Status	No. of fields
Co-adds run	7788
Co-add Failed	111
Scattered (WCS)	1260
Successful co-adds	6528
SCP error	21
SSH error	9

Table A1. Statistics of errors and success for first complete run of co-add.

Status	No. of fields
Scattered (WCS)	1
Successful co-adds	7791
Corrupt Fits on disk	15
SCP/SSH error	0
Unknown error	5
Fits header error	4

Table A2. Statistics of errors and success for last complete run of co-add.

In this document we present some of the important points about the coadds which were not mentioned in the paper.

APPENDIX A: SCATTER IN IMAGES AND OTHER ERRORS

Here we present some of the problems which were faced while co-adding. During the co-addition of 7894 fields in the first run, it was noticed immediately that significant fraction of the fields were returning very large co-adds (in memory); size of >10GB as opposed to the ~75MB. Due to memory limitation, the run was immediately terminated and this problem was addressed. It turned out that it was due to arbitrarily large spread of images in those fields, that is the center position (RA, Dec) of each image in the field does not line up and rather are spread apart as shown in Fig. A1. As the SWarp software package will create a single output space, which will containing all the images, these final co-add output were often very large for some of the fields.

The problem was not solved in the meantime, hence a simple check in the SwarpA algorithm was added that, if the size of final co-add happens to be >700MB, that co-add will be deleted and will be logged for further investigation. In this run 6528 fields were successfully co-added and were of the size ≤700MB, 111 fields returned error message, mostly due to either, consisting no image with valid WCS or containing any corrupted file(s) and lastly remote access to around 30 fields failed.

A practical solution for the problem of scattered images was to ignore all the images which were separated by more than 1.5° from median center RA, Dec. If all the images are sorted in dictionary order by their center RA-Dec, the center Ra-Dec of the median image is define as center RA, Dec. By the final run, the issue of scattered images was resolved except for 1 field (N69041), and all there was no remote access error. Now header was added to include more information about the co-add. There few errors were encountered regarding updating the header and few of unknown nature. The Table A2 shows the final statistics.

APPENDIX B: COMPARING ALGORITHMS

We arbitrarily selected 50 images each from a few fields as the test sample for comparing the co-addition methods MontageA, MontageB, SwarpA, and SwarpB. We used SExtractor to identify all sources in the image, with the "DE-

Method	Input images 1		Input images 2		Input images 3	
	1.5σ	3.0σ	1.5σ	3.0σ	1.5σ	3.0σ
MAG_ISO						
MontageA	23.8	23.1	23.55	23.00	23.70	23.10
MontageB	23.9	23.2	23.90	23.20	23.85	23.20
SwarpA	23.7	22.9	23.40	22.85	23.50	22.90
SwarpB	23.5	22.9	23.50	22.90	23.55	22.90
MAG_ISOCOR						
MontageA	22.9	22.7	22.9	22.7	22.9	22.5
MontageB	22.9	22.8	23.0	22.7	22.9	22.4
SwarpA	22.8	22.5	22.7	22.4	22.7	21.8
SwarpB	22.7	22.5	22.7	22.4	22.3	22.4

Table B1. Limiting magnitude m_{lim} obtained with the four different methods, for three randomly chosen sets of 50 images each. We measured the isphotal magnitude (MAG_ISO) and the corrected isophotal magnitude (MAG_ISOCOR) with SExtractor, and use an arbitrary but constant zero point of 28.

TECT_THRESH" parameter set to 3.0[1]. We wish to compare the limiting magnitude of of the co-added images across the four methods. The methodology is explained in the paper. Table B1 shows the m_{lim} and m_{mode} for the different algorithms for these sets.

APPENDIX C: REJECTED IMAGES

By now fields are co-added by 2 types of runs. One where images will valid WCS are co-added and only those fields are accepted whose co-add size is less than 700 MB or fields which were rejected in the first run were co-added using images which had valid WCS and within 1.5 degree of median RA, Dec and hence all other images were rejected. There were initially 798145 (0.8 million) images, however only 740096 were used in co-addition of all the fields. Images were rejected mostly due to unreadable WCS, corrupted WCS and Center RA,Dec being far from median RA, Dec. The Fig. C1 shows the histogram of number of images rejected and fraction of images rejected per field.

APPENDIX D: CO-ADD SIZE

A pseudo measure of how good the co-add is can be determined by the size of the co-added image, either by number of pixels or by the memory size on disk. The larger the size of

