Gaia-ESO progress update – open clusters

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The consortium is growing

- 400++ CoIs
- 95+ institutes

- 19 working groups
- active wiki communications:
  300+ users
  130+ visits/day

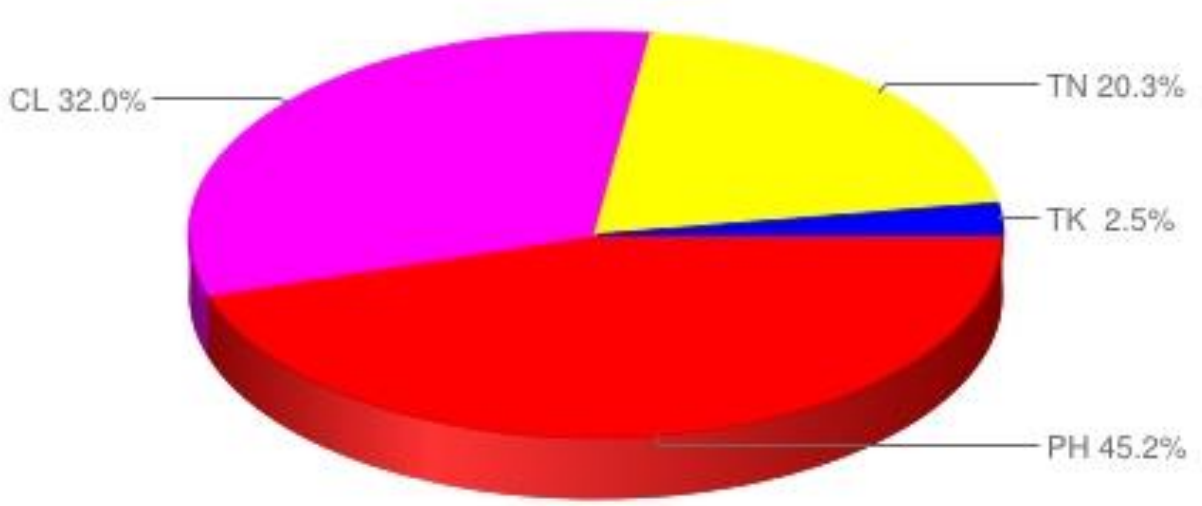
Co-PIs: Gerry Gilmore[1370], Sofia Randich[1336]
CoIs: M. Asplund[1490], J. Binney[1611], P. Bonifacio[1588], J. Drew[1668], S. Feltzing[1473], A. Ferguson[1649], R. Jeffries[1132], G. Micela[1344], I. Negueruela[7609], T. Prusti[1278], H-W. Rix[1489], A. Vallenari[1345], D. Aden[1473], L. Affer[1344], J-M. Alcala[1340], E. Alfaro[1392], C. Allende Prieto[1393], G. Altavilla[7530], J. Alves[1893], T. Antoja[1422], F. Arenou[1588], C. Argiroffi[1883], A. Asensio Ramos[1393], C. Babusiaux[1588], C. Bailer-Jones[1489], L. Balaguer-Nunez[1821], B. Barbuy[1828], G. Barisevicius[1376], D. Barrado y Navascues[1088], C. Battistini[1473], I. Bellas-Velidis[1556], M. Bellazzini[1329], V. Belokurov[1370], M. Bergemann[1490], G. Bertelli[1343], K. Biazzo[1335], O. Bienayme[1582], J. Bland-R. Blomme[1650], C. Boeche[2112], S. Bonito[1344], S. Boudreault[1242], J. Bouvier[1449], I. Brandao[1200], A. Brown[1716], J. de Brujine[1278], M. Burleigh[1244], J. Caballero[8545], F. Calura[1197], R. Capuzzo-Dolcetta[1857], M. Caramazza[1344], G. Carraro[1261], [490], S. Casewell[1244], S. Chapman[1370], C. Chiappini[1135], Y. Chorniy[1376], N. M. Cignoni[7530], G. Cocozza[7530], M. Colless[1017], R. Collet[1490], M. Collins[1489], M. Covino[1340], D. Crnojevic[1649], M. Cropper[1242], M. Cunha[1200], F. Damiani[1344], . Delgado[1392], S. Duffau[2112], S. Van Eck [1358], B. Edvardsson[6181], H. Enke[1135], N.W. Evans[1370], L. Eyer[1377], B. Famaey[1582], M. Fellhauer[1824], I. Ferreras[1242], G. Fiorentino[1422], E. Flaccomio[1344], C. Flynn[2044], D. Folho[1200], E. Franciosini[1335], A. Frasca[1341], K. Freeman[1139], Y. Fremat[1650], B. Gaensicke[1241], J. Gameiro[1200], S. Geier[5677], D. Geisler[1824], B. Gibson[1197], A. Gomboc[1995], A. Gomez[1588], rnandez[7609], J. Gonzalez Hernandez[1393], E. Grebel[2112], R. Greimel[1423], M. [50], F. Grundahl[1368], M. Guarcello[1312], B. Gustafsson[2079], P. Hadrava[1116], D. [1559], N. Hambly[1649], P. Hammersley[1258], C. Hansen[2112], M. Haywood[1588], U. Heiter[6181], A. Helmi[1422], G. Hensler[1893], A. Herrero[1393], V. Hill[1591], S. Hodgkin[1370], N. Huelamo[8545], A. Huxor[2112], R. Ibata[1582], M. Irwin[1370], R. Jackson[1132], R. de Jong[1135], P. Jonker[1660], S. Jordan[2112], C. Jordi[1821], A. Jorissen[1358], D. Katz[1588], D. Kawata[1242], S. Keller[1139], N. Kharchenko[1135], R. Klement[1489], A. Klutsch[1803], J. Knude[1966], A. Koch[1244], O. Kochukhov[6181], M. Kontizas[1560], S. Koposov[1370], A. Korn[6181], P. Koubsky[1116], A. Lanzafame[1874], R. Lallement[1588], P. de Laverny[1591], F. van Leeuwen[1370], B. Lemasle[1422], G. Lewis[2044], K. Lind[1490], H.P.E. Lindstrom[1966], J. Lopez santiago[1803], P. Lucas[1668], H. Ludwig[2112], T. Lueftinger[1893], L. Magrini[1335], J. Maiz Apellaniz[1392], J. Maldonado[1803], G. Marconi[1261], G. Matijevic[1995], R. McMahon[1370], S. Messina[1341], M. Meyer[1377], A. Miglio[1359], S. Mikolaitis[1376], I. Minchev[1135], D. Minniti[1801], A. Moitinho[8848], N. Molawi[1583], Y. Momany[1261], L. Monaco[1261], M. Montalto[1200], M.J. Monteiro[1200], R. Monier[5695], D. Montes[1803], A. Mora[1350], E. Moraux[1449], T. Morel[1359], A. Morino[1490], N. Mowlavi[1583], A. Mucciarelli[7530], U. Munari[1343], R. Napiwotzki[1668], N. Nardetto[1824], T. Naylor[1130], G. Nelemans[1638], S. Okamoto[1616], S. Ortolani[6311], G. Pace[1200], F. Palla[1335], J. Palous[1116], E. Pancino[1337], R. Parker[1377], E. Paunzen[1893], J. Penarrubia[1828], I. Pillitteri[1312], G. Piotto[1343], H. Posbic[1588], L. Prisinzano[1344], E. Puzeras[1376], A. Quirrenbach[2112], S. Ragaini[7530], D. Ramano[1337], J. Read[1377], M. Read[1649], A. Recio-Blanco[1591], C. Reyles[1592], N. Robichon[1588], A. Robin[1592], S. Roeser[2112], F. Royer[1588], G. Ruchti[1490], A. Ruzicka[1116], S. Ryan[1668], N. Ryde[1473], G. Sacco[1645], N. Santos[1200], J. Sanz Forcada[1456], L.M. Sarro Baro[5688], L. Sbordone[1139], E. Schilbach[2112], S. Schmeja[2112], O. Schnurr[1135], R. Schoenrich[1490], R-D. Scholz[1135], G. Seabroke[1242], S. Sharma[2044], G. De Silva[1017], R. Smiljanic[1258], M. Smith[1616], E. Solano[8545], C. Soubiran[1592], S. Sousa[1200], A. Spagna[1346], M. Steffen[1135], M. Steinmetz[1135], B. Stelzer[1344], E. Stempels[6181], H. Tabernero[1803], G. Tautvaisiene[1376], F. Thevenin[1591], J. Torra[1821], M. Tosi[1337], E. Tolstoy[1422], C. Turon[1588], M. Walker[1312], N. Walton[1370], J. Wambsganss[2112], C. Worley[1591], K. Venn[2061], J. Vink[1111], R. Wyse[1419], S. Zaggia[1343], W. Zeilinger[1893], M. Zoccali[1801], J. Zorec[1361], D. Zucker[1477], T. Zwitter[1995]

