

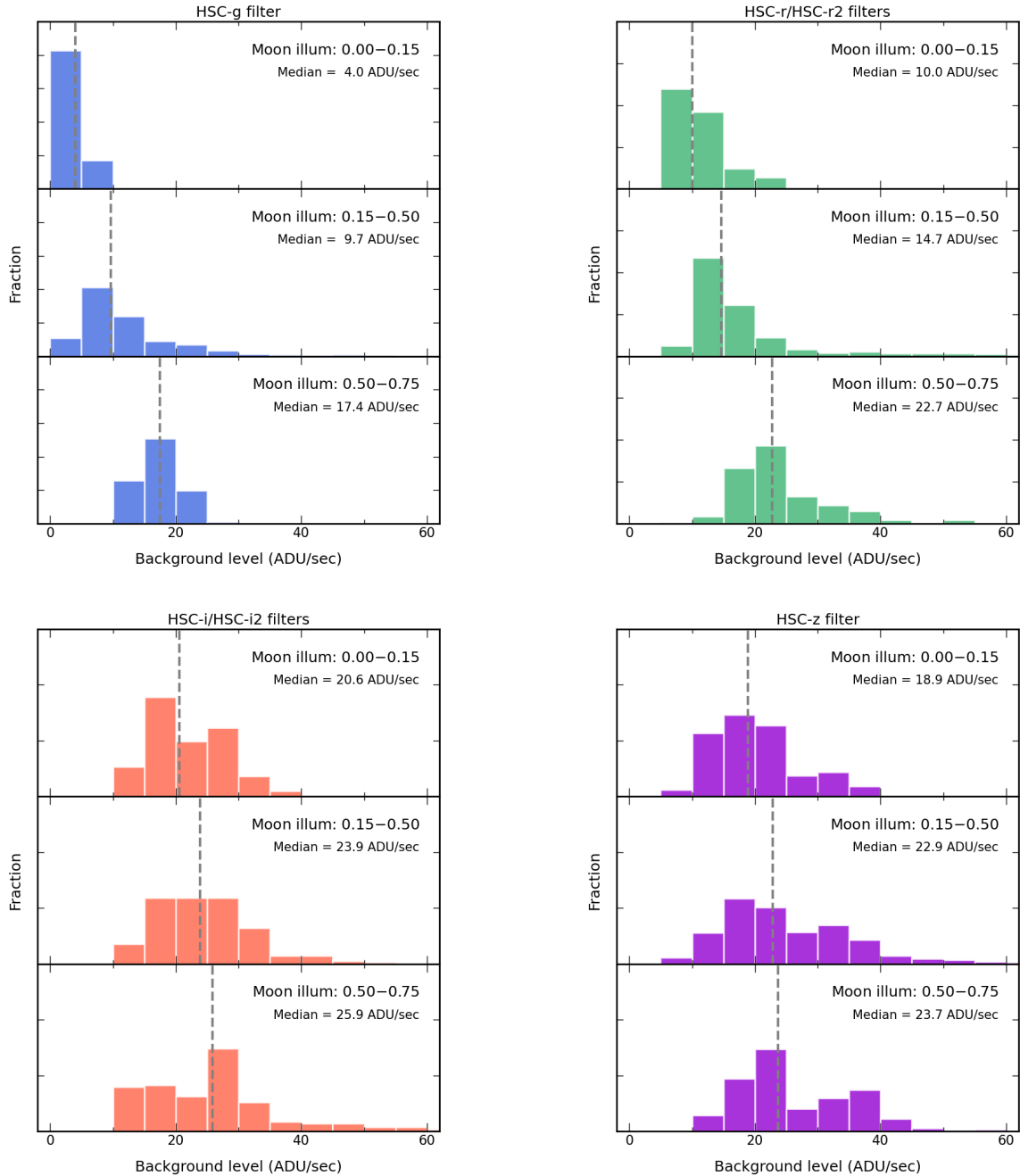
The effects of moon light on HSC images

T.Terai (Subaru Telescope)

January 2023

1 Background levels

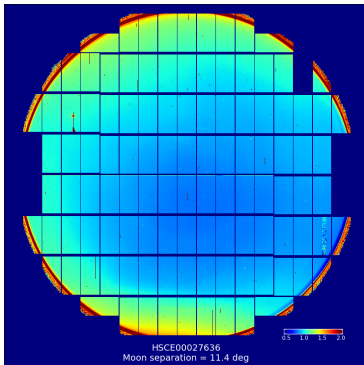
- Background levels of HSC data were statistically analyzed to investigate the effect of moon light on the images under the moon in half or brighter illumination.
- It was turned out that the background levels significantly increase with moon phase in the g and r bands, while there is only a slight difference between dark-gray (moon illum. = 0.15–0.50) and bright-gray (moon illum. = 0.50–0.75) nights in the i and z bands.
- The moon effect seems to be limited in the i -band and longer-wavelength filters.



