Minutes of the tenth GBOG meeting

held at the ROB, Belgium, on 22-23 November 2011

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1	2	2011-12-13	YF	Input for CU8
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Contents

The following table has been generated from the on-line Gaia acronym list:

Acronym	Description
2MASS	Two-Micron All Sky Survey
AF	Astrometric Field (in Astro)
AGB	Asymptotic Giant Branch (star)
AI	Action Item
AP	Astrophysical Parameter
ARI	Astronomisches Rechen-Institut (part of ZAH, Zentrum für Astronomie, Heidelberg)
ASAS	All-Sky Automated Survey
BP	Blue Photometer
CCD	Charge-Coupled Device
CFHT	Canada-France Hawaii Telescope
CU	Coordination Unit (in DPAC)
DEC	Declination
DP	Data Processing
DPAC	Data Processing and Analysis Consortium
DU	Development Unit (in DPAC)
EPC	Ecliptic Pole Catalogue
ESAC	European Space Astronomy Centre (VilSpa)
ESO	European Southern Observatory
EVN	European VLBI Network
FTE	Full-Time Equivalent
FoV	Field of View (also denoted FOV)
GBOG	Ground-Based Observations for Gaia (DPAC)
GBOT	Ground-Based Optical Tracking
GIBIS	Gaia Instrument and Basic Image Simulator
GOG	Gaia Object Generator
GREAT	Gaia Research for European Astronomy Training
GSP	Generalised Star Parametrisation (Parametriser)
GSPspec	Generalised Stellar Parametriser SPECtroscopy
IAU	International Astronomical Union
ICRF	International Celestial Reference Frame
IGSL	Initial Gaia Source List
IMCCE	Institut de Mécanique Céleste et de Calcul des Ephémérides
IoA	Institute of Astronomy (Cambridge; also denoted IOA)
LAB	Laboratoire d'Astrophysique de Bordeaux
LMC	Large Magellanice Cloud (special, high-density area on the sky)
MATISSE	MATrix Inversion for Spectral SynthEsis (software)

MDB	Main DataBase
MPC	Minor Planet Centre
NEP	North Ecliptic Pole
OABO	Osservatorio Astronomico di Bologna
OATo	Osservatorio Astronomico di Torino
OCA	Observatoire de la Côte d'Azur (Nice)
OGLE	Optical Gravitational Lensing Experiment
OHP	Observatoire de Haute Provence (France)
PL	Period-Luminosity (star)
PSF	Point Spread Function
QSO	Quasi-Stellar Object
RAVE	RAdial Velocity Experiment
ROB	Royal Observatory of Belgium
RP	Red Photometer
RVS	Radial Velocity Spectrometer
RVZP	Radial Velocity Zero Point
SDSS	Sloan Digital Sky Survey
SEP	South Ecliptic Pole
SME	Spectroscopy Made Easy (software)
SN	SuperNova
SPSS	Spectro-Photometric Standard Star
SSO	Solar-System Object
TB	TeraByte
TN	Technical Note
VLBA	Very Long Baseline Array
VLBI	Very Long Baseline Interferometry
VO	Virtual Observatory
WD	White Dwarf
WFI	Wide-Field Imager (ESO 2.2-m telescope)
WG	Working Group
WP	Work Package

1 Overview of the meeting

1.1 Participants

G. Clementini (GC), OABO - Bologna
Y. Fremat (YF), ROB - Brussels
U. Heiter (UH), Uppsala University
E. Joliet (EJ), ESAC - Madrid
R. Smart (RS), OATo - Torino
C. Soubiran (CS), LAB - Bordeaux
W. Thuillot (WT), IMCCE - Paris
L. Wyrzykowski (LW), IoA - Cambridge

Were excused: M. Altmann, P. Bendjoya, L. Eyer, E. Pancino, G. Seabroke

1.2 Presentations

Presentations are available on svn :

`http://gaia.esac.esa.int/dpacsvn/DPAC/WG/GBOG/meeting/GBOG_M10/.`

2 Introduction (by CS)

Last developments since the previous GBOG telecon in April:

- The LoI for participating to GAP sent by the GBOG WG was accepted by ESA. This action was led by Elena Pancino. The GBOG WG has not been involved yet. The GAP WG is now very active for defining requirements and we have to think about our participation in this process. One way to interface with GAP is, for example, by proposing Data Access Scenarios on:

  `http://great.ast.cam.ac.uk/Greatwiki/GaiaDataAccess#Data_Access_Scenarios`.

