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Newsletter #112, January 22nd 2020

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News from the front: ZTF Data Quality update from engineering (Roger Smith)

The engineering team continues to address a stream of problems which have arisen in the last year. These have included improvements to eliminate charge spillage, minimize charge tails after saturated stars, increase well capacity and recalibrate linearity. Here we list the current known effects. If you see other issues in the data please contact Andrew Drake and Roger Smith or, for pipeline issues, contact Frank Masci.

Recently fixed:

- **Dirty corrector:** Throughput was improved by ~3% on Dec 10, 2019 by cleaning the corrector. This event allows us to diagnose photometric errors caused by scattering when using the flat field screen.
- **Strong moiré pattern:** on Dec 18, 2019 we released a new waveform that synchronized the focus CCD readout to science CCDs, to remove most of the high frequency “fixed” pattern, which unfortunately was not always fixed in the long term and thus would often not subtract out.
- **Bad flats** after Dec 18. This was actually a loss of well capacity in all images due to a small clock timing error introduced while fixing the charge tails after bright stars, that somehow escaped notice in our tests. Fixed about a week ago.

Still active: (listed in likely order to be addressed)

- **Charge pooling** at edge of image area near serial register: this was probably a byproduct of the same problem that caused loss of well capacity and may be fixed already
- **Charge back-streaming** from serial register when a very bright star produced enough charge to blooming down a column then fills the serial register: a fix awaits night-time testing.
- **Corrupted overscans** when there are these very bright stars nearby: we currently think this is surface trapping in the saturated serial register which will go away when back-streaming is fixed.
- **Bright column in overscan:** Apparent mis-registration of image section with image.
- **Crosstalk:** This used to be unmeasurable (<1:100,000) but now is as bad as 1:5000. The number of channel pairs affected and severity has been steadily increasing for over a year on all CCD controllers. This is difficult to explain (and may be impossible to fix) without opening the dewar so after considerable effort, we decided to first fix the more tractable problems above.

- **Weak moiré pattern:** There appears to be a small residual of the moiré pattern which is not stable enough to subtract out. Andrew Drake is quantifying this. The engineering team will return to this only after addressing the crosstalk issue since the crosstalk fix is likely to suppress the interference that causes the moiré pattern.

Calibration issues:

- **Flat field stability:** Andrew Drake has documented time variability of flat field mean and spatial structure. There are significant long term effects but correlation is good in the short term so nightly flats should be working. The effect of scattered light is to be assessed using the cleaning on Dec 10 as a basis.
- **Spatial structure in photometric error map – CCD QE residual:** The “donut shape” seen in CCD QE pattern (particularly in R band) shows up at ~1% level in maps of the ratio of ZTF to PANSTARRS photometry (equivalent to “star flats”). We are struggling to understand the underlying physical mechanism. A similar effect would be expected in DECam data where dome flats are used but none is seen.
- **Spatial structure in photometric error map – dust spots:** Shadows of dust spots also appear in photometric error maps. We have reasonable hypothesis for the difference in sensitivity to dust measured with flat field screen close to the pupil and starlight. The strongest effects comes from dust close to the CCD and thus inaccessible, so post processing the photometry may be the only remedy in this case. However, regular cleaning of the filters may prove worthwhile since dust on external surfaces while producing a weaker effect does impact commensurately more pixels.

News from working groups

Galactic and M31 Science: “We have a few papers coming out soon on CVs, Be-stars, Microlensing events, an SdB-WD binary, a binary dWD and more. You can find the papers on the Twiki.

The Galactic Plane+LAMOST survey ended Jan-7. We got a total of 9676 epochs which were processed successfully and had reasonable limiting magnitudes and DIQ values. For our 44 fields, we obtained continuous cadence data (~2hrs), and for a subset of 17 field we obtained additional very high cadence data and reached a total of ~400 epochs.”

Cosmology with SNe Ia: “Members from the Cosmology, RCF and Relativistic Explosions WGs got together to discuss how we can coordinate current efforts aimed at improving lightcurves and create a joint standard for referencing data versions. We welcome anyone to participate. More information is available [here](#).”

Multimessenger:

GW detections: “No new GW detections were announced last week, other than one retracted event. However, the probability of ‘mass gap’ candidate S200115j to have included a neutron star and ejected material were both updated to 99%, increasing the likelihood of an observable EM counterpart. We triggered additional follow-up and reported new candidates through TNS and GCN circulars.”

Neutrino triggers: “It was another busy neutrino week, with two additional alerts. The first, IC200117A, was a very well-localized track, covering ~2 sq deg. We followed with ZTF, and identified 2 potential counterparts that we are still tracking. On Monday we got IC200120A, an extremely well-localised track (0.5 sq deg), but unfortunately poor weather has so far prevented us from observing.”

The papers corner:

Please keep us updated about your submitted/published papers, they will be advertised here.

Please send Joy Painter, the Astronomy Librarian at Caltech, links to papers as soon as they are published. They will be kept track of [here](#).

Spring ZTF collaboration meeting:

The spring 2020 collaboration meeting will take place March 23-25 in Berlin. Please have a look at the [meeting page](#) and register if you have not done so already. More information regarding the real-time multi-messenger workshop we will host after the collaboration meeting can be found [here](#).

Reminders:

- PublicAlerts: There is a [link](#) to the alerts archive on the [website](#)!
- Please help us keeping track of all the available softwares! A preliminary list is available on the [twiki](#). Let us know if you are building a software which you think could benefit (or be relevant to) a large portion of the collaboration.
- **ZTF general slack channel:** Please join through this [link](#)!
- If you want to get access to the **ZTF data** via the IRSA interface, please request data access to the communication coordinators: ztf.communication.coordinators@gmail.com
- **Archive GUI** now ready! The interactive image search, filtering and visualization tool is now ready ().
- The **ZTF Twitter account** is now active! <https://twitter.com/ztfsurvey> Re-tweet @ztfsurvey!
- To use the **url shortener**(e.g. during telecons, talks, in emails), navigate to <http://zwickj.tf/shorten> (username: ztf password:16chips) and type in the URL you want shortened.

- The **Wiki page** is active! Check it out at <http://zwicky.tf/wiki>. To request access, please email us at [ZTF.communication.coordinators@gmail.com](mailto:ZTF.communication coordinators@gmail.com)

“There’s no such thing as bad weather, only inappropriate clothing”

Ranulph Fiennes (clearly not an astronomer)

Have a great and productive week!

Igor and Erik