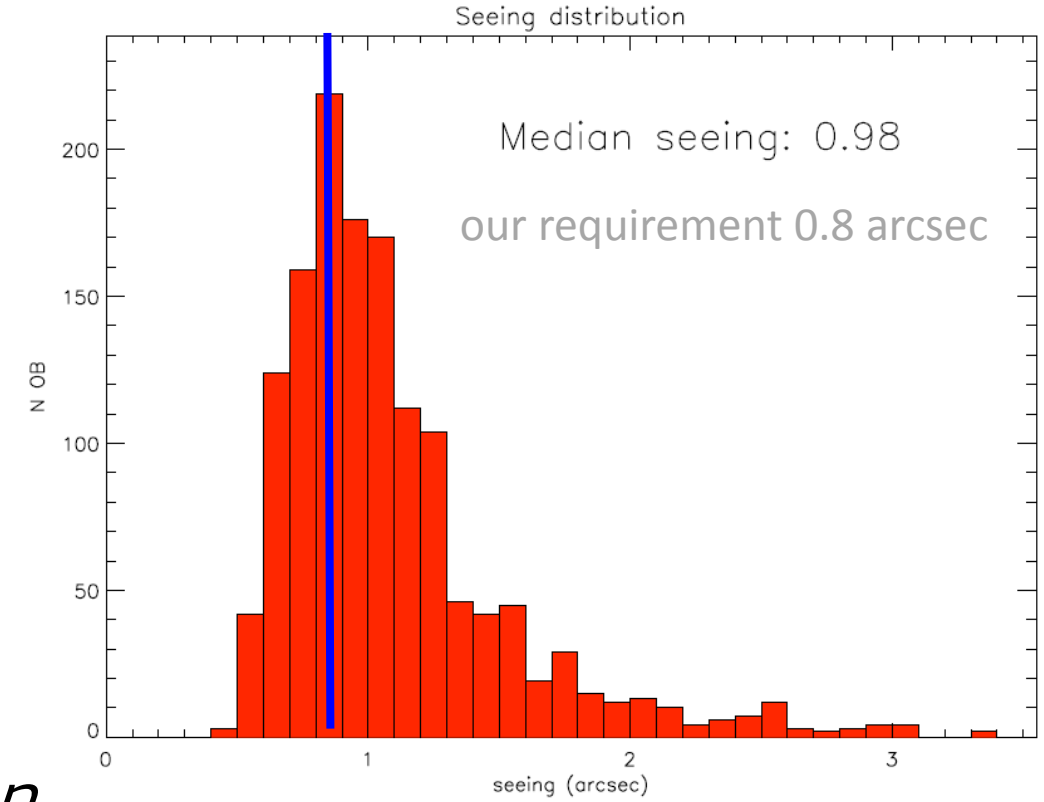
Outline

- Observations and target sample
- Operations
- Analysis cycles and releases
- Management
- Science …-only a few remarks
- Focus on open cluster progress

Observations - statistics

- 31 observing runs completed (since Jan. 2012) = 172/300 nights
- time lost: 15 % weather, 2.4 % tech., 2.8 % ToOs → 35 nights