- Two workshops were held with GBOG representation: the Gaia Science Alerts workshop in Cambridge (29/06-01/07) and the SEP spectroscopy workshop in Heidelberg (27/06-01/07).

- New requirements for the Gaia mission commissioning period appeared: RVS templates for CU6, bright stars not yet included in the EPC for various purposes of calibration.

- The Gaia-ESO survey is starting observations in December 2011 and will eventually provide some relevant data for GBOG.

The agenda is set-up to have the status of proposals and activities in the various CUs, and discuss several important points such as: the GBOG contribution in GAP-CU9; the storage and general organization of GBOG data within DPAC; the availability of mandatory auxiliary data for the commissioning; and the coordination of the different networks of telescopes involved in DPAC activities.

3 CU 3 status report (by RS)

IGSL3 is in preparation. David Katz and RS discussed about RV flags. It was finally decided not to flag those stars having measurements of RV (the flag will be replaced by an extra-table). RS showed how the catalogue is structured. It is an ascii file with columns corresponding to positions, proper motions and magnitudes, together with boolean flags indicating the object membership to several astrometric catalogues (EPC, UCAC, TYCHO,...). A discussion took place about IGSL's queries to the MDB. CS noticed that the info about this catalogue and its content was difficult to find on the wiki and Livelink. IGSL is accessible through Xmatch but Xmatch can only extract data when a list of positions is provided and does not allow to make queries on a field and magnitude range. EJ proposes to rise an issue to have more functionalities with Xmatch. Every one willing to query IGSL should send an email to EJ with requirements. EJ will also put on the GBOG wiki a link to IGSL info.

EPC 3.0 was released on October 14, 2011 including $\sim$612000 stars. The release of the EPC 4.0 is foreseen by the end of year. The final EPC 5.0 will include all bright stars of the field as well as the SEP spectroscopy. A first workshop on SEP spectroscopy was held in Heidelberg in June with the aim of having preliminary results for the data from P84.

The 3rd GBOT meeting is being currently held in Dresden (that is why Martin could not attend the GBOG meeting). The pipeline has significantly improved in precision and the database setup is in progress at Observatoire de Paris. The telescope recruitment is ongoing with 4-6 telescopes involved. (See MA-003 for the GBOT status in summer 2011).

The construction of the QSO catalogue is in good progress under responsibility of A. Andrei. Observations have been conducted on CFHT, SOAR, ESO.2p2 to study the variability of the quasars, their optical morphology and to monitor benchmark variable QSOs.

CS notices that the on-going VLBI program for the reference frame alignment is not mentioned in the CU3 summary although it is an important activity started several years ago (GWP-S-335-15000: Alignment-to-ICRF source list). Two papers (Bourda et al., A&A, 2010, 2011) have been published so far on the detection phase and the imaging, while the astrometry of the

sources has started this year. The optical and VLBI groups had a common GREAT ESF meeting in Porto in June 2011 and they are now collaborating more closely.

4 CU6 status report (by CS)

For the catalogue of RV standard stars, new measurements have been obtained. The programme on Sophie is now over but the query of its public archive allowed us to retrieve more than 1000 relevant RVs for ∼100 stars. There are in principle 26 stars with no measurement, and nearly 300 still lacking one measurement. However these numbers will have to be updated soon when the autumn NARVAL observations will be processed and the CORALIE archive queried. Currently, we find that 92% of the candidates do not vary by more that 300 m/s, and 73% by not more than 100 m/s.

Chuback, Marcy et al. are about to publish a catalogue presenting 2000 stars with accurate RVs and 132 standard stars claimed to be useful for Gaia. However comparisons with our measurements show that this catalogue is quite inhomogeneous and should be sorted out to extract relevant data. Systematic differences are seen for M stars due the use of real templates for the cross-correlation while we use masks computed from synthetic spectra.

Recently D. Katz expressed the need for RVS templates of bright stars at the EPs for RVS calibrations during the commissioning phase. At NEP, 48 bright stars have been selected and are currently observed with NARVAL. At SEP the on-going spectroscopy programme with FLAMES provides with UVES spectra in the V range ∼12-13.5 (but with a gap in the RVS range), and numerous GIRAFFE-HR21, including the full RVS range at R=21000, for fainter targets. No bright star is part of this program. New observations seem mandatory but difficult. FEROS does'nt cover the whole RVS range, the ESO-GBOG plan has been established two years ago, and the manpower in Bordeaux is short. Moreover there is a strong time constraint, the SEP is only observable in good conditions in December.

