Minutes of the third GBOG meeting

held in Bordeaux on 19-20 February 2008

prepared by: C. Soubiran
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1 Agenda

Presentations are available on the GaiaWiki.

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2. CU6 GB activities report (C. Soubiran)
3. CU5 GB activities report (E. Pancino)
4. Pre-launch GB observation activities in CU8 (U. Heiter)
5. Fundamental Gaia test fields: the Ecliptic Pole Catalogues- A progress report (M. Altmann)
6. VLBI observations of weak extragalactic radio sources : Aligning the ICRF with the future GAIA frame (G. Bourda)
7. General discussion : on-going pre-launch GB observations and inter-CU collaborations
8. CU4 GB observation of the Solar System objects (W. Thuillot)
9. Supplementary observations for CU7 (G. Clementini)
10. Observations of Gaia from the ground (F. Mignard)
11. Ground-based follow-up of Gaia Which telescopes? and the possible role of Opticon (M. Dennefeld)
12. General discussion : post launch GB observations
13. Restricted meeting : definition of the Terms of Reference of the GBOG Working Group

Participants

M. Altmann ARI - Heidelberg
F. Thevenin OCA - Nice
Y. Fremat ROB - Bruxelles
G. Jasniewicz GRAAL - Montpellier
U. Heiter Uppsala University
A. Vallenari OAPD - Padova
C. Soubiran LAB - Bordeaux

F. Mignard OCA - Nice
M. Dennefeld IAP - Paris
R. Smart OATO - Torino
W. Thuillot IMCCE - Paris
E. Pancino OABO - Bologna
M. Cropper MSSL - London
G. Clementini OABO - Bologna
C. Allende Prieto MSSL - London
P. Charlot LAB - Bordeaux
G. Bourda LAB - Bordeaux

2 Topics

2.1 GBOG news (C. Soubiran)

For new people in the audience it is recalled that the GBOG group was formed after the 1st CU8 meeting in May 2006 for the coordination of all GB observations in relation with the preparation of Gaia. The aim of the coordination is to avoid duplicate efforts and dispersed proposals, and to make an overall plan in support of Gaia. For its first year of activity the group included about 20 members involved or interested in GB observations. Two previous GBOG meetings were organised in September 2006 and March 2007. In May 2007, the GBOG group received an official mandate from the DPACE and became a pan-CU Working Group with 1 or 2 representatives per CU nominated by the CU manager.

The compilation of the needs in all CUs is now completed. Several urgent observing programmes have already started. They must provide lists of calibration stars for the beginning of the data processing in 2012 for CU3,CU5,CU6,CU8. The merging of observing programmes of high resolution echelle stellar spectroscopy for CU6 and CU8 is successful. The spectrophotometry of stars and galaxies for CU5 and CU8 is also coordinated. A common programme for CU3, CU6 and CU8 is now starting (see Altmann's presentation).

Following the decisions of the previous GBOG meeting, a letter was sent on 14 March 2007 to C. Césarsky, head of ESO, describing our needs for ESO facilities and requesting some advice on how to proceed for our proposals which request large amount of time for calibration purposes. The answer came 3 months later, giving the name of 3 ESO people able to help us for detailed implementation. These people were contacted a first time on 1 August 2007 with no answer, then again on 11 September. Finally Gauthier Mathys answered in a way that we interpreted in favour of Large Programmes. The common CU5-CU8 spectrophotometric programmes were consequently submitted as a Large Programme for 53 nights on EFOSC2@NTT, but finally rejected by the OPC.

Another action of the GBOG group was to maintain wiki pages with relevant information and census and status of on-going programmes. This meeting is aimed at giving an overview on how the urgent observing programmes and inter-CU collaborations are going, and on how things can be improved. The Terms of Reference of the Working Group must be defined.

