

# The Gaia-ESO Survey –

## May 2014 progress report



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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 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. Data release 2 is (nearly!!) live!**

The astrophysical parameters and abundances recommended as most suitable for analyses for all stars observed during the first 18 months of Gaia-ESO (12/2011 to 06/2013) will be available for scientific analysis from the Edinburgh archive in a few days. Astrophysical parameters (Teff, log g, metallicity) after homogenization are available for 13361 stars. 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), plus a fraction of the stars observed between 7/2013 and 12/2013 are also released. To access the archive, go to <http://ges.roe.ac.uk>. These data are ready for science exploitation. By now most of you should already have tried accessing the archive. There may still be some residual processing “features” due to our learning curve, as well as much astrophysics. Check for relevant information on the wiki DR pages. 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 GESviDR2Final. Also note that this is still an internal release. The release of parameters and abundances to ESO will likely occur in September and become public late in the year.

## 2. Science projects and publications

Science verification and exploitation by the consortium of the recommended astrophysical parameters and abundances released in GESviDR1Final, the first internal release of data products, have been very successful. As of today, nine papers have been accepted by Astronomy & Astrophysics, several more have been submitted and are under the referee process, while an additional few have been submitted to the internal College of Readers. The wiki list is up to paper 23. An ADS search (linked from our web page at [www.gaia-eso.eu/publications](http://www.gaia-eso.eu/publications)) lists 19 publications with Gaia-ESO Survey in the title. These papers cover a wide range of science topics: from kinematics of young clusters to abundances in young and old clusters to the radial metallicity gradient in the thin and thick discs. Two of these papers (Jeffries et al., 2014; Bergemann et al., 2014) have been selected as an A&A highlight. In parallel, data release description papers have also progressed: the paper describing UVES pipeline data reduction and radial velocity determination is in press in A&A, while the papers on the cluster target selection and UVES spectrum analysis have been posted on the wiki for comments from the consortium. The latter has been recently submitted to A&A. The remaining data release description papers are still in preparation but we hope that they will be ready soon. The relevant data description papers should be referenced in your own science papers.

The second almost full run through the whole Gaia-ESO data cycle has been completed, providing the data for the DR2 release noted above. This time homogenization of astrophysical parameters and metallicity across the different spectrum analysis WGs has been applied thanks to the efforts of the team lead by Patrick Francois (Anna Hourihane, Laura Magrini, Clare Worley); homogenization of individual abundances has yet not been achieved, but it will be applied during the next analysis cycle. WG recommended or, for some elements, node abundances are being released this time.

We remind you to follow the Survey project and publication process summarized in the Newsletter #4 and the publication policy document posted on the wiki. A new point has been included in the latter to regulate submissions to astro-ph prior to acceptance. To meet our open-access requirements, all Survey papers should be posted to astro-ph when accepted, and should use the standard acknowledgement. Please also note the three week timescale to provide comments and request authorship. If you have remaining doubts, please contact either the CoPIs or the coordinators of the College of Readers (Janet Drew, Rob Jeffries, Antonella Vallenari)

## 3. Survey observations progress

Survey observing run number 27, P93 Run B (we are on our second pass through the alphabet), has been completed in April, for a total of 148 nights so far. As always, we remind you that up to date information on the observing runs, and the survey progress in observed

fields, is available at the WG0 wiki. Summary overviews of Survey progress are available on the wiki homepage, as the various progress reports.

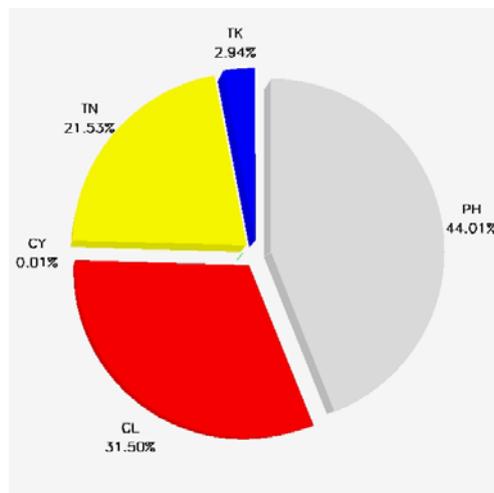
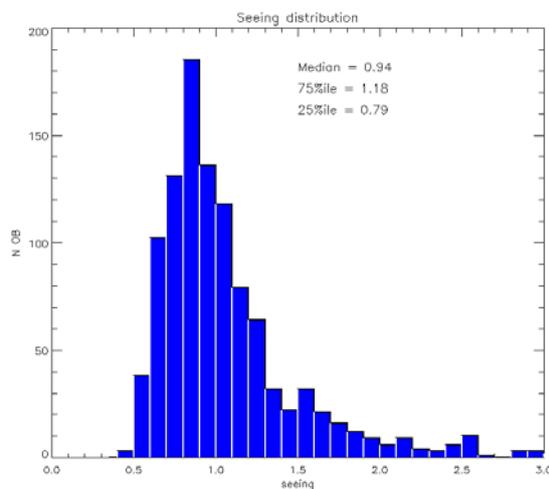
About 80% of the observing time has been useful, with good seeing and transparency conditions for a large fraction of the time. The remaining time was lost mainly due to bad weather, with about 6 % of the time lost due to technical problems and ToO observations.

