

# Minutes of the Second CU7 Meeting

GAIA-C7-MN-IOA-DWE-002-1 (Draft)

Compiled by Dafydd Wyn Evans

7 April 2006

Meeting at held ISDC, Geneva on 3rd and 4th April 2006

## Monday 3rd April

### 1 Welcome

After Laurent Eyer opened the meeting at 13:00, Thierry Courvoisier welcomed everyone to the ISDC. He joked that perhaps a name change was needed for ISDC to cope with Gaia! He added that although ISDC was experienced, new projects are important to ISDC in order to expand that experience.

### 2 Laurent Eyer: Agenda & practical matters

The agenda was presented and checked for any additional items. The previous actions were listed and the status of them described. A couple of deadline changes were brought to our attention. The Announcement of Opportunity (AO) may be delayed, therefore any related process (including Letters of Support) may be delayed. Also the DACC has postponed the deadline for the FLOPs estimation

Various items of progress since last meeting were listed. Finally, practical matters were discussed (taxi for the airport, social meal, ...).

Full presentation

### 3 Jos de Bruijne: New design of Gaia

de Bruijne introduced himself as the Deputy Project Scientist dealing mainly with systems matters and also some industrial concerns. It was pointed out that the Project Scientist for Gaia has changed and that Fred Jansen has taken over from Michael Perryman. Jansen's previous experience has been with Mars Express and XMM. This will be a part-time appointment and Jansen will still be 50% working on Mars Express. This is also an interim appointment until end of year.

The new design, Gaia-3, was described with many pictures. Not much has changed in terms of the orbit. The Sun Aspect Angle has changed from  $50^\circ$  to  $45^\circ$ . The spin rate (6 hours), precession rate (63 days) and basic angle ( $106.5^\circ$ ) remain the same. We were reminded that the precession is the cause of the across scan motion. The average number of observations (counting both telescopes) will be about 86, but there will be about a 20% reduction of number of observations for stars with  $G=15-20$ .

Gaia-3 will only have one focal plane. There is no Spectro telescope. There will be a silver (Ag) coating of the mirrors with 6 reflections to the focal plane. This is better overall than an aluminium (Al) coating, but there will be no UV response. The MBP has been replaced by 2 photometer prisms (blue and red). These disperse in the along-scan direction. Structures were pointed out in some of the diagrams that provide some protection from radiation damage for the payload.

The focal plane consists of 7 rows of CCDs. Each row has 2 Star Mappers (one for each telescope), 9 Astrometric CCDs (AF) and one CCD for each of the blue and red dispersion prisms (BP & RP). The RVS instrument has  $3\times$  CCDs. The image quality is not as good at the edges, therefore the number of rows has been reduced. All CCDs are identical except for a slight difference due to the tuning of the anti-reflective coatings.

The wavelength range of the dispersion prisms is 330–640nm for the blue and 640–1000nm for the red. Both sets of spectra will be 30 pixels length. It is an on-board processing requirement that they be the same. Note that the 640nm cutoff is not 100% fixed yet. Comparison with the C1B and C1M photometric systems show that the overall performance is better as evaluated by the figure-of-merit. The  $T_{eff}$  and  $A_v$  determination is better, but it is slightly worse for  $\log g$  and  $[M/H]$  for  $G > 17$ . There are more degeneracies since there is no UV response. Optimizing the photometers is still going on, but the baseline is close to optimal.

Full presentation

#### *Discussion*

Dubath: Why have a cutoff filter at all?

de Bruijne: You get less crowding and it reduces the sky background

Dubath: The dispersion spectra will lead to a complicated calibration for photometry

Evans: Floor van Leeuwen has discussed this with Ulrich Bastian and they have come up with a solution. More detail will be available at the Barcelona meeting.

Mary: Said he was working on this problem with Bastian.

Eyer: What sample window will be sent to the ground for the dispersion spectra?

de Bruijne: A  $12 \times 58$  pixel window with the edges binned  $2 \times 2$  for sky estimation. Then said that there would be a compression along the 12 pixels (???)

Mary: Will there be an overlap of the blue and red spectra?

de Bruijne: No study has been carried to see if this is required or not.

de Bruijne: Perhaps the red dispersion spectra will be clocked less (*ie.* a smaller exposure) due to vignetting problems caused by the radiation protection.