2.2 CU6 GB activities report (C. Soubiran)

The on-going observing programme in CU6 is to define reference stars for RVs. Aim : define a set of 1000 bright FGK stars ($6 < V < 10$), stable in radial velocity at the 300 m/s level during the mission, to set the zero-point and validate a method of RV calibration with asteroids. Preselection of 1500 star candidates from existing catalogues. For asteroids, look at (O-C) vs physical parameters. 3 Echelle spectrographs used : SOPHIE@OHP-T1.9, NARVAL@TBL, CORALIE@Swiss-T1.2, for 18 nights per year until launch, 40 nights after launch. Joint programme on NARVAL with CU8 for AP reference stars and library of spectra in the RVS range. Good support of French TACs (national funding), status of key-programme (long-term) - agreement with Geneva for 3 nights per year. Production of a new catalogue of RV standards and a new method of RV calibration with asteroids, very valuable for other projects - publications foreseen. Dedicated database maintained by L. Veltz at AIP (Germany). Manpower OK : 6 runs per year, 4 volunteers for observations, reduction pipeline for NARVAL done by G. Jasniewicz, on-line reduction for the others. Secondary catalogue of RV reference stars (fainter stars and other spectral types) might be necessary for spectrophotometric calibration of RVS spectra and initialisation of iterations for wavelength calibration (to be defined) but will probably use existing catalogues.

2.3 CU5 GB activities report (E. Pancino)

GWP-513 : Provide the Spectrophotometric Standards for calibration of GAIA photometry and spectrophotometry. 13 people involved from OABO, UB and Groningen. Total 3.5 FTE (5 required). Pilot programme : the devised observation + data reduction + calibration procedure successfully applied on real stars. Strategy 1: (1) Define the Pillars of the whole absolute scale: HST/CALSPEC fundamental standards [Vega of Bohlin & Gilliland 2004], (2) Select relatively bright Primary SSPS to make possible observations from any site at any time, (3) Select a large number of candidate Secondary SPSS; once validated and calibrated they will constitute the Grid of GAIA SPSS. Strategy 2: (1) Check candidate members of the Grid for variability: SPSS must be constant in flux, (2) Obtain accurate relative spectro-photometry during clear nights at LR spectrographs. Account for all observational effects affecting relative spectro-photometry, (3) Collect - from literature or new observations - very accurate broad band absolute photometry of SPSS to zero point their spectra (4) The strategy has been proved to be feasible: more testing is ongoing as we acquire/reduce more data.

Status of the Activity :

- Proposal writing and submission
- Variability monitoring (REM, Loiano + above sites)
- Refinement of observing and data reduction protocols
- Observations ongoing (North: CAHA, TNG, SPM, Loiano)
- South uncovered (ESO: retry, and/or other observatories have to be identified)
- Data reduction just started (tests and scripts building)
- DB &A in preparation (shortage of manpower)
- Writing Livelink documents (just started): Finalize Observation and Reduction Protocols and Finalize Secondary SPSS candidates list.

Wiki-BO for all the DU13/14 activities : http://yoda.bo.astro.it/wiki/ (User: guest Pwd: gubana), several documents available (Livelink notes, list of SPSS candidates, facilities, protocols, observation summary, reports....).

Useful indications from our experience (several accepted proposals and several runs performed) :

- TACS want to see clear and well defined programs, clear objectives, clear feasibility, detailed description of the techniques. This requires a large degree of coordination: someone should take the responsibility of the final writing; she/he should be well aware of all the points made in the proposal, should collect all the needed info, should critically review all the requirements. It' s a full time job for several days.
- TACS want to see the results of your previous work and on field proofs that your objectives can be achieved with the required observations: you have to reduce (at least part of) your data on a six month scale.
- The last deadline was yesterday, next deadline is tomorrow: schedules are tight and require continuous efforts. Not enough time/energy to pursue scientific objectives other than that strictly related to GAIA.
- More data require more work. You should be well aware of what can be done with the available manpower and just ask for the data that are strictly necessary for your purpose.
- TACS are more aware of the importance of our observations than we typically believe, but beware: each TAC is different!