21 open clusters have observations completed, four more are started. Although these provide a good of the range of cluster and stellar astrophysical parameters, the fraction of completion of cluster observations is below what should have been at this point of the Survey. This is due both to the time lost and to the fact that several clusters required more time than initially foreseen. As a consequence, the full list of clusters is being revised and new priorities are given.

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. Similarly to the open clusters, the level of completion is below what expected and the MW thin disc dynamics surveys has not started yet. The current observing season will focus on inner Galaxy/bulge fields and Corot fields, providing exciting data for the next DR4 analysis cycle

Observations of calibration targets have significantly progressed. The sample of calibrators now includes many benchmark stars, several globular clusters, a few open clusters and more than 2000 COROT red giants. These stars have seismic gravity values from COROT. Combined with Gaia-ESO spectra these will not only become excellent calibrators of our astrophysical parameters, but will enable much core Gaia-ESO science. A special analysis process for them is being devised fir next cycle (see below).

The list of observed targets and OBs, along with some supporting information, is available and regularly updated on the WG0 and WG5 wiki pages.



## 4. Survey data processing progress

Both Giraffe and UVES data processing pipelines are now routinely and smoothly run after each observing run. The Giraffe pipeline, developed by Jim Lewis at CASU, operates well, although continual improvement is sought, in particular on sky subtraction algorithms. UVES data are processed using the ESO pipeline. Thanks to the efforts of the team at Arcetri and the collaboration with Andrea Modigliani at ESO the pipeline is considerably more robust and all settings, including the 520nm and 580nm ones, are now processed.

Radial velocity precision now almost reaches our goal precision: in the best cases, precisions as good as about 250 m/s are achieved. As for the accuracy, differences in the zero point are found for both Giraffe and UVES (and of UVES with respect to Giraffe). Although these differences are small ( $<1$  km/s) additional efforts are on-going to better understand their origin.

Analysis production runs of the first 18 month data have been implemented by the relevant spectrum analysis working groups. The resulting astrophysical parameters and abundances were analysed by the WG15 homogenisation team and discussed during a meeting held in Paris on February 21. The comparison of the results of the products of the different working groups both with the benchmarks stars and across working groups for common calibrators showed a very positive pattern, which allowed the team to determine offsets to be applied to the various datasets. The data quality is excellent, the systematic node-differences are small. The homogenization team has applied these offsets.

The next internal release of spectra and metadata to the spectrum analysis working groups, iDR3, happened in March. This release is incremental and includes Giraffe and UVES 580nm spectra for a fraction of the spectra observed between July and December 2013, all Gaia-ESO UVES 520nm and 860nm obtained up to now, plus a variety of archival data. The cluster spectra include data for IC4665, NGC2243, and Berkeley 25, plus archival spectra of  $\rho$  Ophiuchus and NGC2264. MW spectra include a few COROT fields and a few Bulge fields. Since the release is incremental, the analysis is to be performed by the nodes in the same way as for DR2, without any updates of the codes. The line list and grid of synthetic spectra have also not been updated. We expect that this analysis cycle will be completed by July. As mentioned, a special treatment is foreseen for the COROT spectra. In addition to the standard Gaia-ESO processing and homogenisation process, followed by data release to the Survey community, a parallel analysis is taking place, designed to provide the best possible parameter determinations, exploiting the astero-seismic determinations of  $\log g$ . That special analysis, for which the results will be released to the Co-I community later in 2014, is described fully on the wiki, on the GeSCorot page, linked from the home page.

DR4 which will include reprocessed Giraffe spectra and UVES spectra obtained up to July 2014 will be available for release to the analysis WGs and nodes in late September 2014. The second Phase III release to ESO is expected to occur in September 2014, with data becoming public later in the year.

## **5. Steering Committee #5**

Following the homogenization meeting, the fifth Steering Committee meeting was held in Paris on February 22. Besides a full review of Survey progress, the agenda included some discussion on science and publications, on timescales and planning strategy for the future, as well as on the applications for buildership. More specifically, besides the progress on observations, pipeline reduction, and spectrum analysis, a summary of the homogenization meeting held the day before was given. It was noted that some of the nodes analyze only a minor fraction of the spectra and this introduces some dishomogeneity. Whilst the suggestion of the homogenization team was to merge those nodes, the SC rather suggested that those nodes were contacted and encouraged to contribute to a different task. The proposal of a special processing for COROT targets has been approved, with the recommendation that the details of the plan would be discussed in a telecom, and developed into the practical plan now described on the GeSCorot wiki page. Timescales for DR2 product release, DR3 spectra release, and future DR4 were discussed (see above).

