Gaia15agi | 2015-01-24 09:32:33 | 2015-06-03 15:16:18 | 43.08181 | 60.57638 | 18.97 |
| Gaia15agh | 2015-05-25 01:24:24 | 2015-06-02 15:06:52 | 181.02133 | 14.06805 | 17.58 |
| Gaia15agg | 2015-05-29 15:41:03 | 2015-06-02 13:22:16 | 64.10105 | -28.49464 | 18.96 |
| Gaia15agf | 2015-05-29 08:17:25 | 2015-06-02 13:19:12 | 330.62236 | -20.32945 | 18.54 |
| Gaia15age | 2015-05-29 22:00:29 | 2015-06-02 00:15:29 | 83.48209 | -20.78890 | 16.96 |
| Gaia15agd | 2015-05-29 07:24:33 | 2015-06-02 00:09:38 | 171.57245 | 28.36723 | 18.42 |
| Gaia15agc | 2015-05-30 07:38:04 | 2015-06-02 00:02:43 | 184.59674 | 35.61824 | 17.84 |

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Gaia14aaa







Admin

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Get lightcurve data

O Detection

Other surveys detections None Comments

Scroll down and select one row in the table below to display the corresponding spectrum.

| Date | JD | Average mag. |
|----------------------------|---------------|--------------|
| Aug. 1, 2014, 6:04 p.m. | 2456871.25332 | 18.29 |
| Aug. 2, 2014, 7:51 a.m. | 2456871.82765 | 19.06 |
| Aug. 30, 2014, 12:35 a.m. | 2456899.52493 | 17.28 |
| Aug. 30, 2014, 2:22 a.m. | 2456899.59894 | 17.32 |
| Aug. 30, 2014, 6:36 a.m. | 2456899.77509 | 17.26 |
| Aug. 30, 2014, 8:22 a.m. | 2456899.84911 | 17.32 |
| Sept. 15, 2014, 12:47 a.m. | 2456915.53313 | 17.99 |
| Sept. 15, 2014, 2:34 a.m. | 2456915.60713 | 18.06 |
| Sept. 15, 2014, 6:47 a.m. | 2456915.78329 | 17.96 |



2015 - Institute of Astronomy, University of Cambridge, UK

| 16.96 | | unknown | aka CSS101214:053356-204720 : CV candidate | |
|-------|--|---------|---|---|
| 18.42 | | unknown | SN candidate in low surface brightness starburst galaxy at z=0.03 | |
| 17.84 | | unknown | hostless bright transient with SN-like spectrum in BP/RP | Ы |

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Gaia Data Access: It's complex



Baseline Gaia Data Release Scenario

see http://www.cosmos.esa.int/web/gaia/release

- GDR1: positions, G-magnitudes (all sky, single stars) ~7/16
- GDR2: + radial velocities for bright stars, two band photometry and full astrometry (α , δ , ϖ , μ_{α} , μ_{δ}) where available for intermediate brightness stars
 - Validation phase Gaia Photometric Alerts data
 - 1st (limited) operational phase Gaia Photometric Alerts data
- GDR3: + first all sky 5 parameter astrometric results (α , δ , ϖ , μ_{α} , μ_{δ}) BP/RP data, RVS radial velocities and spectra, astrophysical parameters, orbital solutions short period binaries ~7/18
 - Operational phase Gaia Photometric Alerts data
- GDR4: + variability, solar system objects, updates on previous releases, source classifications, astrophysical parameters, ~7/19 variable star solutions, epoch photometry
- End+3yr: final data release (thus in 2022/23): everything



daia

Gaia Archive Interface "scientific usability"



Density map. Healpix based (nside 512, 3.14Mpixels)



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Gaia Archive Architecture



The Gaia Archive: Current Contents

| Si | imulations | | Credit: Je | sus Salgado | D: ESAC | :/S |
|-----|--|--|--------------|-------------|---------|-----|
| • (| GUMS | | | | | |
| | • Milky Way: 22 | x10 ⁹ rows | | | | |
| • | Large Magellanic Cloud: | 7.5×10^6 rows | | | | |
| • | Small Magellanic Cloud: | 1.2×10^{6} rows | | | | |
| • | • Galaxies: | 38x10 ⁶ rows | | | | |
| • | • Quasars: | 10 ⁶ row | /S | | | |
| • (| GOG | 1.8x10 ⁹ rows | | | | |
| • | 2MASS Tycho2 | 9.4x10 ⁸ 2.5x10 ⁶ | rows rows | | | |
| • | UCAC4 | 1.1x10 ⁸ | rows | | | |
| G | aia (private) | | | | | |
| • | TGAS (private validation team are MDB-00 | (a) 2.2×10^6 rows $> 2 \times 10^9$ | rows | | | |
| PAC | 11 November 2015 N | ic Walton – CU9/Alerts @] | Liverpool | 11 | | 9 |

Data Processing & Analysis Consortin

Archive Design: Mapping Requirements to Functionality



Gaia Alerts in the Main Releases

- Aim to release the set of alerts generated during the phase covered by that data release
- First set of Alerts to be published will be with GDR2
- Alert information will become richer as releases progress
 - Initially the alert position, flux, and classification
- With increasing availability of complex data in the main releases, the ancillary information for each alert will be recoverable (e.g. BP/RP photometry)



Gaia Alerts in the Main Data Release

- With each new data release, each earlier release set will have its observational attributes updated
 - Improved positions
 - Improved photometry
 - Improved spectrophotometry
 - Additional parameterisation as and when available (e.g. astrophysical parameters, Log g, Av, etc).
 - "Living archive": user annotation of alerts if classified
- Size of alerts table not large (verification phase 271 alerts), perhaps 10,000 per release in operations
 - Total for nominal Gaia mission order 100K







Gaia/ GREAT Plenary 2016 @ EWASS2016: Athens 4-8 Jul 2016

- Significant Gaia updates including Alerts progress to be presented at the next GREAT Plenary
- See http://www.great-esf.eu/events/Athens-Jul16/
- EWASS16 at http://eas.unige.ch/EWASS2016/ index.jsp





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