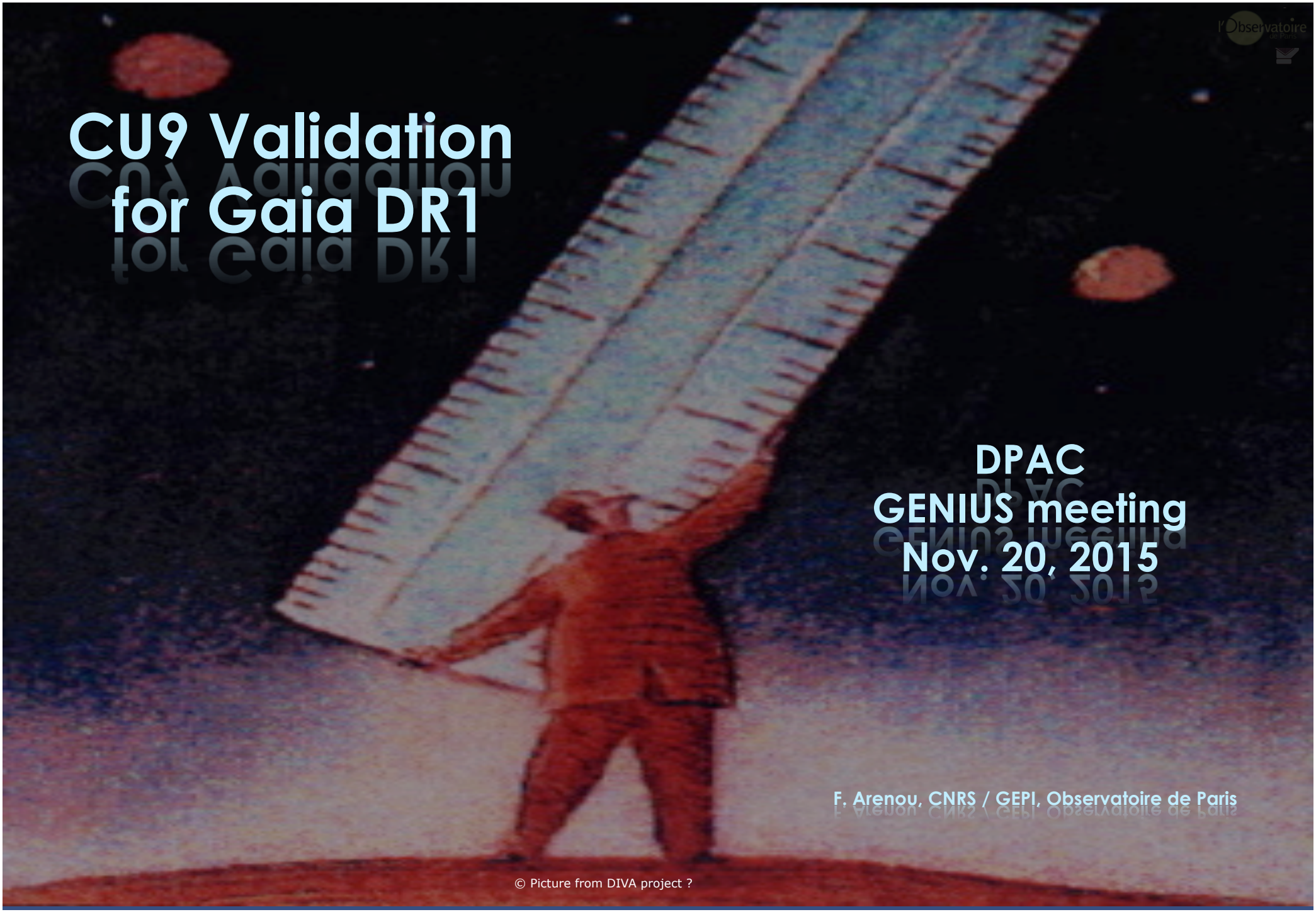


CU9 Validation for Gaia DR1

DPAC GENIUS meeting Nov. 20, 2015

F. Arenou, CNRS / GEPI, Observatoire de Paris

© Picture from DIVA project ?