5 CU8 status report on benchmark and reference stars (by UH)

Benchmark stars are stars suited for testing the atomic data and the physics introduced in the model atmospheres used to compute the synthetic spectra and derive the APs. 75% of our F, G, K benchmark stars candidates already have high resolution spectra. The remaining are to be observed with NARVAL at TBL in the framework of our Gaia AP reference Star programme. Additional data and benchmark starks were selected from various other sources (e.g. ESPADONS archive, "Nearby Stars Programme" by Luck and Heiter 2007, ...). More details on the benchmark stars can be found on the wiki: `http://www.rssd.esa.int/wikiSI/`

index.php?title=CU8:_Benchmark_Stars:_Datasets&instance=Gaia.

Benchmark stars are generally too bright to be observed by Gaia. AP-reference stars are fainter stars with known astrophysical parameters that will be observed by Gaia. A joint CU6/CU8 programme on NARVAL is dedicated to their observation. 30 reference stars could further be identified in the PASTEL database, while 47 stars in eight open clusters were found to have spectra with SNR ranging from 70 to 160. More data were found in other databases (French and ESO) and a status on the resulting dataset was given in a technical note (GAIA-C8-TN-LAB-CS-008-1: Soubiran & Heiter).

6 CU8 status report on OBA and UCD stars (by YF)

The preparation of samples of reference and benchmark stars for the AP calibration of hot and ultra cool dwarf stars started recently. As shown by Luis Sarro Baro, a lot of mid- to high-resolution spectrophotometric data for a hundredth of M-, L- and T-type stars are already available in various databases. A significant part of these objects already have their astrophysical parameters determined in various papers. RS noted that, according to his ancient estimates, we cannot expect that Gaia will be able to observe a lot of stars cooler than 3000 K. New estimates should however be done to confirm this by using the last results of the GUMS. From a first analysis, 11 A- and B-type stars were found to be good benchmark stars candidates which: are not known variables; have available HR spectra; have Hipparcos parallaxes known at better than 30 %; and have known astrophysical parameters. Alex Lobel will continue this work for A, B and O stars. Based on a suggestion made by R.Blomme, we propose that for the hot stars (A, B, O stars) we use the ESO Gaia public survey targets and results in order to construct our set of AP reference stars.

7 CU4 Gaia-FUN-SSO progress report (by WT)

WT gave the new information about the setting up of the Gaia Follow-up Network for Solar System Objects (Gaia-FUN-SSO) which is related to the CU4 object processing / SSO and will be operating through the DU459 task. Four points have been addressed.

1. Extension of the network: After a Kick-Off meeting in December 2010, a census was organized and 13 observing sites were registered. Since this period, several individual contacts and two events (Pisa Great Workshop and Astrometry school and workshop in Turkey) allow a significant increasing of the number of sites. At this date the network is composed of 33 operating observing sites involving 49 operating instruments from 0.25cm to 2.4m. A Corean project of network KTM is interested by participating to the network and will add in 2014 three important 1.6m

automatic telescopes in the South hemisphere. Other contacts are also in progress, in particular one with the MASTER Russian network.

2. Astrometry software: the Brazilian software PRAIA (developed by M. Assafin from Valongo Observatory) will be the astrometry pipeline for the data processing. We foresee a web service format in order to provide to the participant with online tools for their own astrometry processing if they wish, work is in progress. Neverteless we intend to collect, analyse and store all the data in the central node of the network (at IMCCE at the present).

3. Wiki server: a wiki server has been open at the address `https://www.imcce.fr/gaia-fun-sso`.The participants can access there to general information on the network and its goals, but also to specific information on observations. We are organizing in November an observing campaign in order to test the network. The asteroid 2005 YU55 is the target of this first campaign. We will organize at least two other campaigns. After these campaigns we foresee to organize observations similar to the Gaia alerts, requiring fast reaction, and to get feed back and to have discussions during a second workshop in order to be ready for the mission time.

4. Discussion with other networks: discussions have been held in order to think about the coordination between this network, the GBOT network and the Science Alerts network. We propose to publish a common FUN newsletter in order to organize a fast and good circulation of ideas and information.