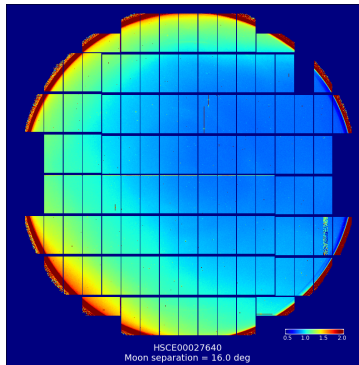
2 Stray lights

- The effect of scattering light from bright moon was investigated using the engineering data obtained on the night of March 31, 2015 UT with a moon illumination of 0.86.
- The images show that stray light is not significant even in the bright condition if the moon is at least $\sim 40^\circ$ away from the target field.

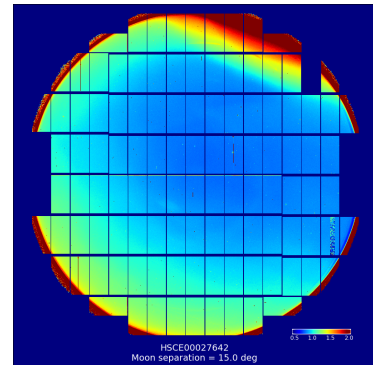
Moon separation: $10^\circ - 20^\circ$



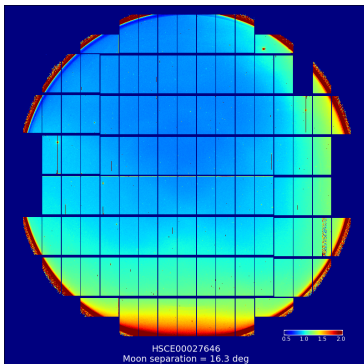
Moon sep = 11.4°



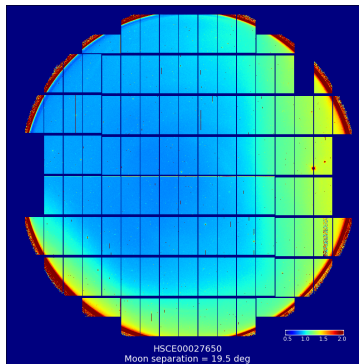
Moon sep = 16.0°



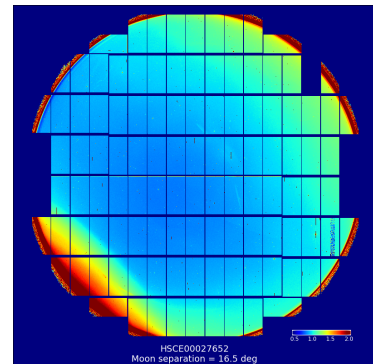
Moon sep = 15.0°



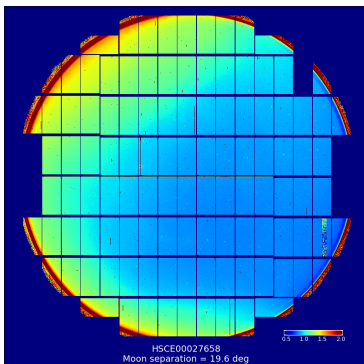