CU9 / Genius Work Packages

- 942 – Internal tests
  - C. Fabricius (Univ. Barcelona)
- 943 - Comparison to models
  - A. Robin (Utinam, Besançon)
- 944 - External catalogues
  - C. Babusiaux (CNRS/OPM)
- 945 - Statistical & graphical
  - A. Helmi (Groningen), M. Manteiga
- Special objects:
  - 946 – Variability
    - L. Eyer, S. Blanco (U. Geneva)
  - 947 - Clusters as tools
    - A. Vallenari (INAF)
  - 948 - Solar system objects
    - P. Tanga (OCA)
- 520 – Looking for troubles
  - F.A./K. Findeisen (CNRS/OP-GEPI)
- 530 – Simulation vs reality
  - A. Robin/H. Ziaeepour (CNRS/Utinam)
- 540 - External catalogues
  - C. Babusiaux (CNRS/OP-GEPI)+CSIC+KU
- 550 - Statistical & graphical
  - CNRS/OP-GEPI+FFCUL
- Transversal (special obj.):
  - 563 – Variability
    - L. Eyer (UG)
  - 562 - Multiple stars
    - D. Pourbaix (ULB)
  - 561- Solar system objects
    - D.Hestroffer/M.Kudryashova(CNRS/IMCCE)

Activity

- Work summary
  - Design + R&D + implementation of tests
    - Validation Test Specification (VTS) reference document (100+ tests)
    - TGAS solutions availability changed completely our schedule
  - Creation of simulated Catalogues
    - Based on AGISlab simulation added to astronomical data
  - Setting a validation environment S/W
    - Running at ESAC, sending back results
  - Done 2 TGAS validation rehearsals, with most WPs on-board
    - Validation Tests Report on TGAS_00.01, sent to Test Review Board
- Meetings
  - 3 plenary meetings (Vienna 2014., Meudon 2015, Barcelona 2015)
  - Telecon meetings with validation WP managers every 1.5 month
  - Once every 2 weeks within WP942/540

Documents and deliverables

Documents on Livelink

- GAIA-C9-MN-OPM-FA-063, Minutes of CU9 validation telecons 1-2, 2014, LL:FA-063
- GAIA-C9-MN-OPM-FA-064, Minutes of CU9 validation telecons 3-8, 2014, LL:FA-064
- GAIA-C9-SP-OAPD-AV-012, ICD for GWP947 Observational Auxiliary data, 2014, LL:AV-012
- GAIA-C9-SUM-OPM-IS-001, SUM for CU9 Validation-Common, 2014, LL:GAIA-C9-SUM-OPM-IS-001
- GAIA-C9-TN-UB-ELA-011, GAT Statistics for the old Attitude Star Catalogue - IGSL, 2014, LL:ELA-011
- GAIA-C9-TN-UB-ELA-012, GAT Statistics for the new Attitude Star catalogue, 2014, LL:ELA-012
- GAIA-C9-TN-UB-FJL-002, GAT development plan for CU9, 2014, LL:FJL-002
- GAIA-CO-TN-OPM-FA-062, Prototype of internal validation tools, 2014, LL:FA-062
- GAIA-C9-SP-OAPD-AV-016, WP-947 Cluster, Auxiliary data description for TGAS, 2015, LL:AV-016
- GAIA-C9-SP-OPM-FA-061, Validation Tests Specification (WP940), 2015, LL:FA-061
- GAIA-C9-SP-OPM-FA-066, Simulated TGAS data used for validation ICD, 2015, LL:FA-066
- GAIA-C9-TN-IUOB-HZ-001, WP943 validation code, Software Release Notes, 2015, LL:HZ-001
- GAIA-C9-TN-OAPD-TCG-001, Spatial variation precision of parallaxes in clusters, 2015, LL:TCG-001
- GAIA-C9-TN-OPM-KF-002, Calibration of Parallax Deconvolution Parameters for WP942, 2015, LL:KF-002
- GAIA-C9-TN-UB-ELA-017, Statistical validation of Gaia Archive, 2015, LL:ELA-017
- GAIA-C9-TN-UB-RMC-001, Besancon Galaxy Model Simulation for CU9-WP943 (BGMBTG 2.0), LL:RMC-001
- GAIA-C9-UG-OPM-IS-001, Software User Manual for CU9 ValidationTools, 2015, LL:IS-001