A few issues regarding science/publications were discussed and the wiki page has been updated accordingly. Rob Jeffries volunteered to join Janet Drew and Antonella Vallenari as coordinator of the College of Readers. The feedback from A&A on the cluster papers submitted to A&A was also discussed. The SC agreed that, whilst collaboration from the consortium on broad topics is certainly encouraged, there is nothing wrong in publishing papers based on individual clusters, provided that there is enough scientific merit.

The team of observers plus another few people making substantial contributions to the Survey were approved as builders.

It was noted that both the MW and cluster surveys are behind schedule. This implies that a detailed analysis of the science cases that are mostly affected should be performed, along with a new prioritization of the targets. Most obviously a convincing case should be made to ESO to get compensation time.

Plans for the second all-hand meeting were agreed (see below). A meeting on the use of the WFAU archive with training sessions will also be organized either at Edinburgh or at the all-hands conference. The possibility to submit a proposal for a Horizon 2020 network will be explored by Piercarlo Bonifacio and Rob Jeffries. Finally some discussion on possible outreach activity took place.

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.

## **5. Reports and interaction with ESO: Survey Review**

A very detailed report to the OPC was sent last November and is available on the Survey wiki. No feedback so far was received.

A full survey status report was provided to the ESO Public Surveys Review in April, and is available to read on the wiki; besides survey progress information, a discussion on the survey

completion, additional time required, the scientific merit of Gaia-ESO with respect to other surveys, and the legacy dataset that Gaia-ESO will deliver was requested.

The second year major review with the ESO Public Spectroscopic Survey Panel took place at ESO on April 30, with Survey representation by Sofia Randich, James Binney and Clare Worley. The Review will report to ESO OPC and ESO SPC. We have as yet no formal feedback, but informal news is positive. The presentation to the Panel is available on the wiki. The review report and presentation is a very good overview of Survey status.

## 6. Meetings

The first Gaia-ESO science meeting of 2014 has been held in Palermo on May 20-22 and focused on young clusters. A meeting specifically devoted to the use of WFAU archive is also planned and may be held as a separate workshop or within the second all-hands meeting that will be held in Porto next November. Keep checking on the wiki for updates. The first announcement of the Porto meeting is shown below.

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* *                                     * *
*   GES 2014 : Gaia-ESO Survey Second Science Meeting   *
*                                     *
*   10 - 13 November 2014, Porto, Portugal             *
*                                     *
* *   http://www.astro.up.pt/ges2014/                   * *
* *                                     * *
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Please forward this message to potentially interested colleagues.

Scientific Rationale:

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The Gaia-ESO Survey (GES) is currently half way to achieve its goal to collect spectra for 100 000 stars over a period of five years.

The survey is providing an homogeneous overview of the distributions of kinematics and elemental abundances for the major components of the Milky Way, namely the bulge, the thick and the thin discs and the halo . In addition to the field component, a very significant sample of open star clusters, covering all accessible clusters ages and stellar masses, as well as a handful of globular clusters are being observed.

This Gaia-ESO Survey Second Science Meeting is perfectly timed to present and discuss new results arising from the second internal data release. Given the already significant data volume and the current more mature stage of the GES data analysis, we expect a variety of scientifically interesting results on a wide range of topics proposed within the Survey:

- Local Field Dwarfs (UVES parallels)
- Bulge and Inner Galaxy

- Thick Disc
- Halo
- Thin Disc Kinematics
- Calibrations and Standards
- Cluster Membership
- Cluster Kinematics
- Cluster Abundances
- Stellar Evolution
- Cluster-Field Analyses
- Technical and Methods
- Any other project

By the time of the meeting, several studies based on the first data release will be already published and many based on the second data release will be ready to verify previous work and reveal new findings on the different subjects.

Like in the first science meeting, in addition to the interest of the new science results, this conference will also allow some discussion on the survey progress, data analysis methods, challenges, and synergies with other surveys (e.g. SkyMapper), etc. This will be an ideal occasion for the different groups within the survey to meet and discuss their progress, difficulties and ways forward and ensure a better and better progress of the Survey.

Scientific Organizing Committee

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Giusi Micela (co-Chair)  
Sérgio Sousa (co-Chair)  
Sofia Feltzing  
Alejandra Recio-Blanco  
Karin Lind  
Carlos Allende Prieto  
Ronny Blomme  
Germano Sacco  
Rodolfo Smiljanic

All information is available at the conference website:

<http://www.astro.up.pt/ges2014/>

The page includes all information concerning the important dates, registration and abstract submission forms, registration fee payment information, venue and lodging.

For any queries please contact the LOC at [ges2014@astro.up.pt](mailto:ges2014@astro.up.pt).

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Our best regards to all Gaia-ESO Co-I's

Gerry Gilmore & Sofia Randich