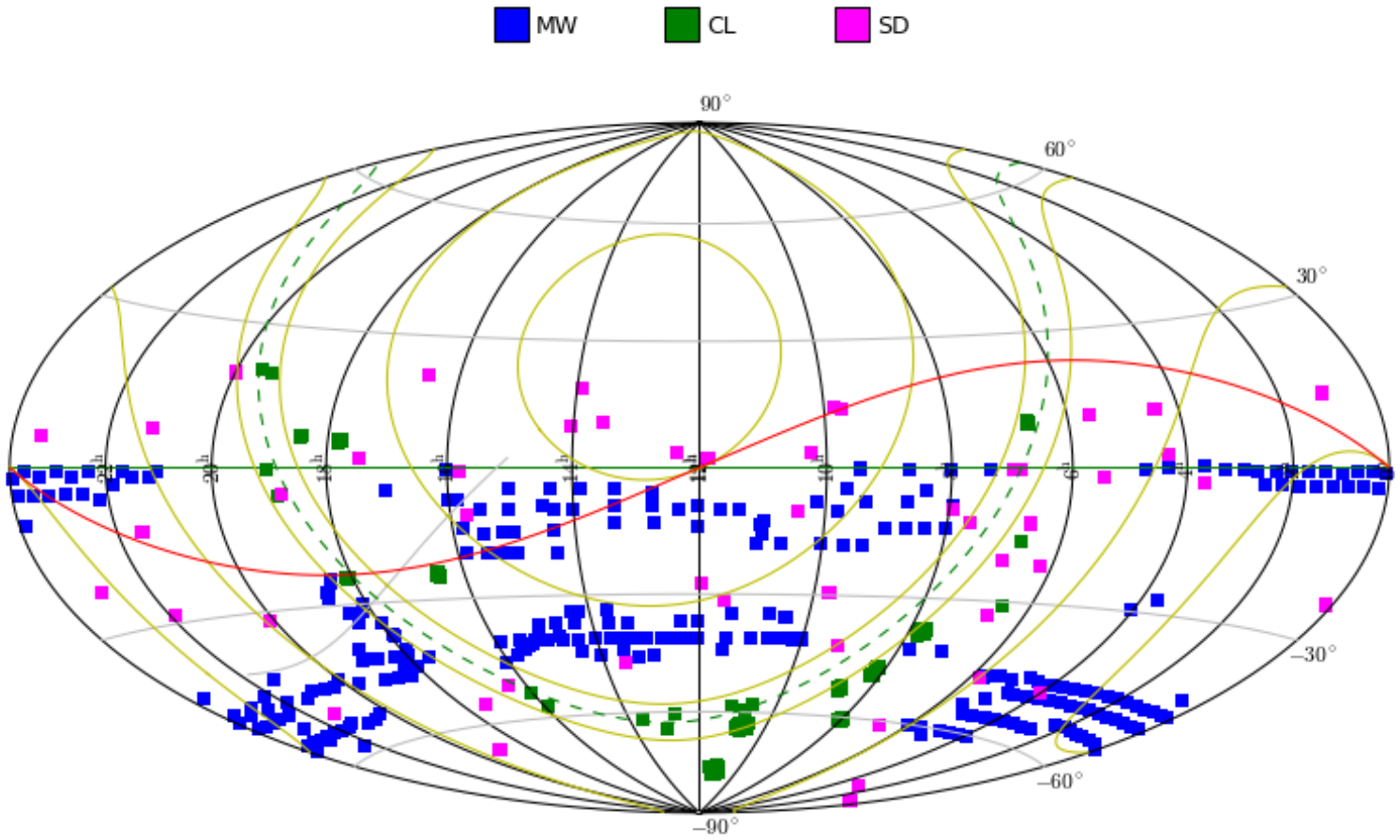


Statistics updated up to next to the last run

Observations – target sample (up to July 2014)

- **~53,000** (21,000 CL) science targets
- ~48000 Giraffe (int. res), ~5000 UVES (high res)
- **> 5000 calibrators** (RVs, benchmarks, GCs, CoRoT giants)
- **27** open **clusters** completed/started
- Wide **variety of MW fields:** outer thick disc --> Bulge
- Several **x 1000 spectra** from **ESO archive**
- **SNR** distributions **"stable"**

Observations – target sample



Operations (3 cycles completed, cycle 4 starting)

- Data Reduction and RVs:
  - **CASU:** 8 Giraffe setups - new pipeline developed –**ok**, but sky subtraction; goal **RV accuracy achieved**
  - **Arcetri:** 3 UVES setups - partnership with ESO –**ok**; 520nm not perfect yet

- Spectrum Analyses and homogenization
  - Model atmospheres, synthetic spectra, and line list (version control) **-ok**
  - Implementation of multi-purpose Fixed Format FITS template**–ok**
  - WG recommended parameters, through node result combination **-ok**
  - Top-level Survey-wide homogenisation team –**ok, achieved for DR2 APs**
  - **CoRoT** analysis proceeding in **parallel**
  - **iDR4 kick-off meeting (Sept. 2014):** several things to be improved identified

- Edinburgh Archive (WFAU): **–ok (but long timescales),** new data-model for iD4

See talks by A. Korn, R. Blomme, C. Davenhall, T. Masseron, K. Lind, P. Jofre

Analysis cycles and releases

Internal releases of spectra
RVs, photometry, etc.

Internal releases of products

Releases to ESO

Analysis cycles

Analysis cycles and releases

INTERNAL RELEASES OF SPECTRA RVS, PHOTOMETRY, ETC.

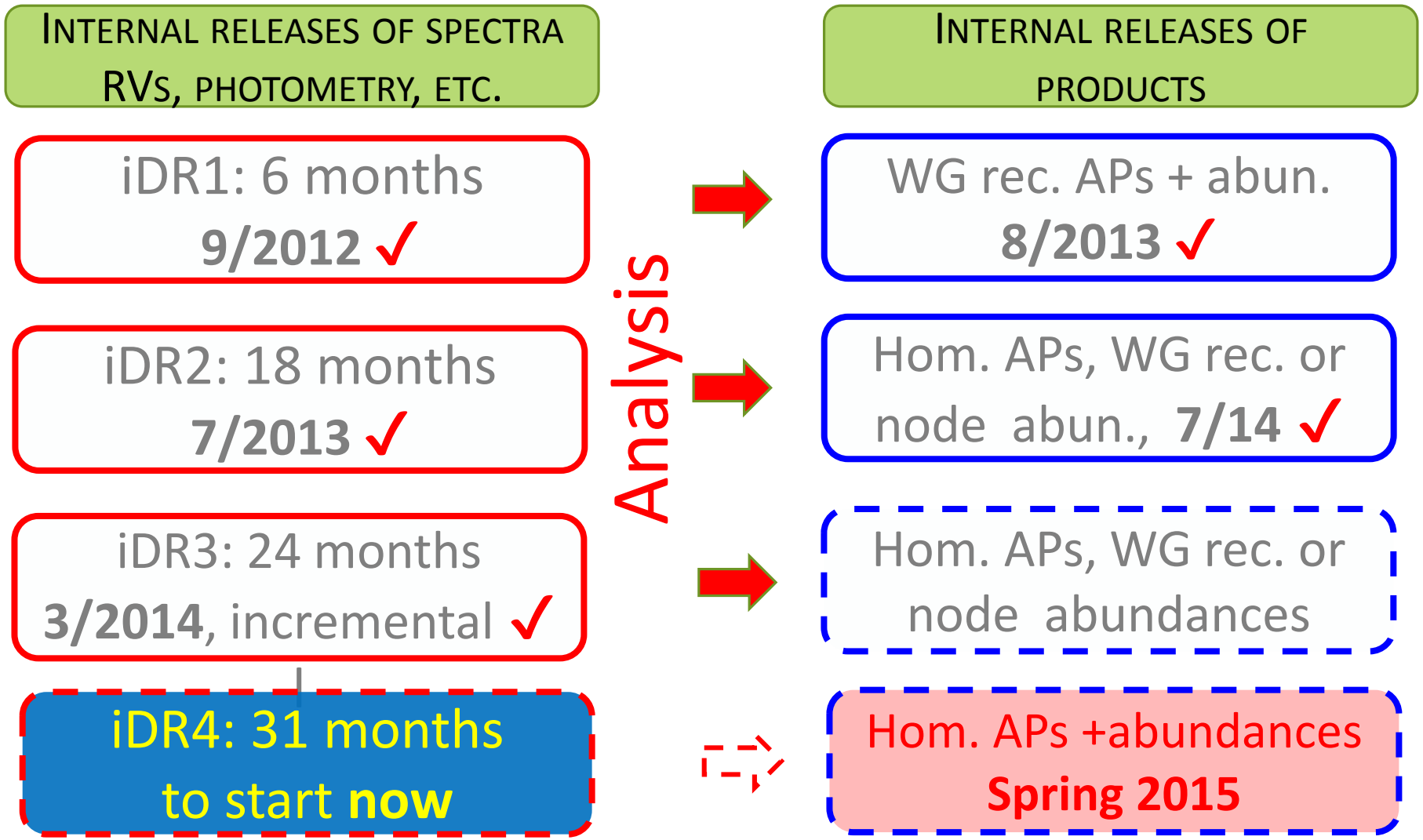
iDR1: 6 months
9/2012 ✓

iDR2: 18 months
7/2013 ✓

iDR3: 24 months
3/2014 incremental ✓

iDR4: 31 months
to start **now**

Analysis cycles and releases



Analysis cycles and releases

Internal releases of spectra RVs, photometry, etc.	Internal releases of products	Releases to ESO
iDR1: 6 months **9/2012** ✓	WG rec. APs + abun. 8/2013 ✓	
iDR2: 18 months **7/2013** ✓	Hom. APs, WG rec. or node abun., 7/14 ✓	selected iDR1 spectra **8/2013 (11/2013)** ✓
iDR3: 24 months **3/2014** incremental ✓	Hom. APs, WG rec. or node abundances	spectra up to Dec. 2013; iDR2 and iDR3 products. **< 15/2/2015**
iDR4: 31 months to start **now**	Hom. APs +abundances Spring 2015	