2.4 Pre-launch BG observation activities in CU8 (U. Heiter)

CU8 Objectives are to classify all sources (assign probabilities for being a single star, binary, galaxy, quasar, asteroid, etc.) and determine astrophysical parameters (APs) (for stars: Teff, logg, [Fe/H], [α/Fe], interstellar extinction). Work packages for software development (e.g. Quasar classifier, Extended Stellar Parametriser) and for providing data for training and testing (e.g. synthetic stellar spectra, interstellar extinction). Observations needed : High- and low resolution spectroscopy of various types of stars and galaxies for astrophysical parameter determination of calibration stars and tests and calibration of classification packages and synthetic spectral libraries. 15 active CU8-GBOG members are involved in several WP : ESP (extreme stars), training data, unresolved galaxy classifier, Solar System object classifier. 2 rejected proposals: ESO-NTT/EFOSC-2 for 53 nights (large program) in spectrophotometry (CU8+CU5) and La Palma-NOT proposals by I. Kolka and J. Warell. Successful proposals: at Pic du Midi-TBL/NARVAL for 2x6 nights by C. Soubiran/C. Neiner (CU8+CU6), at ESO-3.6m/HARPS for 11.3 hours and La Palma-TNG/SARG for 4 hours by U. Heiter, at ESO-VLT/UVES for 1 night and La Palma-NOT/FIES for 1 night by A. Önehag.

Example : Calibration of Generalized Stellar Parametriser. Observed spectra of reference stars will be used to correct for deficiencies in synthetic spectra (e.g. non-LTE effects, incomplete input physics, 3D effects) and as training data for GSP. Example for parameter accuracies : Teff: 2%, logg: 0.3 dex, [Fe/H]: 0.2 dex, [α/Fe]: 0.2 dex. Reference star grid covering FGK stars (4000K$<$Teff$<$7000K, –3.0$<$[Fe/H]$<$+0.5) would require 10,000 stars with high-quality data and known parameters, impossible. Three-level approach for calibration (1) Benchmark stars ($\sim$10) with highest quality, high resolution data, best-known parameters and physically complete stellar atmosphere models (2) Primary grid of reference stars ($\sim$500) with standard data available in literature and complemented by new data and analyses, calibrated on benchmark stars (3) Secondary grid of reference stars ($\sim$10,000) from large photometric surveys, calibrated on primary grid stars. Magnitude of reference stars : bright stars ($6 < V < 12$) for RVS data, faint stars ($10 < V < 18$) for photometers. For primary grid : bright field stars from [Fe/H] catalogues based on HR spectroscopy, faint stars in open and globular clusters. For secondary grid: bright and faint stars from large (spectro)photometric surveys (e.g. SDSS). Candidate benchmark stars : high resolution observations with HARPS@3.6m (R = 120 000, 380 to 690 nm, 10 stars) and SARG@TNG (R= 164 000, 360 to 1 000 nm, 4 stars) at signal-to-noise ratio > 400 and radii from interferometry available for 8 giants + 5 others Other example: Solar analogues for Solar system object classifier. High- and low-resolution observations with UVES@VLT, 1 night in Jan 2008, 390 to 1 060 nm, R = 65 000, S/N > 300, 13 stars designated solar analogues by stellar or solar-system researchers.

Other example: calibration of Extended Stellar Parametriser. High-resolution observations with NARVAL@TBL, 4 nights in Sep 2007, 370 to 1 050 nm, R = 65 000, 24 hot, emission-line or peculiar stars.

To be done : Define final target lists for AP calibration (field stars, clusters, ecliptic-poles fields),

continue high-res spectroscopy, submit new proposals, e.g. for low-res spectroscopy, organize data reduction and analysis, identify possible science applications.