## 4 Pierre Dubath: Functional Decomposition – High level

Dubath said that the purpose of this is to split the tasks into subtasks. The goal is to minimize the interfaces between the subtasks. He then described the main diagram.

Full presentation

## 5 Laurent Eyer: Special Variability Detection

Eyer described each subtask within this top-level task and listed the expected input and output for each:

- Planetary transits: (no details)
- Scintillation: this now has a PhD student for 2006(now)-2009
- Extremely Short Periods: this will use data at the CCD level and not at the transit level. A problem may be how to combine different measurements since a change of phase is possible between clusters

of data. Also, what is the optimal detection test to use?

- Small amplitude & strictly periodic: see Eyer & Mignard 2005. There may be a problem with false detections. A variability of 3 mmag at G=14 should be detectable.

Full presentation

#### *Discussion*

Mary: Is the 3 mmag limit strongly frequency dependent?

Eyer: For most frequencies the detection is good. The limit quoted is a conservative estimate.

Cuypers: Why does the periodogram test detect better than a  $\chi^2$  test?

Eyer: This is all to do with what limits you set for your  $\chi^2$  test. You have to be conservative due to systematics and irregular sampling or you will select too many. However, if the variable is strictly periodic then you can do better.

## 6 Jan Cuypers: Variability Characterization Jan Cuypers: Supervised Classification

Cuypers described what we want out of characterization and that this naturally leads on to classification. Classification generally is split into supervised and unsupervised. The input into the classification process could come from light curves (periods) and colours from CoRoT. Gaia will provide similar data, but additionally spectral information and radial velocities. Although CoRoT will only observe 100,000 stars, there will be many more observations. The data from CoRoT will provide training examples for the supervised classification.

A number of issues relating to period search were raised. A false alarm probability will be important. Will it be possible to use weights for the period search? This will imply slower processing. How can we deal with multiperiodicity? It is likely that much more computing time will be needed. What products do we want from this process?

Methods for period search were discussed. First of all you must do a linear or parabolic fit to detrend the data. Two methods were listed: (1) Fourier least-squares – a good method (fast) and (2) Analysis of Variance (ANOVA - PDM like) (has ‘peaked’ phenomena). Multiperiodic data will need special treatment. A few numbers were quoted to quantify the amount of processing needed. It was noted that only  $40 \times 10^6$  separate epochs will be sampled. Can we use this information? Perhaps it will be possible to design a very efficient algorithm that precalculates the time dependant quantities and can save on processing since different stars will use the same epochs. Perhaps it will be possible to have a “supervised” period search *ie.* ignore certain periods. However, this will prevent us from discovering new variable types.

The Stellar Variability Classes under consideration for CoRoT were listed – up to 29 different classes so far. Work on characterizing these is on going.

Full presentation

#### *Discussion*

Clementini: Will we get fluxes or magnitudes from CU5?

Evans: CU5 will probably provide fluxes, but afterwards it will be up to CU7 what it uses, but we should be thinking about what sort of biases we will introduce if we use magnitudes.

Lanzafame: Using a priori information will be useful.

Various: This was understood to refer to limiting the period search (as mentioned by Cuypers) and many thought that we might miss new things. Also there was a comment that this will bias unsupervised classification.

Later clarification from Lanzafame: the comment about using a priori was referring to an additional

process to Special Variability Detection which would use data from CU8 classification (using mean photometry and spectrometry) to identify probable variables so that these objects could be selected for further variability processing.

## 7 Laurent Eyer: Variability Characterization: Model fitting

Eyer described the various methods along with the inputs and outputs expected. Two possible algorithms were to fit a linear or parabolic model or to fit a Fourier series to the data. An example from OGLE was presented where proper motion gives a photometric trend due to Different Image Analysis. Described a possible method for providing a robust period.

Full presentation

## 8 Laurent Eyer: Classification: Extractor

Eyer said that most surveys (MACHO, OGLE, ASAS) use this method. The limits used in forming the extractor classifications for a particular survey are known, so it is then possible to compare these surveys directly by applying the same limits. It was noted that the UV part of the spectrum has been lost so variability detection is now important for QSO detection. An example of extractor classification (selection of QSOs) was taken from Eyer 2002.