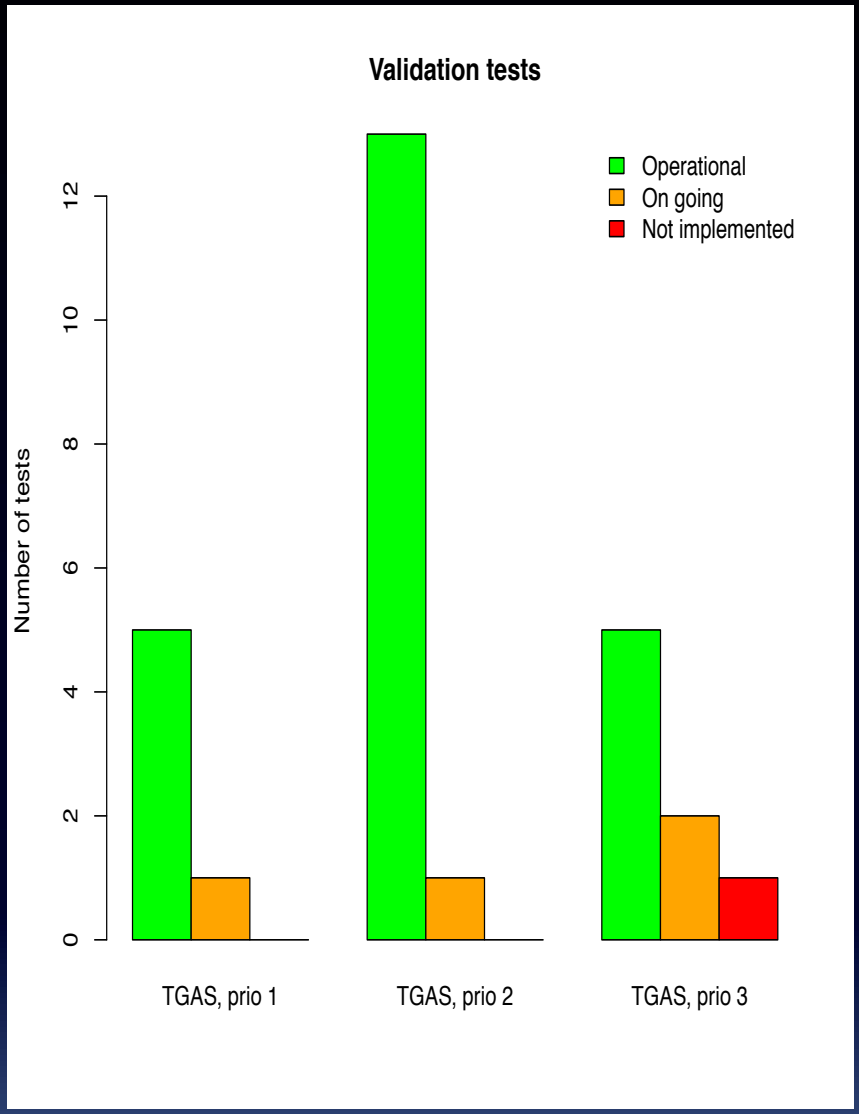
GENIUS deliverables

		Month after 2013-11 K.O.
D5.1	Delivery of prototype of internal checking tools (WP 5.2)	12
D5.2	Delivery of prototype model-based validation tools (WP 5.3)	18
D5.3	Delivery of of internal checking tools (WP 5.2)	24
D5.6	Delivery of prototype comp. with external catalogues (WP 5.4)	24