Management

- Last **SC meeting Feb. 2014 –** no major issues since then
- PI telecons with spectrum analysis WGs since iDR3
- **ESO/PSSP 2nd year review**:
  - ► report sent at the beginning of **April 2014**
  - ► review at ESO on **April 30 2014**: **EXTREMELY POSITIVE FEEDBACK →**

*The **Gaia-ESO** survey is a **particularly notable success**….the decision to force a **collaborative effort** between two initially disjoint proposals….proved **advantageous** for all concerned. The **legacy value of the survey data seems incontestable now that Gaia is operating successfully in orbit.** Gaia-ESO has currently completed about 1/3 of their envisaged programme, and it will be **important that they get sufficient time (including weather compensation) to complete** systematic coverage of Milky Way populations as originally envisaged.*

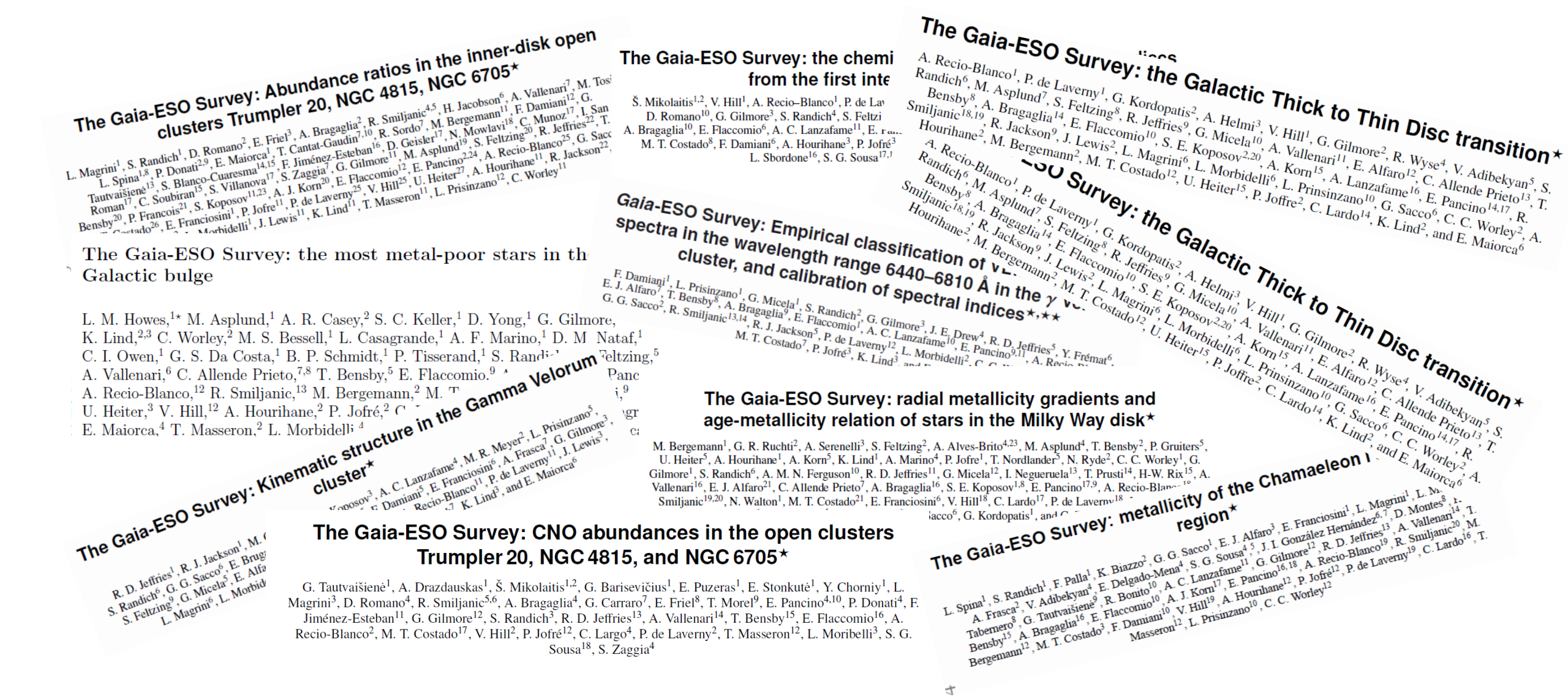
- **Standard report** to ESO/OPC submitted on **Nov. 4**

SCIENCE EXPLOITATION

this meeting !

Science exploitation - statistics

- Bottom up approach: 100++ CoI science **projects** posted on wiki
- **32 refereed papers** (2/3 published/accepted) since August 2013; science + data release papers; several papers lead by students/young post-docs
- 4 A&A highlights + 3 A&A cover pages
- 2 Messenger articles
- Several presentations at meetings



Top level science goals addressed + many unanticipated results

Publication policy reminder

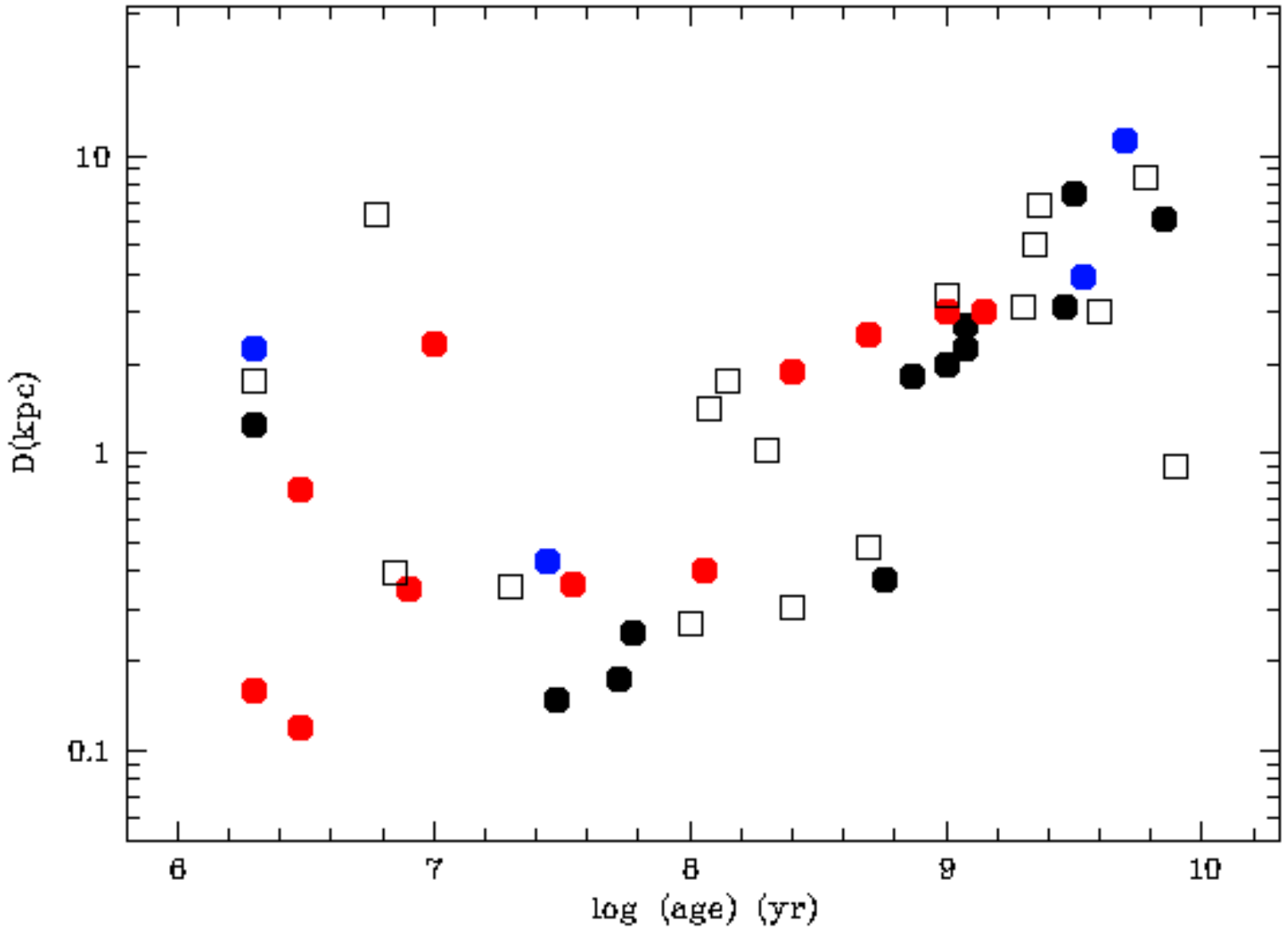
The only astrophysical parameters which may be analysed in a publication are the "best" parameters: photometric, spectroscopic, astrophysical parameters, elemental abundances, velocities, etc, and their random and systematic uncertainties, held in the Survey archive. Publication based on any other data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