2.5 Fundamental Gaia test fields: the Ecliptic Pole Catalogues- A progress report (M. Altmann)

Motivation: test fields needed for testing and evaluation of space craft and its functions immediately after launch. Accessible at all times (exact launch date is unknown). Straightforward scanning law covering test fields during every orbit. Moderate galactic latitude (avoids crowding). 2 fields: different environments to test behaviour of Gaia under differing conditions. Analysis of system efficiency at the faint end: how faint will Gaia be able to measure the various quantities (i.e. Astrometry, photometry, abundances, RV)? How good is the object detection and windowing procedure? does it work properly, are there angle-dependencies? How large is the incompleteness near the cutoff magnitude, what is the cutoff detection magnitude? Pre launch simulations and lab tests are important, but only in situ tests of the instruments in space will tell us exactly how good Gaia really is. Ideal fields at Ecliptic poles: 90 degrees from the Sun at all times, moderate Galactic latitude, ideal for a polar (orange slice type) scan law. SEP includes fields of the outer LMC, higher star density, several LMC clusters. NEP includes PN NGC 6543 and galaxy NGC 6552. Coordinates of Ecliptic Poles: SEP: 06:00:00 -66:33:41, NEP: 18:00:00 +66:33:41.

Status for Southern Ecliptic Pole catalogue: successful MPIA 2.2m+WFI proposal (9 hrs) for VRI imaging (PI: Klaus Meisenheimer), observations in Nov. 2007 semi-successful (60% done), data reduction pending (currently learning the MPIAphot software dedicated to WFI, proposal for Nov. 2008 planned to complete data acquisition (deadline August), U,B images as well? 2nd epoch planned for about 2010 (WFI, OmegaCam or others). Status of Northern Ecliptic Pole catalogue: successful CFHT proposal (4 out of 5 hours), phase 2 completed, observations in summer 2008 (queue), UBVRI observations 1 square degrees field, additional field offset by 30' to test astrometry (GBOT), 1st epoch already available (2004 by Korean group (Hwang et al.), 3rd epoch in 2010. Follow up observations, high resolution spectroscopy of SEP: HR-Spectroscopy for RV and abundance determination of stars with V $\leq$ 17 mag, very important add-on! Again: Testing the procedures in Gaia initial phase (GIP), Gaia spectral window: 8470-8740 Å. We need HRS of a significant fraction of SEP stars, especially near the 17 mag cutoff. SEP: 1700 MW stars <V=17 mag (5700 >V=20 mag), LMC contribution: 2-4 times higher (see GAIA-C3-SP-ARIBV-001). Proposal at ESO Paranal on UT2-FLAMES-GIRAFFE-UVES: Moderate - High resolution multi object wide field spectrograph, up to 130 objects per shot, 30' diameter circular field, HR and LR grisms, intervals spanning most of the optical range. Bonus: up to 6 objects can be fed into UVES, with higher resolution an a larger spectral range, several (positioned) masks can be observed during the night (one is being exposed, the second one prepared). Next steps: HiRes spectroscopy proposal for the next ESO-deadline (March 2008) aiming at FLAMES/GIRAFFE+UVES with 2 grism setups (HR21 +LR02). Second part 2009. Apart from supplying vital information for the testing and eval-

uation of Gaia in its initial phase, the data base we are creating here is a very useful data set for studies of the structure of the Galaxy. Additional follow up observations required for Gaia: full set of UBVRI photometry (already implemented into the NEP 2008 observing campaign). Use 4m-Blanco+MOSAIC2 for U (access through NOAO)? LoRes multi object Spectroscopy. Magellan+IMACS (Access?) ESO-Paranal: FORS,VIMOS, ESO-La Silla Emmi, EFOSC2. Other facilities: Las Campanas (du Pont), SALT, Australia HiRes full optical range single object spectroscopy. FEROS, UVES (see HiRes follow up chapter) Others?

2.6 VLBI observations of weak extragalactic radio sources : Aligning the ICRF with the future GAIA frame (G. Bourda)

Context - ICRF : 717 extragalactic sources, Radio (8.4 & 2.3 GHz / 3.6 & 13 cm), VLBI technique. Gaia Celestial frame in 2015-2020 $\sim$ 10 000 QSOs, Directly in the visible. Important to align accurately the ICRF with the future GAIA frame with several hundreds of common sources (Mignard 2002) having precise radio (VLBI) and optical (GAIA) positions (no extended VLBI structures and V$\leq$18). A priori suitable radio sources = 30% ICRF with optical counterpart V$\leq$18. Study of the VLBI structures with VLBI maps. Sufficiently compact radio sources = 10 % ICRF. Necessity to find new radio sources suitable for aligning accurately ICRF & GAIA. VLBI observations of weak radio sources with EVN, the most sensitive VLBI network.