Moon sep = 16.3°



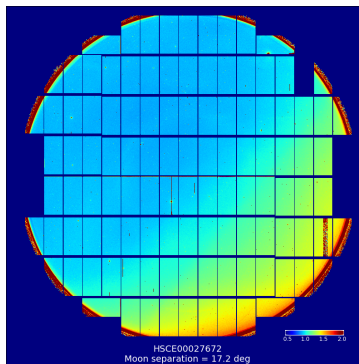
Moon sep = 19.5°



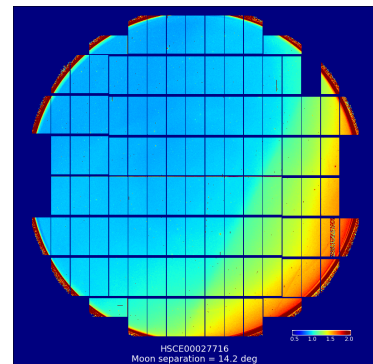
Moon sep = 16.5°



Moon sep = 19.6°

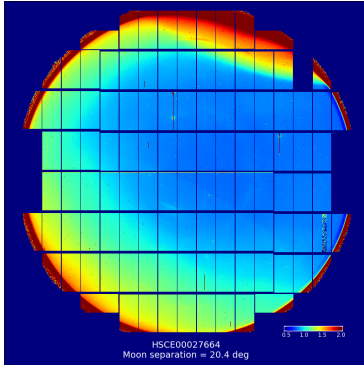


Moon sep = 17.2°

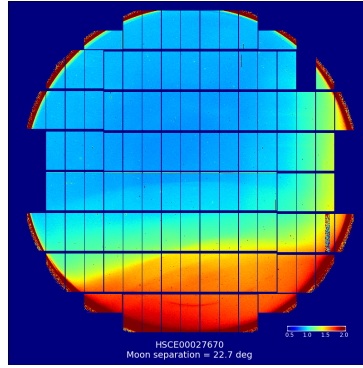


Moon sep = 14.2°

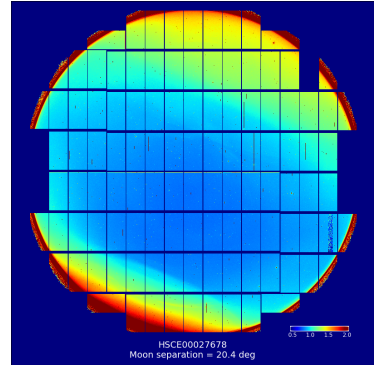
Moon separation: 20° – 30°



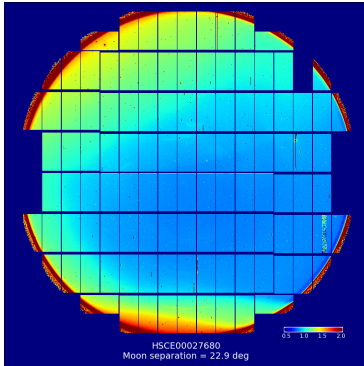
Moon sep = 20.4°



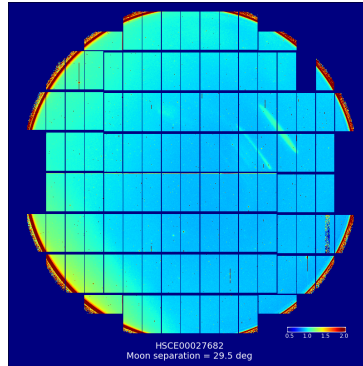
Moon sep = 22.7°



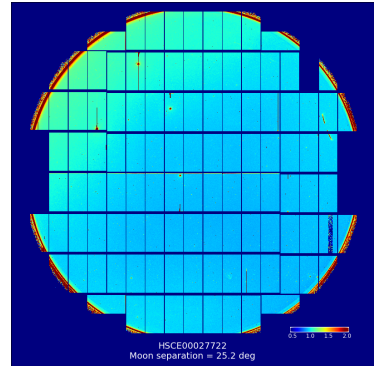
Moon sep = 20.4°



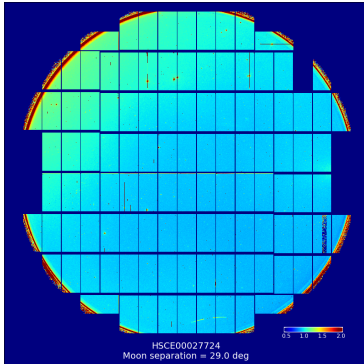
Moon sep = 22.9°



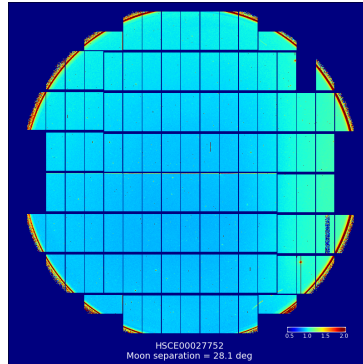
Moon sep = 29.5°