Full presentation

## 9 Luis Sarro: Classification: Unsupervised

Sarro said that with unsupervised classification there is no a priori bias and that the technique just identifies natural clustering. Described the inputs (as much information as possible) and also the outputs (includes probabilities). With this method it is possible to discover new classes of objects. Showed a simulation to show the performance of unsupervised classification (about 95% accurate) The k-means method (non-parametric) is CPU fast. Noted that three groups were interested in this topic: Spanish Virtual Observatory, Leuven and Geneva. Another method was described – AutoClass (parametric). The foreseen development stages were listed.

Full presentation

### *Discussion*

Eyer: Different methods have different computational loads. This adds to the uncertainty on the overall FLOP calculation.

Sarro: Did not think that even AutoClass would be that bad. It all depends on how long you wait – you can stop the process early.

Eyer: How fast was the method Support Vector Machine?

Sarro: Optimizations were now available, so now quite fast.

15:45–16:15 Tea

## 10 Nami Mowlavi: Global Variability Studies – Catalogue Visualization

Mowlavi described the purpose of this task: to provide tools for internal use to see the whole catalogue in a global way. It is also possible that these tools could be used by an outside user under the authorization of Science Team. These tools will produce overview diagrams for variability/classifications eg. HR diagram with colours indicating variability level (*cf.* Eyer & Grenon 1997)

Full presentation

## 11 Nami Mowlavi: Global Variability Studies – Catalogue Quality Assessment

Mowlavi asked the question “How do you control the quality of variability analysis?”. The main work will be in developing non-standard statistical processing tools. The output from this task will be quality check reports and candidates for unexpected feature analysis. An example was given: Protopapas, Giammarco, Faccioli (astroph 0505495) – identification of possible outliers from defined classes.

Full presentation

### *Discussion*

Sarro: There used to be a work package (WP) called Statistical Studies of the Catalogue.

Eyer: This has changed to two work packages: Catalogue Visualization and Catalogue Quality Assessment.

## 12 Luis Sarro: Global Variability Studies – Survey Comparisons

Sarro described the objectives of this task. Creating local VO compliant mirrors of external surveys would be desirable. From these could be obtained the relative prevalence of different variability classes and the distribution of parameters (period, *etc.*) within each category, for example. Possible topics for study would be correlations in the variables, population studies and spatial clustering. Various biases will be a problem for this task.

Full presentation

### *Discussion*

Sarro: In which of these 3 WPs does “Statistical analysis of catalogues” fall?

Eyer: It will be a collaboration between the three. This point applies to all WPs *ie.* collaboration is important – do not work in isolation.

A discussion followed regarding who should mainly do the statistical description of the catalogue. Most thought Visualization WP.

Mowlavi: These will be common tools but each of the 3 WPs will use them for different purposes.

Sarro: Saw the possibility of merging the 3 WPs since they are effectively a common task.

## 13 Gisella Clementini: Supplementary Observations

Clementini gave a description of the Loiano Observatory (OABo) as an example of where supplementary observations could be carried out for CU7. The main telescope is 1.52m but there is also a 0.6m one which is mainly used for outreach. The 1.52m has various instruments: spectrograph, imaging, photometer. This generates about 13–14 refereed papers per year.

50% of the nights are useful and the seeing is in the range 1.5–2.0". 40% of the telescope time is dedicated to variability. Examples of observing programmes carried out at Loiano was given. Future developments at the telescope include holographic gratings and a wide-field camera (25' × 25' 0.75"/pixel). Also there is a new telescope operated by OANaples.

Full presentation

### *Discussion*

Eyer: This shows that smaller telescopes are out there for us to use. Remember, we don't need 8m telescopes.

## 14 Pierre Dubath: Work Organization and top-level planning

Dubath presented a worked example (Variability Characterization) to explain the general ideas and methodology behind the structure of the WPs. The CU7 Gantt chart was shown and explained, especially the offsets between some of the tasks. Some tasks have not yet been included (DU3 and longer-term tasks).

Full presentation

### *Discussion*

Cuypers: Will CU7 process data just at the end of the mission?

Eyer: CU7 will regularly receive data. With permission of GST, CU7 might be able to release some results.

Beck: Every 6 months there will be an interchange of data between the core and CU7 databases. This could also mean that previously received data will be revised.

## 15 Laurent Eyer: Specific Object Study Organization

Eyer listed some of the problems with the organization of the Specific Object Studies.

- The capabilities of Gaia-3 are still unknown to most people.
- Several groups are interested in the same objects
- How can these groups be structured?

From the work carried out in planning CU7, it was seen that it was possible to delay this group of tasks. This was due to the phase steps in the Gantt chart.