8 CU7 status report (by GC)

The GBOG programs being carried out by CU7 are progressing, they include study of Cepheids; RR Lyrae particularly in the SEP; LPVs; short period variables; and Be stars. Main goals of the CU7 GBOG activities are: 1) to fully characterize variable stars (Cepheids and RR Lyrae stars in particular) in the EPs in advance of the launch; and 2) to test the algorithms being developed within the CU7 pipeline, for the classification and characterization of the different types of variables. An important problem is, for instance, to disentangle single from binary Cepheids. CU7 is also involved in the validation of the Gaia Science Alerts system. A first test was performed during the summer with the 1.5m telescope of the Bologna Observatory in Loiano, which followed up a couple of transients (two blazars of V 18 mag) alerted by the Catalina Real-Time Transient Survey. The test concerned of the following steps: distributing the alerts, following them up in photometry, reducing the data and adding phase points on the existing light curves. The test was successful and demonstrated the capability of fast reaction (targets were selected in the afternoon, observed and analyzed in the night). The photometric measurements have rather large error bars mainly due to the cross-correlation with other photometric systems and to the missing colour term correction. Another test will take place using 5 Italian telescopes at the end of November (Nov. 26-29,2011). A wiki page has been prepared: `http://www.`

oact.inaf.it/gaiatwiki/bin/view/Main/WebHome where to collect results from this new test.

9 Status of the verification of Gaia Science alerts (by LW)

LW presented a report on recent Science Alerts activity. The outcomes of the last workshop on Gaia Alerts Verification held in Cambridge in June 2011 were presented, including listing of potential partners for the verification of alerts and presentation of the newly setup photometric calibration server for the follow-up data. The verification is planned to take place formally from February until April 2014, given the launch date of 19 June 2013, but some preliminary verification of the alerts can start as early as the Ecliptic Poles scanning phase.

During the splinter on Science Alerts the discussion was held about the proposal of the next GREAT meeting on Gaia Alerts follow-up to be held in Italy in September 2012. Another discussed issue was related with preparation of formal letters of agreement with the Verification Phase partners.

10 CU1 report (by EJ) and discussion

Emmanuel Joliet (EJ) reported the CU1 activities during this last few months. ESAC is giving a storage and backup for auxiliary data such ECP catalogue, spectra tables, etc. to GBOG products. EJ presented a summary of last news coming from GAP (CU9). A discussion was brought from CU1 about GAP and the interrogator requirements to include GBOG data products which could be used in CU9 for the Gaia archive. The action is till open under issue #9592 (http://www.rssd.esa.int/mantisSI/view.php?id=9592). Action: GBOG representatives might help the assigned person (G. Seabroke) to close it by identifying contribution from GBOG products that could go into the archive.

EJ also asked each CU representatives present to check whether they have (or prepare to have) reference data completeness during commissioning phase. CU6 already ask a requirement to have NEP and SEP bright stars (50 per field) V ¡ 11.5. The problem in the Southern Ecliptic Pole is identified and considered. CU3 seems to have covered this issue. Other CUs doesn't have the issue as they don't need data from commissioning phase. Action: EJ should contact CU5 (Elena Pancino) in order to discuss this issue as she wasn't present at the meeting.

During the CU3 presentation made by RS, IGSL and MDB were discussed and the need to query IGSL by magnitude was expressed (and not only the cross-match tool). Action: EJ to provide a tool to query IGSL in term of magnitude, number of stars and per angular position. C. Soubiran had submit to EJ a scenario that will be used as input to implement and add it to the already existing IGSL cross match web tool.

Action: EJ to add to the wiki a link of IGSL cross match web tool and the content of IGSL as it appears in the dictionary tool.

11 Report on the SEP spectroscopy workshop (by UH, CS, YF)

The spectroscopic observing program of SEP stars is aimed to obtain UVES and Giraffe spectra for a random selection of stars with V <17, in order to determine their RVs, Teff, logg and [Fe/H]. A first spectroscopy workshop was organized by M. Altmann in Heidelberg from June 27 to July 2, 2011 to share experience on stellar spectra analysis and provide a first version of the EPC-spec for the P84 data. The analysis of P86 is pending, while the P88 observations are on-going in C priority. UH presented the wiki page: `http://www.rssd.esa.int/wikiSI/index.php?title=GBOG:_EPC_Spectroscopy:_data_analysis_of_SEP_spectroscopi data&instance=Gaia` and commented the different tasks.

12 Splinter meetings

GC, WT and LW had a splinter meeting related to FUNs and collaborations. UH, CS, YF had a splinter on SEP spectroscopy analysis and reviewed the recent actions and established a workplan.