



## The Gaia-ESO Survey –

### July 2013 progress report

- 1) Science verification and early science – update
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*All the Survey policy, progress, and activity is recorded on the Survey wiki, available at <http://great.ast.cam.ac.uk/GESwiki/GESHome> An account there will keep you up to date.*

*We also have a new set of public web pages <http://www.gaia-eso.eu> Comments and feedback on the contents of the web pages, and contributions for new material, especially articles about you, your group, and your science, will be very much appreciated.*

### 1. Science Verification data available

The first almost full run through the whole Gaia-ESO data cycle is now complete. While homogenization across the different spectrum analysis WGs has not been achieved yet, a way forward has been devised and will be applied during the next analysis cycle (see below).

The astrophysical parameters and abundances recommended as most suitable for analyses for all stars observed during the first 6 months of Gaia-ESO (12/2011 to 06/2012) will be available for scientific analysis from the Edinburgh archive by late July. In addition, all the individual sets of parameters derived by each individual spectrum analysis node for each of these stars will be available, to support analyses which need the full information set. As well as all this, the target list and metadata (photometry, radial velocities) for all stars observed in the first 18 months observing (12/2011 to 06/2013), will also be available. To access the archive, go to <http://ges.roe.ac.uk>. You should have been contacted already to set up your local password access to the data. If in doubt, contact ccworley @ ast.cam.ac.uk. These data

are ready for science verification. We do expect to find some residual processing “features” due to our learning curve, as well as much astrophysics. Do get in there, write papers, submit them to the wiki internal review process, and tell us immediately if you discover problems with the data. We look forward to many science results from these data. Please note that in the papers you should refer to this dataset as to GESviDR1Final. Also note that this is still an internal release. The release of parameters and abundances to ESO will occur next year.

For clarity, we recall below the Survey science exploitation (including science verification) process.

- Projects can be submitted to the dedicated wiki page at any time, by any Survey CoI. Keep posting your proposed projects to the wiki or add your name to the already posted projects, if you are interested. All Co-Is may join any announced project.

We wish to encourage early science in as many fields as is possible.

We stress again that there are no “protected” science topics, and that registering an interest in a subject, or submitting a draft paper, does not preclude other analyses of the same topic or data by other groups of Co-Is. Scientific collaboration is desirable, but complementary analyses are also encouraged.

- Science analysis can start as soon as data are available in the Edinburgh archive. At that time, it would be helpful for everyone if projects that are expected to lead to a paper in a **short timescale** could be flagged on the wiki with an updated text. In proposing a paper, potential authors accept a commitment to deliver a draft for internal review in a **reasonable** time, to be agreed between the lead author and the Publication Group, after which the paper proposal expires.
- Once the draft papers are ready they are to be posted to the dedicated wiki page, for access by all Co-Is, and to allow co-authorship requests. This wiki will allow Co-Is to activate automated notification of new papers.
- There will be a set of “Survey Overview” and “Data Release” papers which will need to be referenced as the description of the Survey itself, and of the various data processing methodologies being implemented. Plans for these are being finalised. We will put a description of each paper and its contents on the wiki, so you are able to reference these papers in your own science paper. The plan is to submit these general papers to Astronomy & Astrophysics in a group. Of course, these top-level papers will have a very wide Co-I authorship, as so many people have contributed to making the Gaia-ESO Survey a reality.
- Do keep in mind the publication policy document available on the wiki. In particular recall that

*“The only astrophysical parameters which may be analysed in a publication are the “best” parameters: photometric, spectroscopic, astrophysical parameters, elemental abundances, velocities, etc, and their random and systematic uncertainties, held in the Survey archive. Publication based on any other data requires prior special agreement with the Co-PIs.”*

If you have plans for a science project which requires access to the raw spectra, and you are not a member of one of the analysis teams, contact the Co-PIs.

## 2. Survey observations progress

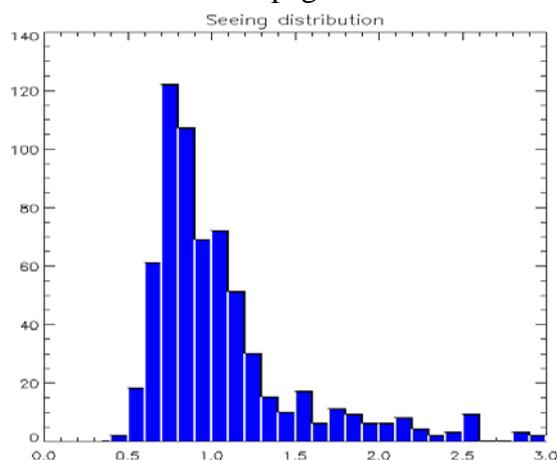
Survey observing run number 17, P91 Run Q, has just been completed, after first light on 31-12-2011, for a total of 85 nights so far. Up to date information on the observing runs, and the survey progress in observed fields, is available at the WG0 wiki. About 80% of the observing time has been useful, with good seeing and transparency conditions most of the time. The remaining time was lost mainly due to bad weather. No major technical problems occurred, with exception of a damaged UVES fiber in plate #2 which has been disabled in September and has not yet been repaired.