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[1] Pixels that are 3σ above the local background are considered part of a star.
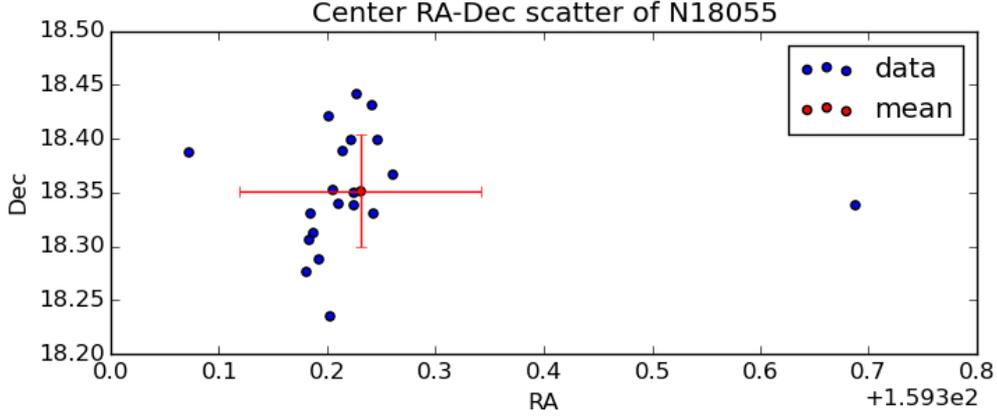
Figure A1. RA, Dec of center of different observation of the field named N18055.

the image implies more were the spread of the input images used in the co-add. As discussed before the ideally all images in one field must align exactly with each other, however for some reason their WCS shows that their location varied vastly. Now the reason WCS had information of a different location could be either image was purposefully taken for a different location or somehow the WCS saved had an error which lead to mismatch. At least one known case where 2 almost identical images had significantly different WCS. This was not further investigated and hence there might be a requirement to check WCS of some other images and re-co-add those fields. The Fig. D1 shows histogram of size of co-add images. The information which is not shown the plot is that 15 fields contain co-add of 2880 bytes and 305 fields containing co-add size more than 200 MB.
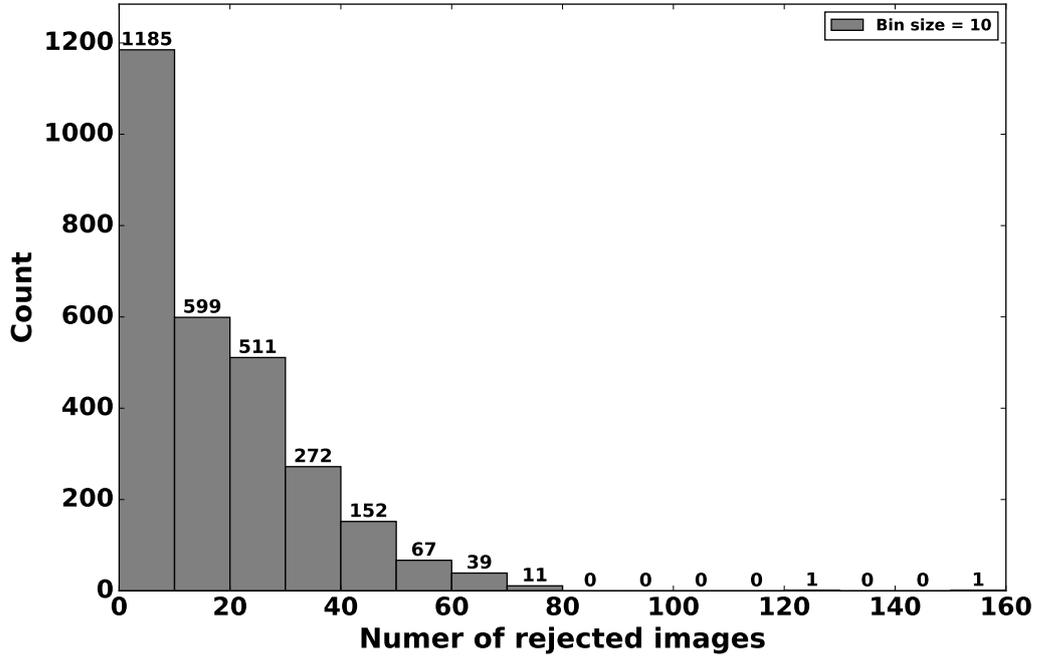
(a)
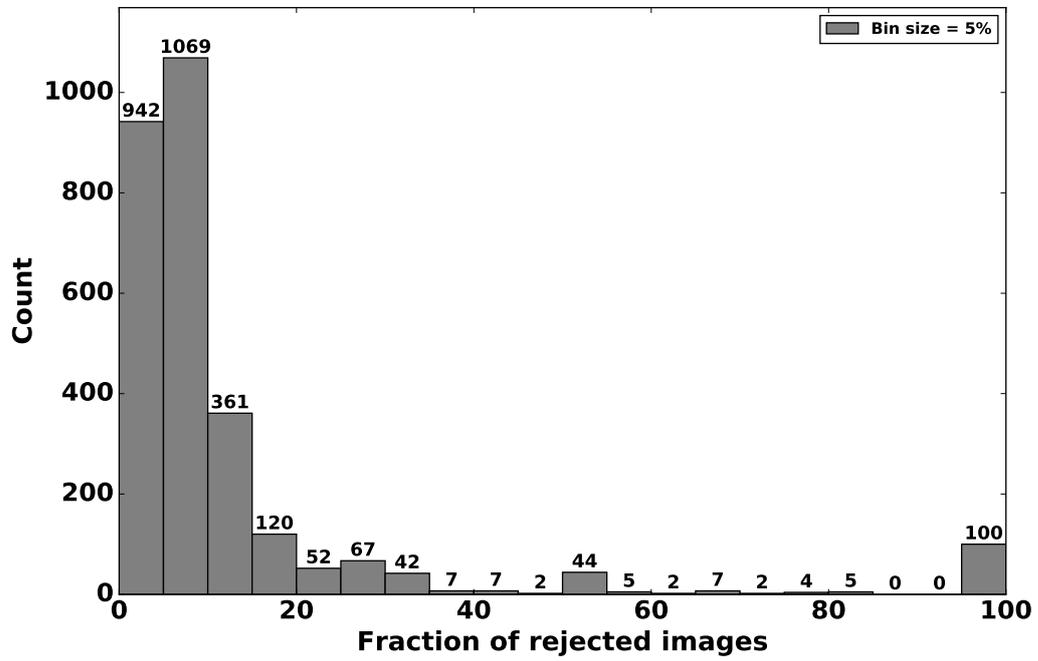
(b)