VTS: tests for TGAS subset

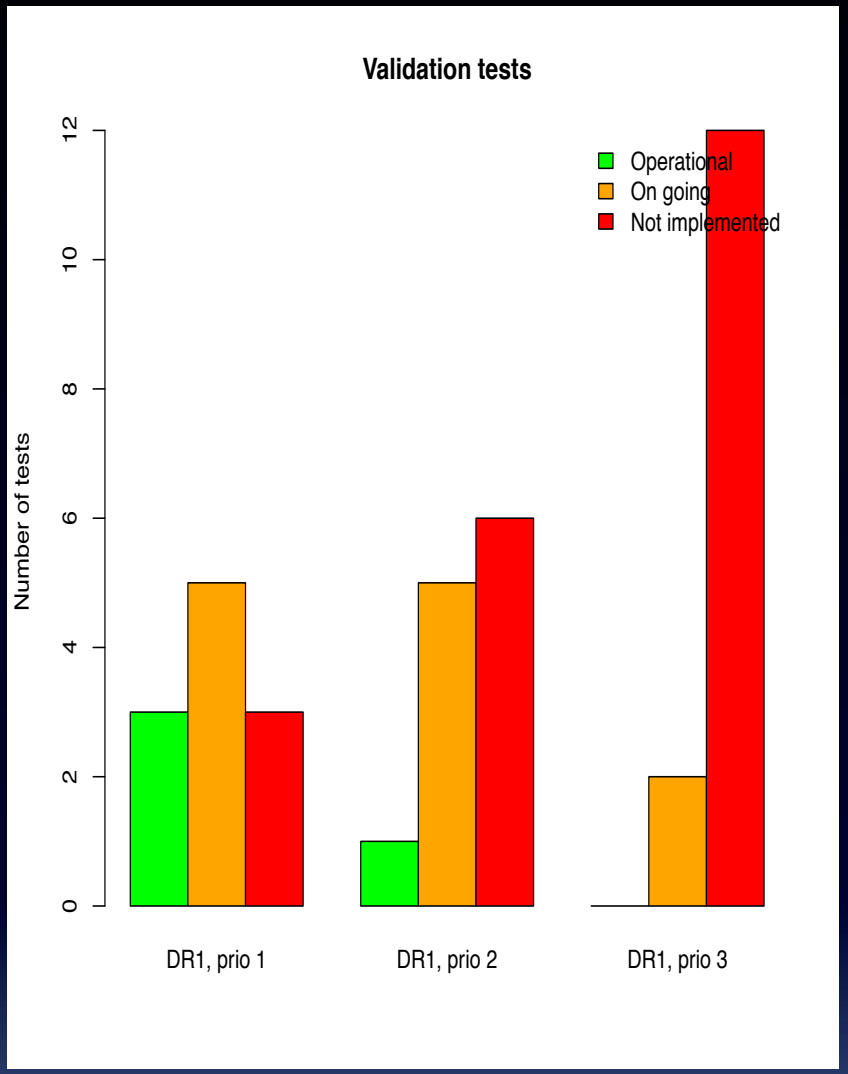
Summary of tests starting at Release TGAS

Test reference link	Description
WP942-VAL-310-040	Check of parameter continuity at gate transitions
WP942-VAL-340-010	Accurate formal parallax errors
WP943-VAL-040-020	Parallaxes distribution as a function of color vs GOG
WP944-VAL-030-003	Comparison to Hipparcos astrometry
WP944-VAL-030-006	Parallax zero-point and precision using very distant stars
WP947-VAL-010-030	Spatial variations and precision of parallaxes in clusters
WP942-VAL-120-020	Verify that the errors are consistent between each other.
WP942-VAL-210-010	Verify that there are no duplicate sourceIds.
WP942-VAL-210-020	Verify that there are no duplicates based on the object location.
WP942-VAL-310-080	Detection of groups of proper motion (PM) outliers
WP942-VAL-310-090	Detection of isolated proper motion (PM) outliers
WP942-VAL-310-100	Check consistency in proper motions (PM) and parallax
WP942-VAL-310-110	Testing Negative Parallaxes (NP)
WP942-VAL-310-120	Check consistency of astrometric error distributions
WP943-VAL-030-010	Mean and higher moments of proper motion components in magnitude bins
WP943-VAL-030-020	Histogram of proper motion components versus color
WP943-VAL-040-010	Parallaxes distribution in magnitude vs GUMS and GOG
WP944-VAL-030-002	External proper motions
WP944-VAL-030-004	Known high proper motion stars
WP947-VAL-010-010	Proper motion accuracy for distant clusters
WP942-VAL-110-010	No fields equal NaN.
WP942-VAL-110-030	All values fall within the specified range.
WP942-VAL-110-050	Check that the astrometric correlation matrix is a valid correlation matrix
WP944-VAL-010-003	Known issues for specific stars
WP944-VAL-030-001	External parallaxes (and proper motions)
WP944-VAL-030-005	Parallax zero-point and precision using external distances
WP944-VAL-060-003	QSO parallax and proper motions
WP944-VAL-070-001	Consistency of fit properties for multiple stars



