**GWP-M-511-00000 (DU11): BP/RP flux extraction and initial data treatment –** Brown, Busso; **Pulone, Castellani, De Luise, Piersimoni**

**Sub WPs: DU11-N-11: PhotPipe: Crowding Evaluation**

De Luise (INAF - OATeramo), close to the end of his contract, has made a general revision of all the crowding evaluation (and the rough structure of decontamination already developed), both for code and JavaDoc documentation. The technical note about the crowding evaluation algorithm has been reviewed as well and presented to all the co-authors and finally to the CU5 responsible for publication in CU5. De Luise, after a selection procedure, won a new position to continue the work on the algorithm and the code development for crowded evaluation.

**Sub WPs: DU11-N-12: PhotPipe: Template Library for Crowding Evaluation**

In order to (try to) make a step forward in the code verification, OATe team is going to integrate the data set from the datamodel CalSpecFovTransit, by extracting epoch calibrated spectra for the template library, the fundamental missing parameters like Gmag have been recovered from the GDR1.

This will lead to create an input for crowding evaluation that should be, though still ad-hoc/fake, nearer to a real scene than that already used in tests up to now.

**Sub WPs: DU11-D-02: PhotPipe: Per Transit Deblending**

Giuffrida (INAF Associated), Pulone, and Castellani (INAF - OARome) have worked in improving the algorithms adopted for the neural network approach in the validation of the deblended spectra (as already described in our previous reports). Namely, from several tests, they realised that - while thegeneral behaviour of the network was acceptable and also encouraging - occasionally some odd behaviour in the results demanded for a more accurate investigation. In attempting to figure out was wrong, they choose to select as input only a small collection of the entire set, in order to carefully inspect ”by eye” each adopted spectrum. This approach turned out to be fruitful, since they were able to individuate - and correct - several errors in the code, both large and small (some involving the added noise to the original spectra). It has to be said that such errors do not invalidate results presented in Bologna, since they were for the most part introduced in the work of optimization the code, that was carried on after the meeting. The ”new” behaviour of the net is being examined. Besides this main activity, they started to experiment with Weeka framework to test the random forest approach, as an alternative to the neural network.

The reference template library has been modified and recomputed due to minor bugs found.

**Sub WPs: DU11 Other Tasks and Issues**

The old contract of De Luise expired on June 30. Piersimoni accomplished the necessary administrative steps for a new contract and De Luise had a new position since August,1 st.

The early duration of this contract is up to the end of february 2017 but renewable until the middle of 2018.

**Related activities**

Coordination telecons have been organized/attended by all the team members every two weeks. De Luise, Pulone, Castellani, and Piersimoni attended to GDR1 day press event at the ASI-headquarters . FDL and AP organized one-day meeting on Gaia Data Release 1 results, held at the INAF - Observatory of Teramo on September, 28th.

At this meeting have been invited. Pulone (from the OAR team) and the ASDC Gaia team (Marrese, Marinoni, Fabrizio andAntonelli), to present the ASDC Gaia Portal.

The aim was to present to the local scientific community the results already obtained by GDR1 and give tools to mine the database. Moreover the work done by Teramo and Rome teams on photometric pipeline has been shown with future developments.

On October, 14th Pulone attended to the GAIA Italian coordination group meeting held in in Bologna to discuss the needed actions for the next ASI contract.

**GWP-T-513-00000 (DU13): Instrument absolute response characterization, ground-based preparation** – **Pancino**, Altavilla, Bellazzini, Bragaglia, Cocozza, Galleti, Marinoni, Ragaini

**Management.** Altavilla’s TD contract was renewed for 12 months, until July 31 2017. Bellazzini took over the management of Gaia-DPAC funds for OABO because of Pancino’s relocation in Arcetri, nevertheless Pancino continues managing DU13 as usual. Regular weekly meetings were held (2-3 times per month) and will be regularly held in the future among DU13 members. Three SPSS archive meeting were held in this reported period.

**Interfaces.** Altavilla collaborated with Polish observers within the Gaia science alerts verification programme

**Observations.** Our observational campaign was formally concluded in July 2015.

**Data reductions.** Data pre-reductions (image de-trending and spectra extraction and wavelength calibration) were formally completed in the reporting period. New procedures for reducing fringing and for differential light loss correction were finalized and are now routinely applied. A Technical Notes documenting these further steps (GA-006) was submitted to Livelink and it is waiting for approval. New macros for the second order correction of these new products are under development as well as the pipelines for uploading them in the ASDC archive. The goal is to increase the data quality of the SPSS flux tables already delivered (V1, Summer 2015) and to add a few SPSS of spectral types A and M to the next release (V2, expected in Spring 2017), to improve the Gaia calibration model.

**Data Analysis.** The short-term constancy monitoring analysis was completed, and the results published in Marinoni et al. 2016, MNRAS, 462, 3616. Only 12 SPSS were rejected because of variability, including some stars that were widely used as flux standards in the literature like BD+174708, SA 105-448, 17403468, and HD 37725. The absolute magnitudes of SPSS observed in photometric conditions were measured, we are now assessing the internal and external uncertainties, and collecting the relevant literature measurements for the quality control.

**GWP-T-514-00000 (DU14): Instrument absolute response characterization, definition and application** – **Cacciari** (0.70 MM), Bellazzini (0.25 MM), Montegriffo (4.40 MM)

The first release of Gaia data (Gaia-DR1, 14 September 2016) contained the integrated G photometry,

which was calibrated via the zeropoint in the VEGAMAG system calculated using the nominal passband

and the mean internally calibrated data for 57 SPSS. For the sake of completeness, also the zeropoint in the AB system was calculated, as well as the BP/RP zeropoints, all based on the nominal passbands. These

values were then delivered to the MDB and included in the Gaia-DR1 (except the BP/RP zeropoints which were meant for DPAC internal use only). This work and results are described in detail in the corresponding papers (A\&A monographic issue) and online documentation (<http://gaia.esac.esa.int/documentation/GDR1/>) that accompany the data release.

Work continued on the development of the BP/RP instrument response model, and several tests were made using the mean internally calibrated spectra of 87 SPSS, to find the best way to model the passband cutoffs and hence obtain the best fit of the passbands. A solver based on a differential evolution algorithm was

developed to find the best fit set of model parameters independently from the values of the initial conditions. This work is in progress, and the results are relevant for the next data release DR2 planned for early 2018.

The mean instrument simulator to train the CU8 algorithms was completed, and the corresponding project

was created in SVN/DPAC/CU5/Software/Support/MIOG (MIOG=Mean Instrument Object Generator). This external calibration model for BP/RP mean spectra is of interest for CU5 to calibrate the spectra for future

data releases, and also for other CUs to fine-tune their procedures, e.g. CU4 (characterization of SSO), CU8 (estimate of astrophysical parameters) etc.

Regular monthly meetings with the CU5 Management Team were held via teleconference by Cacciari, as well as exchanges with CU8 members on MIOG issues. Internal meetings were held regularly to discuss, plan, organize and coordinate all aspects of the work to be done.

**GWP-T-517-00000 (DU17): Science Alerts – Altavilla**

A joint proposal (Bologna-Warsaw) for the Oct 2016-Jan 2017 semester was submitted on Sept 9 and accepted on Sept 22, 2016 (P.I. G. Altavilla) to continue using the Loiano telescope in a follow-up observing campaign of transient objects detected by the GSA. A significant amount of additional time has also been awarded to this programme to follow an intriguing binary microlensing event (Gaia16aye).