- Note: **"best" parameters are not necessarily WG15 recommended** one; **instructions** on the parameters that can be used are **given** by the PIs in the release announcement
- **ask** the PIs **before** writing papers

Update on open clusters

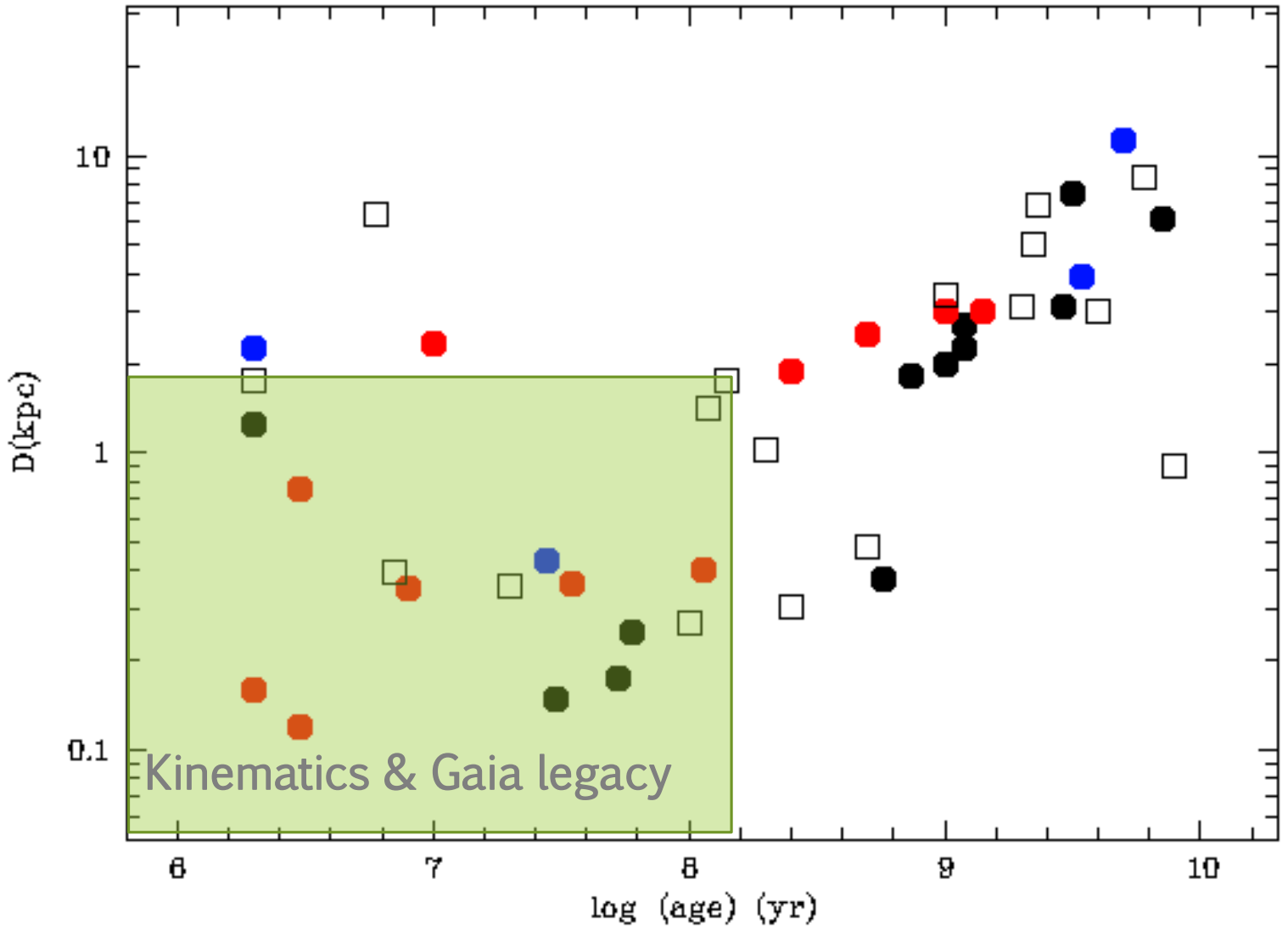
Observed cluster sample

- iDR2
- iDR3
- iDR4
- protected



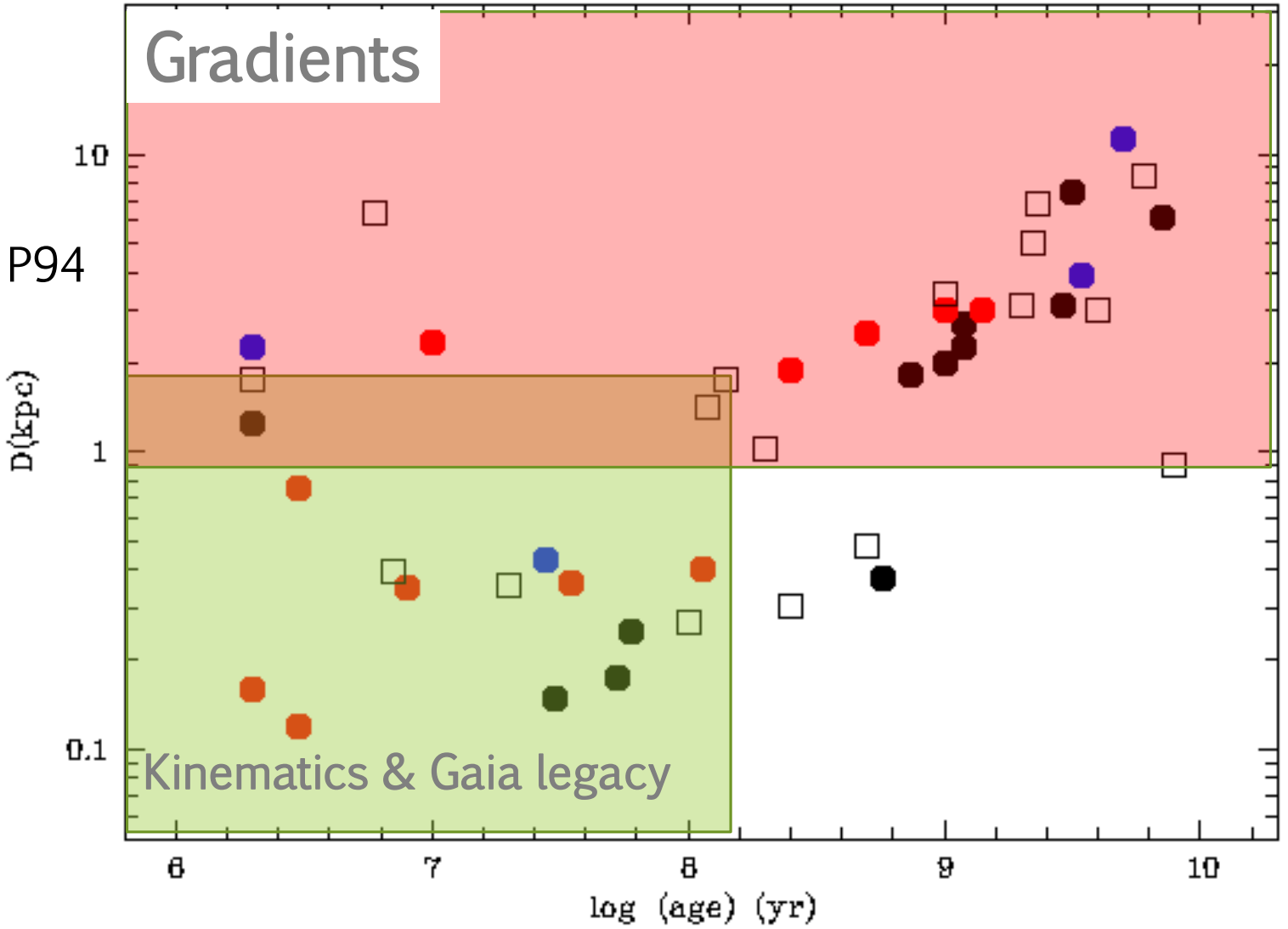
Observed cluster sample

- iDR2
- iDR3
- iDR4
- protected



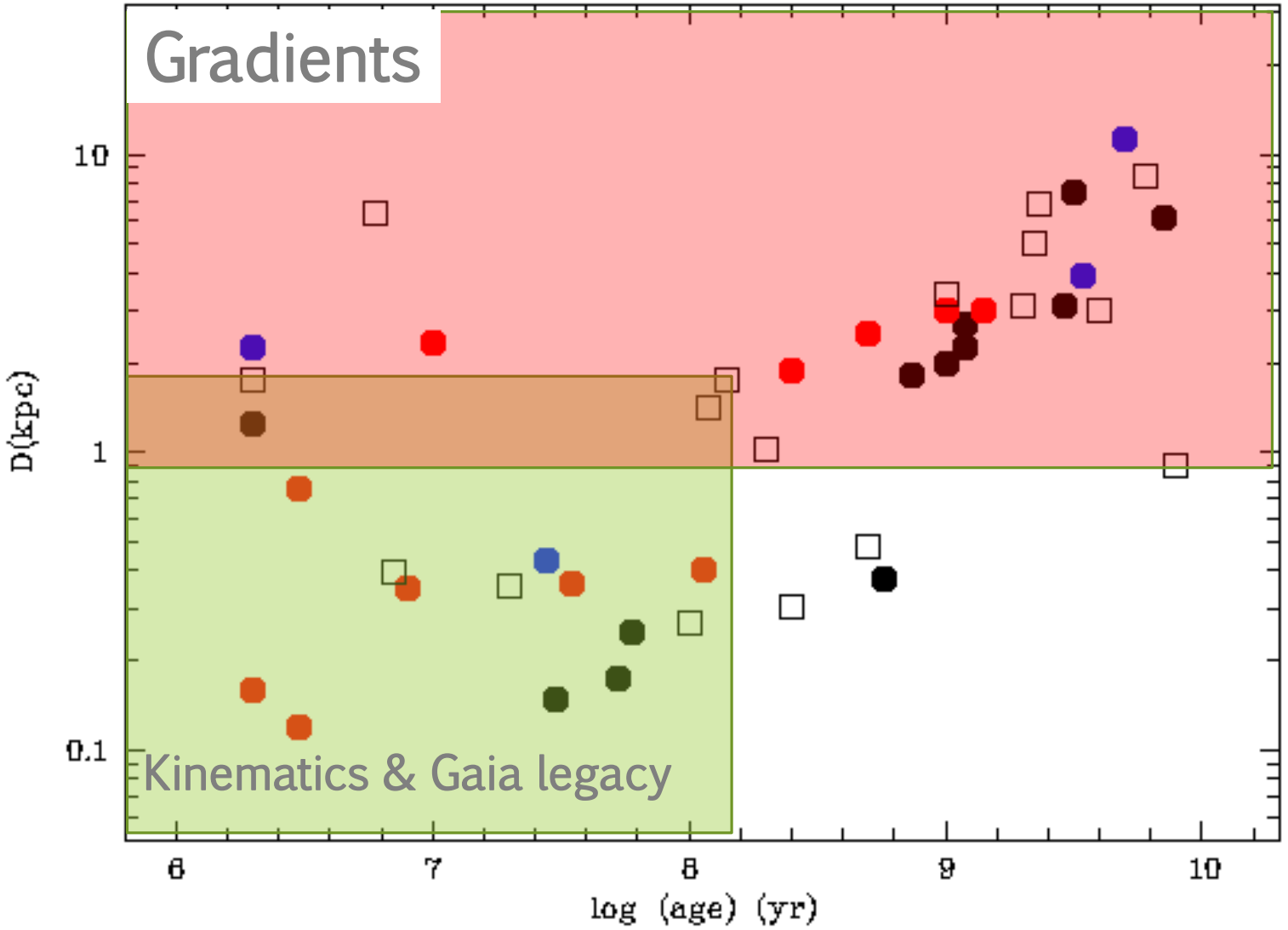
Observations – cluster sample

- iDR2
- iDR3
- iDR4
- protected for P94 and P95