In the interests of being good citizens, and maximising overall ESO Paranal science output, we accept overrides from targets of opportunity and time-critical observations. We trust this time will be replaced by ESO later in the Survey. In the meantime, apart from GRBs, the complementary science of detailed spectroscopic analyses of micro-lensed Bulge stars has been making progress!

12 open clusters have observations completed, 3 more are started – these provide an excellent sampling of the range of cluster and stellar astrophysical parameters-

MW observations have focused on covering the widest range of target fields, from the outer thick disk to the inner Galaxy, from the Galactic pole to relatively high extinction low-latitude fields. Several inner Bulge fields have been completed.

Several calibration targets have been observed, including benchmark stars, COROT fields, top-up observations in some open clusters, and globular clusters. Through a special agreement with the COROT Red Giant team, we are observing a large number of stars for which COROT has derived seismic gravity values – combined with Gaia-ESO spectra these will not only become excellent calibrators of our astrophysical parameters, but will enable much core Gaia-ESO science. Look at the wiki Projects page to identify these science opportunities, and if interested then join these and other projects. The list of observed targets and OBs, along with some supporting information, is available and regularly updated on the WG0 and WG5 wiki pages.



*Median seeing = 0.92"*

*25<sup>th</sup> quartile = 0.73"*

*75<sup>th</sup> quartile = 1.15"*

*Time lost:*

*Weather 15%*

*Technical 2.8%*

*ToO overrides 2.5%*

### 3. Survey data processing progress

We have developed enhanced data processing pipelines for Giraffe data, which now seem to be operating well. Continual improvement is sought. UVES data are processed using the ESO pipeline. This has proved quite problematic and fragile, so we continue to work closely with ESO in making it more robust. Significant improvement has now been achieved; the 580nm setting data are processed reliably, but the 520nm and 860nm settings are still not robust - we trust that these will be solved soon.

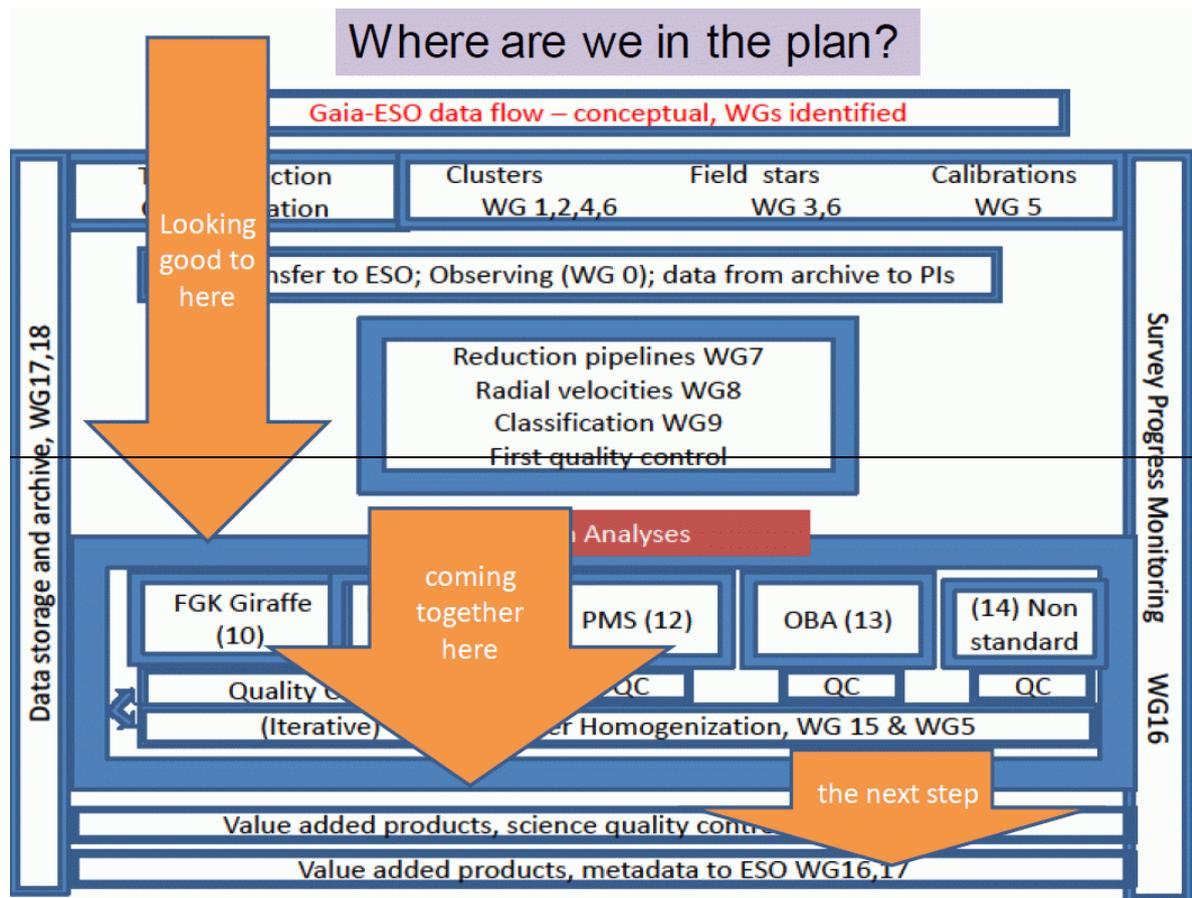
Improvement has been obtained also in the radial velocity precision: Careful analysis shows that we are achieving significantly better than 1km/s accuracy and that, for cool stars in clusters, the precision can be as good as 0.3 km/s, close to our original goal. There are hints we can do better and work is underway on this, involving teams at Cambridge and Keele.