Criteria for the sample: $\sim$ 450 sources from dense radio catalogue NVSS (ICRF excluded) with V $\leq$ 18 (i.e. accurate GAIA position), Flux density $\geq$ 20 mJy, $\delta \leq$ -10deg. Project with 3 steps over several years: 1. Detectable in VLBI? 2. Mapping and accurate astrometric positions. 3. Refine astrometry for the most compact sources. First observations in June 2007 : 224 sources observed (half of the sample), network with 4 antennas in Europe, 48-h experiment, detection rates = 99 % X-band and 95% S-band. Very good detection rate. Second half of the sample observations in October 2007. Second step: Mapping and accurate astrometric position, first observations in March 2008. $\sim$ 105 sources will be observed, 48-h experiment, Global Network with VLBA (10 antennas), South Africa (1 antenna), EVN (4 antennas). Following observations: probably proposal in June 2008.

2.7 General discussion : on-going pre-launch GB observations and inter-CU collaborations

Thanks to GBOG, the discussions between CUs to merge, or at least to coordinate proposals and exchange information are successful. Following the rejection of the Large Programme by ESO, the main problem remains the southern part of the spectrophotometric programme for CU5 and CU8. For P81, there was an ESO anouncement : ”Large Programmes on the NTT are encouraged, provided that all the runs foreseen can be fully completed before the end of Period 83. Requests for usage of the NTT telescope in Period 84 and beyond will not be

accepted". One period has been lost. The current call for proposals, P82, doesn't contain this restriction anymore but we must be watchful concerning the long-term availability of ESO-La Silla facilities. It is suggested to have an action (e.g a letter from DPACE), to tell ESO that we need EFOSC2 for preparing Gaia. It seems that several instruments at La Silla have been maintained for identified projects. It is recalled that we cannot pay for observing time, DPAC has no money by its own. Other facilities should be considered in other chilean observatories or in Australia, Brazil, Argentina, South-Africa... CU5 and CU8 have also to carefully study whether having calibration stars in the South is really mandatory.

2.8 CU4 GB observation of the Solar System objects (W. Thuillot)

CU4 includes the task GWP-M-459 dedicated to the setting-up and the management of a ground-based network supplementing the Gaia observations of peculiar Solar System objects. Two kinds of observations will be carried out. The first kind is observation on alert, for example for fast moving objects, or faint objects, or asteroids with small solar elongation, in order to avoid their loss due to a possible too low number of observations performed by Gaia itself. The second kind is the follow-up observation during several days of some specific objects which would require complementary astrometric or photometric measurements after detection, for example objects with suspected cometary activity.

For this goal we have got in touch with about twenty sites of observations at various longitudes and latitudes (in Brazil, Europe, China, India, Russia) in order to have a wide geographical coverage with instruments spanning 0.2m to 2m in diameter. It is a difficulty, several years in advance, to convince teams to be involved in operational activities for the providing of complementary astrometric measurements for Gaia. But most of these sites are also (or will be) involved in another project coordinated by IMCCE, the observation of mutual events of natural satellites which occur periodically. Next international campaigns are organized in 2009 for the Saturnian system and 2010 for the Jovian system and they give opportunities to meet observers in workshops. This configuration allows us to keep in touch and exchange experience with candidate sites of the Gaia follow-up network involved in these international campaigns.

Besides the ground-based observations useful for the data processing of Gaia, we will have also the opportunity to organize observations to complete the Gaia measurements in order to improve the scientific return of the mission. For example, Gaia will observe many asteroids involved in asteroids encounters and will succeed to determine more than 100 masses by measuring the gravitational deflection. But several such phenomena will occur at the edge of the mission and the ground-based observations will increase the number of asteroid masses. We intend also to focus on observations of the same asteroids with high angular resolution instrumentation in order to improve the physical characterization and to access the measurement of their density.