The evaluation phase (e-mail of 14 March 2006) was introduced to help with this. The WP attribution will therefore come later. This has consequences. In particular, funding agencies may not like it. If this delay causes a problem for any group, it will be possible to go faster through the evaluation process and allocate WPs when appropriate for the relevant funding request process.

It was emphasized that this phase starts now and the grouping of various types can be started. How should objects be grouped? By signal properties or by astrophysical properties? For the evaluation phase

grouping should be by astrophysics, but for data processing grouping will be by signal properties. Examples were given where some progress has already been made (solar system bodies and asteroseismology).

The schedule of the evaluation phase was shown:

- People write the document
- E-mail contacts in summer between Eyer and each group to assess progress on documents
- CU7 meeting in autumn
- WPs distributed

Full presentation

#### *Discussion*

Evans: There should be an action on Eyer to write an e-mail soon so that all know what should go into these documents.

Cuyppers: Wanted further clarification. There is a need for clear justification why special processing is needed for some specific objects.

## 16 Alessandro Lanzafame: Solar-like Variability

Lanzafame said that the evaluation document for this type of object was already being written. This variability is caused by magnetic fields (stellar spots) and flares. There is a need to develop algorithms to characterize this and false alarms will need to be considered eg. from planet transits. Note that also the photocentre can be affected by large spots. Described what science can be done from Gaia data on this topic.

Has had some thoughts on the Gaia-3 design and the equivalent of the BBP can easily be recovered. It is possible to do a lot from a single-epoch observation using the dispersion spectra. For example, it will be possible to tell if a star is spotted and what the filling factor is. With multiepoch data light curve analysis will also be carried out. Described what can be done with flares and his current thoughts for a WP.

Full presentation

#### *Discussion*

Hudec: How good does the sampling need to be?

Eyer: Wanted numbers to various things (number and size of spots, periods) – is it like the Sun?

Lanzafame: large range of numbers – from Sun-like to one spot covering 20% of the star.

**Tuesday 4th April 9:00**

## 17 Jos de Bruijne: Gaia Parameter Database

de Bruijne described the purpose of the database and gave examples of what sort of parameters were available. Access to the database is via the MyPortal area of the Gaia website. Contact Karen O’Flaherty if you do not already have access to this. Three modes exist: Off-line mode where you can obtain the full database eg. via wget; Search mode and Browse mode. There are many supported output formats in either human or machine readable forms. The structure of the parameter names are based on a hierarchical breakdown of Gaia.

Scalar or vector data from the database can either be hard-coded or derived (calculated on-the-fly from the hard-coded values). Multi-dimensional data is only available as FITS files. Some of the data can be displayed by a special viewer (Java applet).

The change from Gaia-2 to Gaia-3 has been implemented. The payload parts have consequently changed significantly. The full upgrade was released on 1 March 2006 (v2.0) and is consistent with the EADS-Astrium documentation. Feedback is very important. If there are any problems, bugs or new parameters wanted contact [gaialib@rssi.esa.int](mailto:gaialib@rssi.esa.int). It was pointed out that the database was the responsibility of the Project Scientist Support Team. A live demonstration was then given.

Full presentation

*Discussion*

Mary: What is the size of the database?

de Bruijne: Marginal.

Mary: Can you modify the basic parameters and then have new derived parameters?

de Bruijne: Not yet, but there are plans to do this.

Sarro: What is format of database?

de Bruijne: MySQL, but you never access the original format. You get what you ask for (HTML, Java class, *etc.* ).

## 18 Laurent Eyer: Task/Work Package allocation

Eyer showed the WP spreadsheet which had been updated from the last meeting and requested comments. A new version of the table will be circulated after the meeting. Note that Specific Objects Studies is in Evaluation Phase and that everyone in the table should write an evaluation document.

Spreadsheet

*Discussion*

Eyer: There is no need to consolidate the classes, since when documents have been submitted, then we will have a better idea of how to group the tasks. Don't think of this table or any grouping within the table as very rigid. Note that the end result will be a split/classification that is based on methods and not to do with astrophysics.

Mary: Is there a link between Special Variability Detection and other Special Object modules?

Eyer: Yes – explained why Special Variability Detection is there – to pick up variables not identified by the default CU5 variability flag.

Cuyppers: Supplementary Observation may be more important and urgent than we think.

Hudec: Will only photometry be used for classification of variables?