The importance of common line-lists, a standard set of model atmospheres, and rigorous use of standard FITS data formats have become fully appreciated by all involved. The Implementation Plan, which documents and describes all these internal working standards, is rapidly converging to completeness. When ready, as with all Gaia-ESO Survey documents, it will be available to all Co-Is through the wiki.

Analysis production runs have been implemented by the relevant spectrum analysis working groups. The resulting astrophysical parameters and abundances were analysed by the WG15 homogenisation team, at a meeting on June 5. Whilst during the meeting a way forward to homogenization has been discussed, it was felt that more benchmark stars, calibrating clusters and stars observed with both UVES and Giraffe are needed to apply it. This will be doable in the next analysis cycle.

As mentioned “best” or “recommended” parameters for each star are available for analysis by all Co-Is through the Edinburgh archive. Radial velocities and photometry are also available. Up to date information on the status of the data processing, and delivered signal-noise and sample statistics, is already available on the Survey wiki, to assist planning for science verification and early science analyses.

The status of our data processing is shown in the figure below. The next internal release of spectra and metadata to the spectrum analysis working groups, iDR2, will happen on July 22. This data set includes newly reprocessed Giraffe spectra, and UVES spectra, for all Gaia-ESO observations obtained up to now. We expect that the full analysis cycle, this time including homogenization, will be completed by Christmas, when you will have available for science verification and analyses all the data from the first 18 months of the Gaia-ESO Survey.



#### 4. First Gaia-ESO Survey meeting, April 8-11, 2013, Nice, Fr.

The first all-Survey meeting took place in Nice, in April 2013. This meeting was the first opportunity to present the full range of early science results and ambitions, as well as data processing results, and to get to know who is doing what and who is involved in our ambitious Survey. 133 participants attended for four days, with 6 plenary sessions and 7 splinter meetings. All aspects of the Survey were discussed, covering scientific, technical and organisational issues, with substantial progress being made.

A quite impressive range of early scientific results were presented, illustrating the impressive potential of Gaia-ESO. Presentations are available on the wiki. The final discussion session was extremely lively and very helpful feedback was provided to the Co-PIs. The meeting was followed by a Steering Committee meeting, with agenda as below.

#### 5. First ESO Public data Release: Gaia-ESO-sub.#1

The Gaia-ESO Survey will make its first release of Survey products to the ESO archive, and so for public availability, at the end of July 2013. This release will include spectra taken before mid-2012, where the observational data are considered complete to the required SNR. No astrophysical parameters and abundance data will be released at this time. For the clusters

this implies releasing Giraffe and UVES spectra for  $\gamma$  Velorum, Chamaeleon 1, NGC4815. For the MW field and calibration targets this includes over 2200 stars with Giraffe spectra in both HR10 and HR21, and over 800 UVES field star spectra. The first Gaia-ESO data release to ESO, and the public, which includes abundances is expected to be in July 2014, and will include data for all targets which have been observed prior to 31-12-2013, where the observational data are considered complete to the required SNR.

## **6. Steering Committee #4**

Following the Nice science meeting the Steering Committee carried out a full review of Survey progress. A key issue included the distribution of signal-noise ratio for high-latitude MW fields. In these fields the number of high-priority targets is insufficient to fill all fibres, so lower-priority targets are allocated. These lower-priority targets are essentially for radial-velocity science, having too-low SNR for full astrophysical analyses. Careful analysis shows our priority targets are achieving the anticipated SNR, given the actual seeing experienced.

An additional item of interest was to ensure that those people investing very special contributions to the Survey, beyond normal participation or science activity, are fully recognised through “Builder” status. The Steering Committee issued a call for new nominations as Builders, and will review the responses shortly.

The full minutes of the Steering Committee meeting are available on the wiki. If you have any issues you would like to bring up to the Steering Committee, please let us know. Agendas and minutes of all management meetings are available on the Survey wiki.

Best regards

Gerry Gilmore & Sofia Randich