The observations on alert will be certainly easier to carry out by the means of robotic telescopes. Four such telescopes are included in our list of candidate sites of observation but their

diameter are less than 0.4m and we are now looking for contacts with teams operating larger robotic telescopes. Such instrumentation are in development in several countries and several among them work in grids of telescopes (see for example the UK e-star robotic telescopes network). In such a network the Virtual Observatory protocol VO-event allows different telescopes (or human teams) to receive a standard information on the targets and to efficiency deal with their observations. This kind of instruments and protocol will be the best solution to deal with observations on alert during the Gaia mission.

2.9 Supplementary observations for CU7 (G. Clementini)

Tasks of GWP-M-732 : (1) observations of groups of variable objetcs, either from ground-based observatories, or from other satellites, to prepare or complement our knowledge of the Gaia sources, (2) observations for quality control to check the studies developed in the CU7. Needs of the CU7 variability studies : time series photometric/spectroscopic observations + proper time sampling and accuracy (depending on the type of variability: short/long period variability; high/small amplitude variability) + dedicated observations properly scheduled in time and coordinate multi-site campaigns. Now working with existing ground based/satellite observations. Building a CU7 database out of existing photometric catalogues. OGLE and Hipparcos catalogues are being put in the CU7 software system in Geneva. HAT (not public yet), private database available in Geneva. Under investigation: SDSS, MACHO, AAVSO, OGLE, COROT. Spectroscopic catalogues (RAVE, SDSS3, Archival data of CORAVEL, CORALIE, ELODIE.) still to be explored.

New observations for CU7: preparatory observations not yet deemed necessary - calibrations of some specific CU7 algorithms with SOs: under investigation - alert, in and post-mission follow-up observations focussed on specific objects : planned -

Questionnaire (November 2006) to put in place a network of small/medium (1-2 m) size telescopes:

- institutions and names of people interested to SO and e-mail addresses
- manpower (e.g. number of people/FTE you think you can devote)
- available resources: telescope+instrumentation, size, FOV, limiting magnitude photometry, spectroscopy, available photometric bands, precisions spectroscopic resolution, service mode or guest observing, scheduling procedures and time that can be dedicated to the project
- GAIA targets that you think need complementary observations and type of observations that are needed (photometry, spectroscopy, IR photometry etc.).

CU7 small telescopes network :

- D. Mary: ARIES (India) + SAAO (South Africa)
- L. Eyer: Geneva Observatory, Euler (1.2m La Silla - Chile), Mercator (La
- T. Lebzelter: Leopold Figl Observatory Austria, (1.5m), and SMARTS (0.9- 1.5m CTIO)
- R. Hudec: Astron. Inst. Ondrejov Czech. Rep., (8,25.4,30,40,50,60cm)
- V. Ripepi: Toppo di Castelgrande Italy, (1.5m)
- G. Clementini: Loiano Observatory Bologna, Italy, (60cm, 1.5m)
- K. Kolenberg: Network of small telescopes for Blazhko stars (various sites)
- M. Ibrahimov: Maidakan Observatory Uzbekistan (1.5m, 1m, 2x60cm)

about 15 persons in total, involved so far. 7/8 sites, 15 telescopes from 8 to 150 cm in size.

Coordination with other CUs: feasibility to be evaluated since CU7 needs time series observations properly scheduled in time, possible with CU4 (asteroids and transits). Amount of observing time, instruments, purposes: mainly photometry to complement and extend to other bands the time series that will provided by GAIA, (see above for telescope/instrument list)

2.10 Observations of Gaia from the ground (F. Mignard)

Overall Constraints for the astrometric processing : astrometry at 25 μas for G = 15, modelling light-path to better than 2 μas (relationship between proper direction and coordinate direction), need to define carefully the reference frames and their relative motion. Astrometric accuracy vs. Systematic errors : final accuracy in position and parallaxe (V $<$ 13) 7 μas, proper motion 7 μas/yr, epoch 20 μas, single transit error 50 μas. Taking the worst case : ephemeris induced errors must be lower than 0.7 μas. Velocity requirements : $<$ 2.5 mm/s. Position requirements (stellar parallax) : $<$ 100 km. Position requirements (Solar system object) : $\sim$ 150 m. Overall systematic $<$ 1 mm/s. Constraint in frame : position and velocity vector in BCRS, ensure that ephemerides are consistent in orbit solution and data analysis.