Eyer: No, all data (astrometry, RVS instrument, R/B dispersion spectra) will be used, but the main information will be G photometry.

Lanzafame: Asked that the work package descriptions be made available to all in order to help with the writing of the evaluation documents.

## 19 Laurent Eyer: Endorsement of CU7 structure

Eyer went through the historical situation: Letter of Intent, GST appointed DACC, which formed the CUs and Data Processing Centres. If you have any problems with the CU7 WPs then write to Eyer. DACC has felt a bit uncomfortable with how things were set up since it was not really democratic. Thus, an endorsement procedure was proposed by Francois Mignard in which if you have problem with DPAC/CU structure you should write to Mignard.

Full presentation

## 20 Mathias Beck: Architecture & Data Processing Centre

Beck focused on Variability Characterization as an example of the structure. For the data model and interfaces the Interface Control Document will be needed soon. Some common WPs that were present in all CUs were mentioned and the software infrastructure WPs described.

A technological survey is being carried out and everyone invited to contribute via the GaiaWiki. A meeting with CU1 (O'Mullane & Hernandez) was held on 22 March in order to get CU1 views. Two aspects from this meeting were highlighted:

Data formats: an assumption is made that all data can be represented as a table. The options available are:

FITS (cfitsio for C/C++ and ivoafits for Java);

ASCII;

Database (eg. Oracle, MySQL);

Root (AstroROOT for C/C++, JAS for Java);

Flat binary files.

The final choice will be influenced by the data model and architecture. Performance comparisons will be needed to help decide on the data formats.

Processing Systems: the options available are:

CNES;

OPUS (HST);

ROOT;

GRID;

CU7 specific.

He finished by listing some tools that should be considered (or are already being used) for CU7:

Livelihood (Documentation server)

GaiaWiki (Collaboration platform)

Subversion (CVS like)

ROOT/JAS (Analysis Framework)

Eclipse (Integrated Development Environment)

Mantis (Bug tracking)

CruiseControl (software builds)

Full presentation

## 21 Reiner Rohlfs: ROOT

Rohlfs introduced ROOT as a data analysis framework. The authors of ROOT want it to be the basis of your analysis. What is ROOT? To a developer it is a C++ library, but to a scientist it is the data interpreter. ROOT was originally written by Rene Brun in 1994 at CERN. In 2002 it became an official product of CERN. As of 2006 it has 12 people in its core group of developers.

The driver of ROOT was that the limit had been reached for some of the previous systems and that the amount of data that needed to be processed had grown by several magnitudes. The goal of the design of ROOT was one of scalability linked with efficient data access. Thus, development of any system can proceed using a smaller data set. Also this lends itself easily to parallel processing. Also data visualization is an important part of ROOT. Instructions on how to install root can be found at

<http://root.cern.ch>. Some projects using ROOT were listed: Integral; Planck; CERN and others.

The generic file format for ROOT was described: data is stored in “trees”. A simple view of this is that this is a 2d table. These are stored in an optimized way tailored for write once, read many times. The data is buffered automatically and each buffer can be compressed individually (this implies faster access since IO is generally slower than CPU).

Examples of the data viewer were shown. For data processing with ROOT, parallel processing would use **Proof** and file access via the network would use a URL-like program (**XRootd**). ROOT is already in use with projects with Tbytes of data. AstroROOT is an extension of ROOT for astronomy. This gives access to FITS files and provides conversion between FITS and ROOT files.

Full presentation

#### *Discussion*

Eyer : Wanted clarification on the difference between rows and columns.

Rohlf: All columns have the same format, so are not interchangeable.

Evans: Is ROOT limited to 2d tables?

Rohlf: Each cell can be an array, so can be extended.

Sarro: Are there statistical libraries available in ROOT?

Rohlf: They are available.

## 22 Mathias Beck: FLOPS and Data Volume Evaluation

Beck structured his presentation around the 5 questions: Why, Who, What, Where and When?

Why do we need it?

For planning and assessment of future resources needed (man and machine).

Who will do it?

The WP managers with assistance from the technical and science coordinators. You will get an e-mail shortly.

What is needed?

This was described.

Where do we put the information?

It is proposed to put results on GaiaWiki.

When is the deadline?

As soon as possible because this has an impact on funding and architecture.

Full presentation

#### *Discussion*

de Bruijne: There was an earlier estimate of FLOPs. How is that related?