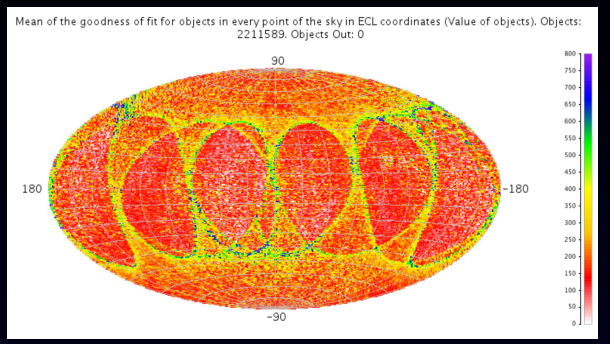
VTS: tests for the rest of DR1

Summary of tests starting at Release I	
Test reference link	Description
WP942-VAL-110-070	Check that astrometric data quality is not excessively poor.
WP942-VAL-120-011	Source brightness inconsistent with Tycho ID.
WP942-VAL-320-021	Verification of completeness of bright magnitudes.
WP944-VAL-010-001	Sky homogeneity
WP944-VAL-010-002	Catalogue detailed completeness
WP944-VAL-010-005	Visual binaries completeness
WP944-VAL-050-001	Colour relations
WP944-VAL-060-001	QSOs identification from cross-identification; sky distribution
WP944-VAL-060-002	QSOs detailed completeness
WP944-VAL-060-004	ICRF2
WP946-VAL-010-010	Variability detection accuracy of CU7 variability for EPSL processing
WP942-VAL-110-040	All array fields have the correct length
WP942-VAL-110-060	Check that there are fewer astrometric outliers than data points.
WP942-VAL-310-050	Verification of the alpha and delta distributions
WP942-VAL-310-060	Spatial variations of parallax (and other) zero point
WP942-VAL-320-020	Verification of completeness in magnitude.
WP942-VAL-320-030	Verification of detectability vs angular separation
WP942-VAL-330-020	Angular correlation function
WP942-VAL-340-020	Correlations consistent with formal covariance
WP942-VAL-430-030	Bad cross-matching (high proper motion star, non-single star).
WP944-VAL-010-004	Problematic areas
WP946-VAL-010-020	Variability classification accuracy of CU7 with the EPSL data
WP947-VAL-010-050	Photometric tests
WP942-VAL-120-031	Plausible space velocities
WP942-VAL-220-010	Verify that there are no artifacts, including near bright stars
WP942-VAL-220-020	Verify that there are no faint stars very close to bright stars
WP942-VAL-230-020	Wide binaries have common proper motions
WP942-VAL-310-070	Goodness-of-fit statistics follow their intended error distributions
WP942-VAL-320-010	Verify that there are no missing source or holes
WP942-VAL-320-011	Verify that there are no missing data values.
WP942-VAL-430-060	Evaluation of the frequency distribution of the first digit and the first decimal
WP942-VAL-430-080	Spurious IGSL doubles
WP943-VAL-030-030	Decomposition to spherical harmonics and the power spectrum of distributio of l and b average proper motion in bins of G magnitude in Healpix bins of sky
WP944-VAL-070-002	Wide binaries
WP944-VAL-080-001	Galaxy sky distribution
WP947-VAL-010-020	Position accuracy for large clusters
WP944-VAL-070-003	Separation

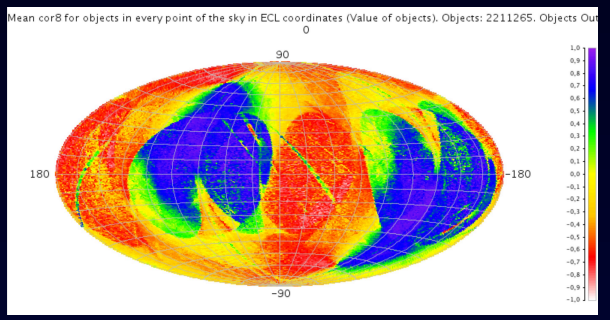


Lessons from TGAS 00.01 validation

- Scientific summary
  - TGAS_00.01 is a good preliminary solution
    - A `proof of concept' for the work done by DPAC
    - Several results passed on to CU3
  - A useful rehearsal for validation
    - Validation not fully ready, though working and effective: proving consistent scientific results
    - Gives indications of what should be improved now for validation as for Gaia solution
- Technical summary
  - New paradigm for the validation WP
    - Must now be prepared to several iterations (→ tests even more automated)
  - Excellent support from ESAC/SAT… and GENIUS
  - Validation software not fully ready
    - At least not for 1+ billion stars
    - But everything now on tracks!



Goodness of Fit (Ecliptic coordinates)



Correlation alpha-parallax

CU9 / Genius Work Packages

- Giving now the floor to two colleagues contributing to:

- 520 – Looking for trouble
  - F.A./K. Findeisen (CNRS/OP-GEPI)
- 530 – Simulation vs reality
  - A. Robin/H. Ziaeepour (CNRS/Utinam)
- 540 - External catalogues
  - Speaker: Y. Yamada (KU)
- 550 - Statistical & graphical
  - CNRS/OP-GEPI+FFCUL
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