ESOC tracking performances : 7 km max for position, 8 mm/s max for velocity. Better performances by adding optical GB observations of Gaia. Optical Observations : 150 m at 1.5x 10^6km is 20 mas on the tangent plane (this solves the positional accuracy requirement for solar system). 20 mas accuracy is achievable without too much difficulty (this could be even better with Gaia reference stars). This clearly not enough to get straight away 2 mm/s accuracy in V (this is only achievable with a dynamical model, ESOC proposes to carry out the job within the orbit fitting). But the charge of carrying the observations rests on the DPAC : this must be an operational activities during the mission and astrometric processing must be done in a pipeline

mode. Needs topocentric positions every day. Technical constraints & tests : Gaia is observable every night from the Earth (meridian transit at about midnight local time, low altitude in summer, high in winter in northern hemisphere). Gaia is a moving object: small trail on a CCD exposure : 1 arcsec(seeing) over 15 to 30 s. Gaia V $\sim$ 17 to 18 mag (based on diffuse light scatter) : exposure of a few mn needed + astrometry of a small trail with respect to fixed stars. Test observations on WMAP to assess the achievable astrometric precision and to establish the observation strategy. What to track?, focal length, exposure, telescope diameter.

Geocentric angular motion of Gaia : motion of L2 $\sim$ 1deg/day $\sim$ 41 mas/s, orbit about L2 $\sim \pm$ 20mas/s with 180-day period. The geocentric components have a 6 month timescale. The topocentric displacement has a 24h period amplitude $\sim$ 2Re/rL2/12h $\sim$ 0.5 deg/12h $\sim$ 40 mas/s, opposite in direction to the annual L2 displacement : almost cancels μ_α around midnight. Even by selecting best conditions there is always a significant motion on the sky $\sim$ 10 to 30 mas/s. Trail larger than seeing spot with a $\sim$ 30s exposure : trial observations needed to assess performances, WMAP suggested for trial target (could be slightly fainter than Gaia, ephemeris available on-line). From Torino or Haute Provence, very low altitude in summer : observing site in southern hemisphere (Brasil?) much better.

2.11 Ground-based follow-up of Gaia : which telescopes? and the possible role of Opticon (M. Dennefeld)

In FP5 (2000-2004) OPTICON was an EU funded thematic network bringing together national funding agencies and users with common interests in optical-infrared astronomy. PI. Gerry Gilmore, Institute of Astronomy, Cambridge PS. John Davies, UK Astronomy Technology Centre, Royal Observatory, Edinburgh. 13 Original Participants : ESO, MPIA, CNRS, ... OPTICON Applied to the European Union FP6 programme for funding as an Integrated Infrastructure Initiative (I3) and was evaluated favourably : 6 JRA approved, 22 telescopes in Access, Many networking activities. OPTICON Telescope Network Challenge : create a mechanism for improving access to non-national observing time, provide resources for operation of the telescopes and support of observing runs, implement common R & D projects for infrastructure improvements. OPTICON and network telescopes do publicise their availability to non-national users. Same peer review committee, same standards (no special OPTICON TAC). Successful qualifying applicants do get travel support. Telescopes receive audited user fee. Work towards a common proposal form. OPTICON has made real progress in co-ordination of Optical/IR astronomy. A wide range of EU optical-IR-night-solar telescopes are wide open for new users. Possibility to use these telescopes for teaching schemes (eg NEON- Dennefeld). The Future for European Collaboration is open. Prepare for the FP7 : new Opticon proposal will be submitted, mostly around the same lines BUT with more efficient structure (less formal partners) and focused objectives. Major objective is the E-ELT (new Design Study already approved for 5.02 ME), continued Access Program, towards better European integration (common TAC, etc), coordination with Astronet Roadmap.