Figure C1. Histogram of the number of images discarded due to poor WCS and the fraction of images discarded respectively. Interestingly there are 100 fields for which all the images were discarded. These fields contain fewer than 12 images (mostly), except two.
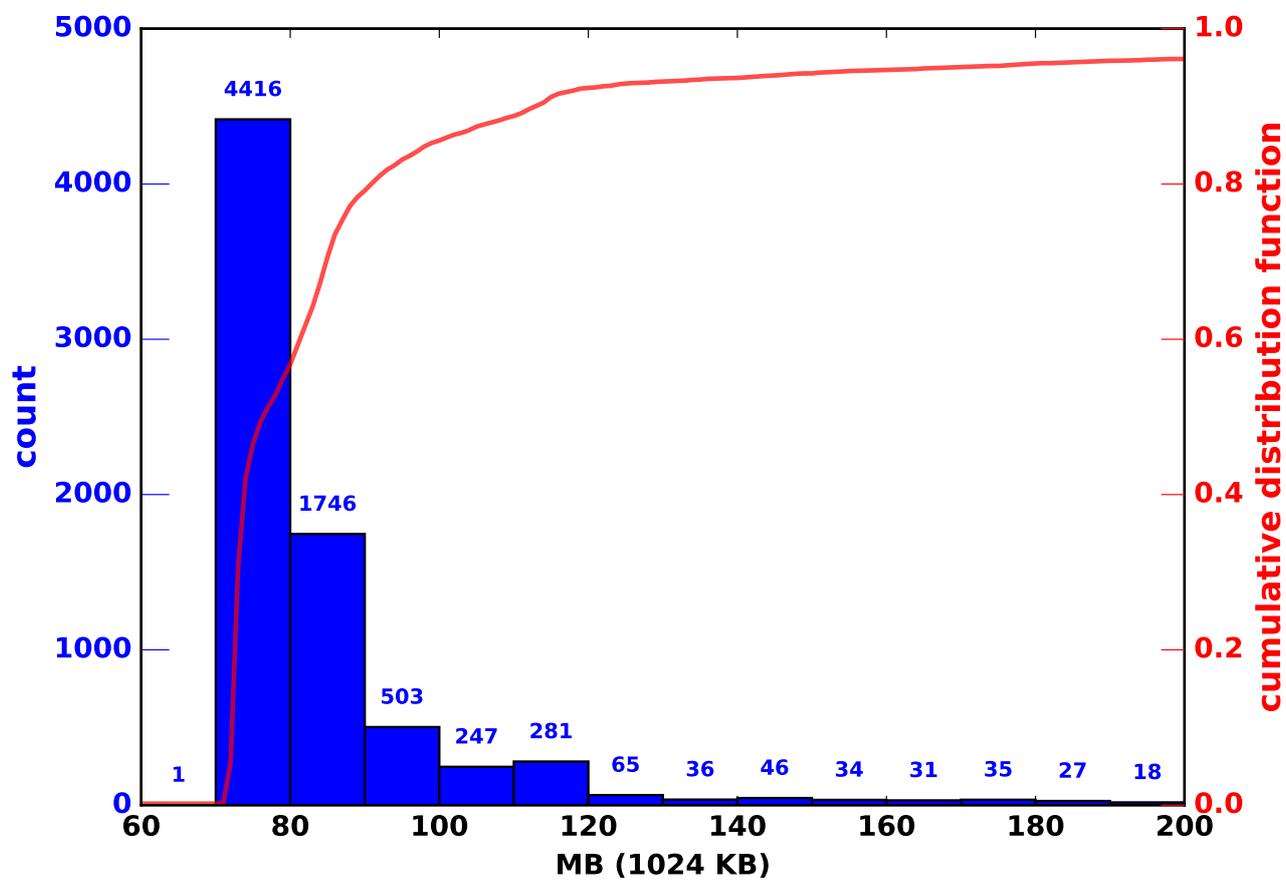
Figure D1. Histogram and cumulative distribution for the size (in MB) of the file co-adds