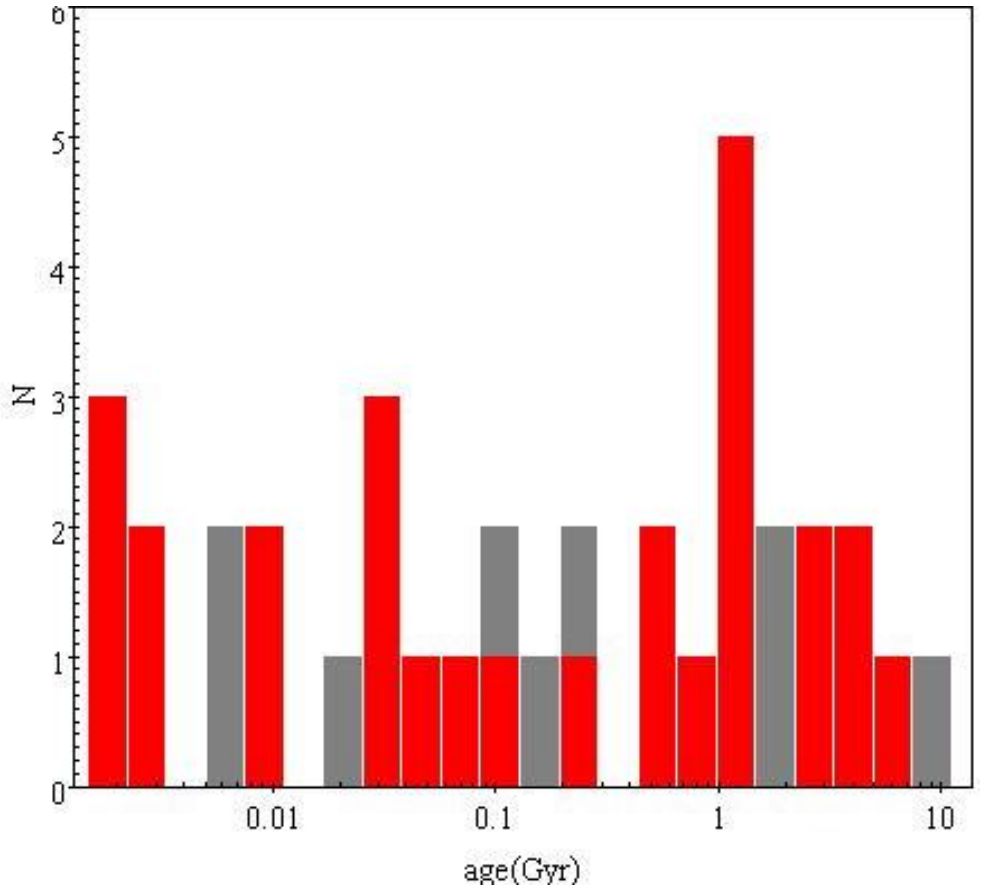
Observed cluster sample

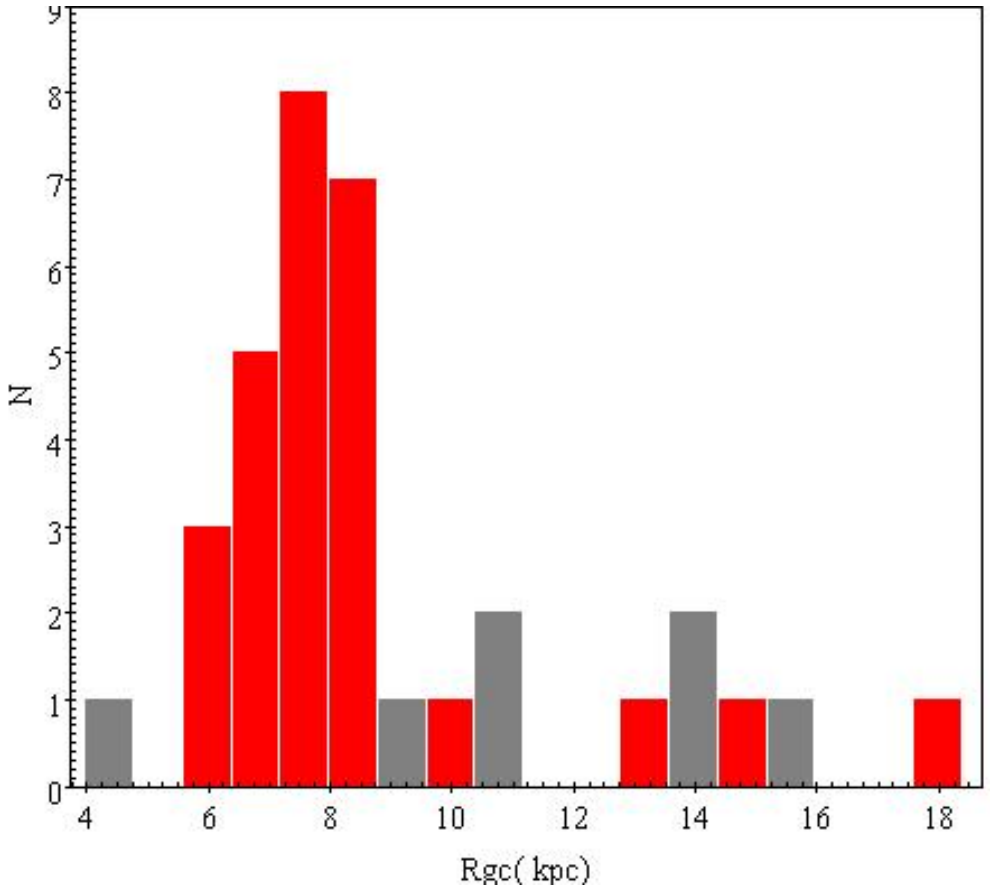
- iDR2
- iDR3
- iDR4
- protected



All: stellar evolution

Observed cluster sample





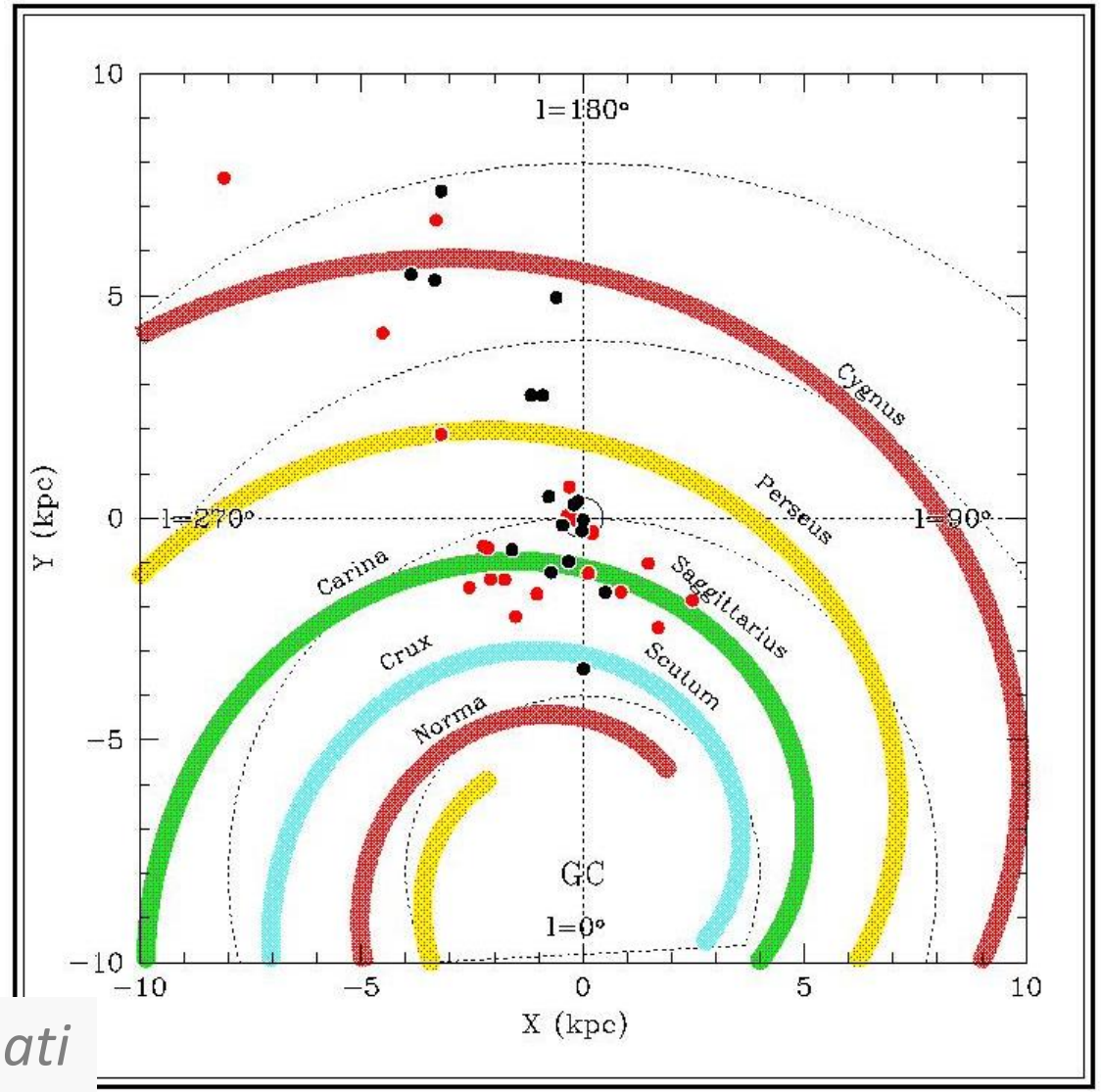
Observed

Protected

Observed cluster sample

Observed
Protected

z sampling to be improved



Courtesy L. Magrini & P. Donati

How are we doing – observing strategy

All stellar-types (O-M dwarfs;MS-evolved giants) ✓

Unbiased for **Giraffe** ✓ → only 20 – 40 % confirmed as members

High prob. members for UVES : **ok** for **old clusters** (90% members), too **few** members (20-50 %) for **young clusters**