What are GAIAs needs ? To be defined by the various CUs. What size of telescopes? Photometry (variability): D $\leq$ 1m ? Spectroscopy: D $\sim$ 2- 4 m , Resolution R = ?? Spectral classification, identification of variables (SNe, etc..). What amount of telescope time ? Opticon offers only a small fraction of the total observing time (20% max, 10% in practice (finance limitation)). Only D $\geq$ 2m telescopes included, not all will remain accessible during FP7 (rationalisation of the offer, ESO 3.6m and 3.5m may disappear). Question of a large programs is not clear yet. For spectroscopy: 5% international time in the Canary islands (but ToO not welcome), buy some time at ESO, CFHT, WHT, CAHA, ? Make sure some of those telescopes remain available!! For photometry: include 1-2m from the East (Rozhen, Ondrejov,), networks of smaller (0.50m) , robotic telescopes.

2.12 General discussion : post launch GB observations

The main conclusion of the discussion is that the GBOG WG has to focus only on GB observations which are mandatory for the data processing. DPAC members must concentrate on the production of the Gaia catalogue, they are not allowed to take advantage of their work on the data processing to make science with Gaia data before the rest of the community. For this reason, supplementary GB observations aimed at resolving scientific cases (e.g determination of masses) are not part of the DPAC activities. In this context, the organisation of GB observations on alerts is not yet clear. Several CUs have a WP dealing with science alerts, from which new classes of objects will be discovered, if observed in due time.

Several mandatory post launch GB observations are already identified : photometric and spectroscopic stability of the calibration stars (CU5, CU6, CU8) during the mission and astrometric observations of the satellite itself. There is however some uncertainties concerning the available facilities at that time. For instance, most of La Silla instruments will be closed, and the French 2m telescopes will not be supported anymore by the national structures. The GBOG WG has to express its needs to relevant authorities. It is proposed to start with informing OPTICON about our GB activities and future needs.

The Astronet Symposium in Liverpool in June 2008 aims at defining an infrastructure roadmap for the next 15-20 years. In the context of the e-ELT, the Gaia community (not only the DPAC) has to take care that a sufficient number of European small/medium size telescopes will stay available.

2.13 Restricted meeting : definition of the Terms of Reference of the GBOG Working Group

Formulating the document GBOG ToR (GAIA-CD-PL-LAB-CS-004). Action : CS will circulate the draft among GBOG members by email. The final version should be ready by end of march to be submitted to the DPACE.

2.14 Activities for the next 6 months

- *Communication :* Some effort will be put to improve the delivery and exchange of information on the GaiaWiki, svn and Livelink. EJ will be in charge of the GBOG information center. In particular it is desirable to have a clear overview of the status of the on-going proposals and to have a dedicated directory on svn.
- *Proposal coordination :* EP, UH and YF have proposed to adopt guidelines for a better coordination of the proposals (use a common title and short introduction, follow a checklist...). A detailed document will be written and circulated among GBOG members.
- *ESO proposals :* Deadline is April 1st. The strategy for the spectrophotometric programme on EFOSC2@NTT was finally to split the LP into 2 LPs, one for CU5 and one for CU8, in order to better justify the respective programmes. The SEP proposal will be submitted on FLAMES@VLT. The proposals will circulate, and the PIs should agree to read and comment each other's proposal to improve quality and coordination.
- *Other proposals :* Several proposals are to be submitted on various telescopes. PIs must complete the summary table on the wiki. CAP will think to a new proposal for the flux calibration of RVS.
- *Management :* The ToR must be submitted to DPACE. A deputy must be chosen.
- *Miscellaneous :* Every GBOG member should think (and write some ideas on the wiki) on relevant instruments, in particular in the southern hemisphere. A letter will be prepared to inform OPTICON about our GB activities and future needs.