Eyer: The 2004 estimate was very preliminary. Things have advanced since then. There have also been some GaiaGrid tests carried with Salim Ansari.

Sarro: There is a need for the number of objects for each type to be specified since not all objects will be processed in the same way. Everyone needs to use the same numbers.

Evans: Better for WP managers to supply information per object and leave the numbers to the top level ie. Eyer.

## 23 Laurent Eyer: Short-medium term planning

Eyer highlighted some of the forthcoming deadlines.  
Information needed on Input/Output data for Top-level WPs.  
by 1 June  
Technological Survey  
by 1 Sept  
FLOPS and Data Volume  
by 1 Sept  
Evaluation phase  
by 10 Oct draft documents  
by 1 Nov meeting (Leuven possibility, Italy?)

Full presentation

### *Discussion*

Mowlavi: Our meetings should be in North Europe in the summer, and South Europe in the winter!  
Various: Ground-based observations also need some thought  
Lebzelter: This is linked with the evaluation phase. We will know more afterwards.  
It is unclear when the Announcement of Opportunity will be.

## 24 General discussion

There was much open discussion at this point. Sadly DWE's notes were lost due to an editor failure!  
The following comes from memory!

Evans: Wanted opinions regarding the fluxes versus magnitudes issue.  
Clementini: No objection to fluxes.  
Evans: We should think about the implications this issue raises on software and on biases.  
Dubath: What about using both?  
Evans: Would this have a CPU implication?  
Eyer: Gave an OGLE example of a magnitude drop, but was really a flux problem.

Lebzelter: Many people are listed under some topics. Should each topic produce one collaborative evaluation document or should many documents be written?  
Eyer: Each group has the freedom to choose which way to go. Collaboration is good, but so is competition.

Clementini raised the issue of Supplementary Observations.  
Eyer: Caroline Soubiran is coordinating this effort. What we need is access to small telescopes, not large ESO telescopes *etc.*  
Evans: Eyer should add to the e-mail describing the Evaluation Document Requirement "What Supplementary Observations might be needed?".

Evans: Since the Evaluation Phase is now October/November, will this cause problems for the funding agencies?  
Lanzafame: It would be useful if some WP leaders could be allocated earlier since Italian funding will be easier to obtain if you are leading a WP.

Cuyper: Can new people still join CU7?  
Eyer: Yes, but it will be more difficult the longer this is left since WPs may already have been allocated.

Meeting ended 16:00

## 25 Actions

- 2.1: **Evans** Write the minutes (as soon as possible).
- 2.2: **All** Check that the timescale of the evaluation process does not cause problems with funding applications (as soon as possible).
- 2.3: **Eyer** Write an e-mail specifying what needs to be included in the Evaluation Phase Document. It should be clear in the e-mail who needs to write one of these documents. This e-mail should specify that the question "What Supplementary Observations might be needed?" should be answered in the Evaluation Phase Document (as soon as possible).
- 2.4: **Eyer** Initiate e-mail contacts with the authors of the Evaluation Phase Documents to assess progress on the documents (summer)
- 2.5: **Various** Write an Evaluation Phase Document (10 October, but work should start earlier!).
- 2.6: **Cuypers** Investigate possibility of hosting CU7 meeting in Belgium around 1 November. If OK, organize it (summer)
- 2.7: **Eyer/Beck** Circulate new version of the WP spreadsheet. The most up-to-date version should always be available from the website (as soon as possible).
- 2.8: **Eyer/Beck** Make available work package descriptions (as soon as possible).
- 2.9: **Eyer/Beck** Send out e-mail regarding FLOP/Data Volume estimates (as soon as possible).
- 2.10: **Various** Produce FLOP/Data Volume estimates (1 September).
- 2.11: **All** Contribute to technological survey (1 September).
- 2.12: **Various** Information needed on Input/Output data for Top-level WPs (1 June)

## 26 Attendance

Mathias Beck  
Pavel Binko  
Jos de Bruijne  
Gisella Clementini  
Jan Cuypers  
Pierre Dubath  
Dafydd Wyn Evans  
Laurent Eyer  
Guillaume Hebrard  
Rene Hudec  
Alessandro Lanzafame  
Thomas Lebzelter  
Isabelle Lecoeur  
David Mary  
Nami Mowlavi  
Frederic Pont  
Vincenzo Ripepi  
Reiner Rohlf  
Luis Sarro Baro

Group photograph