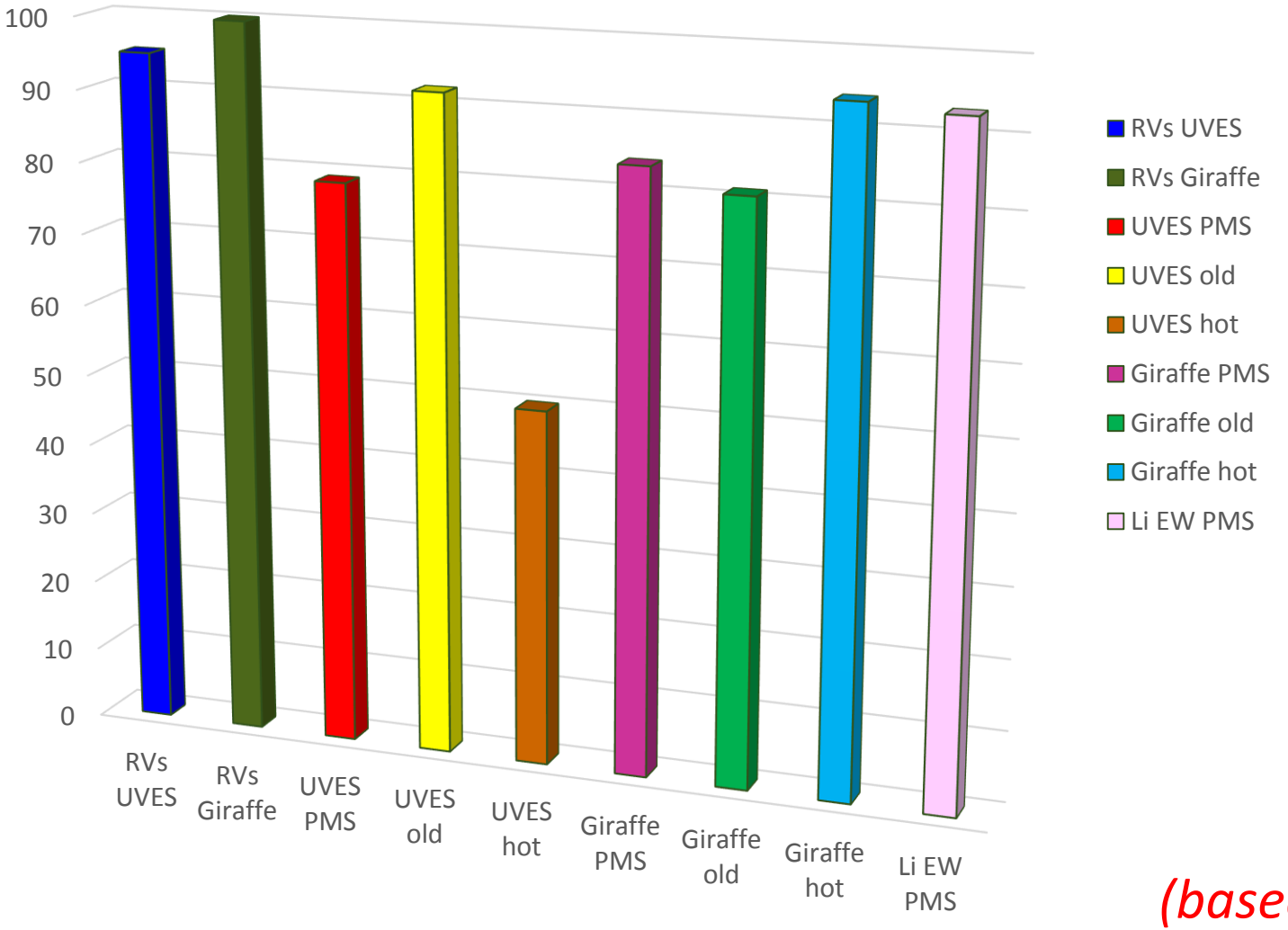
Uniform across clusters ✓

Sample also **external** cluster **regions** ✓

High level of contamination: novel science results confirm that this is an excellent strategy. But we should scientifically exploit the contaminants!

How are we doing – RVs and parameters

% of stars with parameter determined (independent of accuracy)



- Excellent fraction of stars with parameter determination (including log g from HR15N!)
- RV accuracy close to the original goals
- APs and abundance accuracies and precisions to be improved

(based on iDR2+iDR3)

How are we doing – science

Top level science goals addressed + many unanticipated results

Concluding remarks

- Gaia-ESO is nominally half-way, but 20 % time lost
- We are on track, although several aspects can/should be improved (e.g., accuracy of APs/abundances, calibrations, timescales,..)
- iDR4 (spectra until July 2014) is starting → products in the Spring
- ESO is so far happy with us
- Excellent science! Looking forward to many more results during this meeting and in the next months!
- ….and looking forward to feedback on any aspects