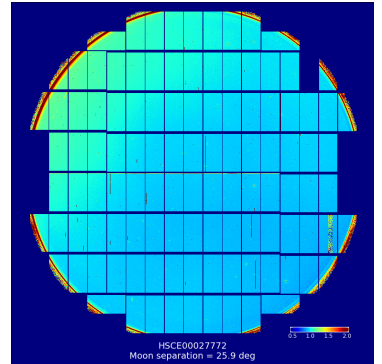
Moon sep = 25.2°



Moon sep = 29.0°

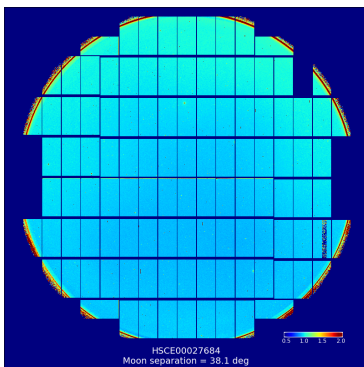


Moon sep = 28.1°

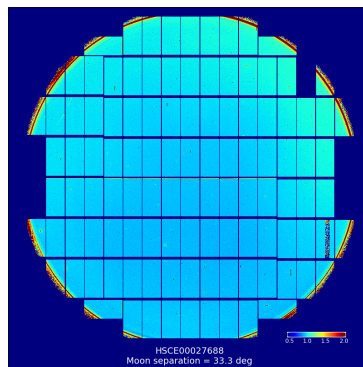


Moon sep = 25.9°

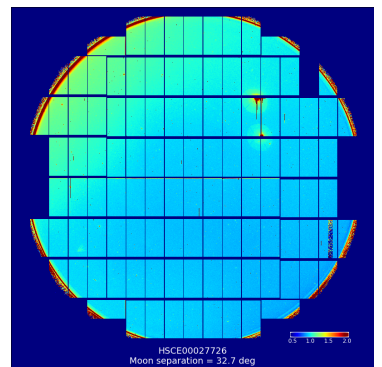
Moon separation: 30° – 40°



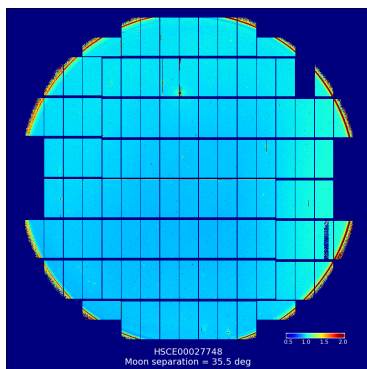
Moon sep = 38.1°



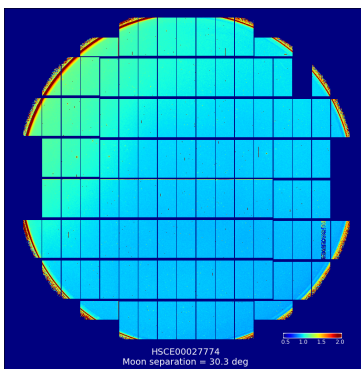
Moon sep = 33.3°



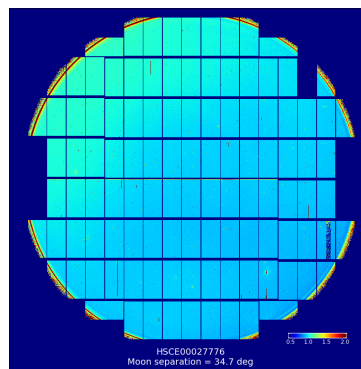
Moon sep = 32.7°



Moon sep = 35.5°

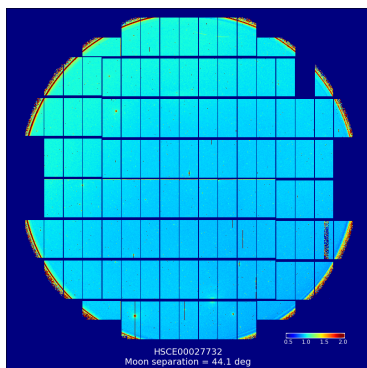


Moon sep = 30.3°

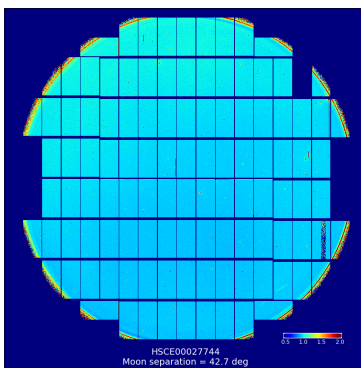


Moon sep = 34.7°

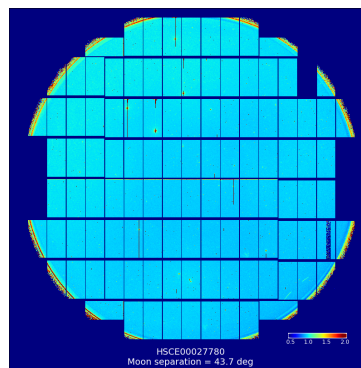
Moon separation: $40^\circ - 50^\circ$



Moon sep = 44.1°

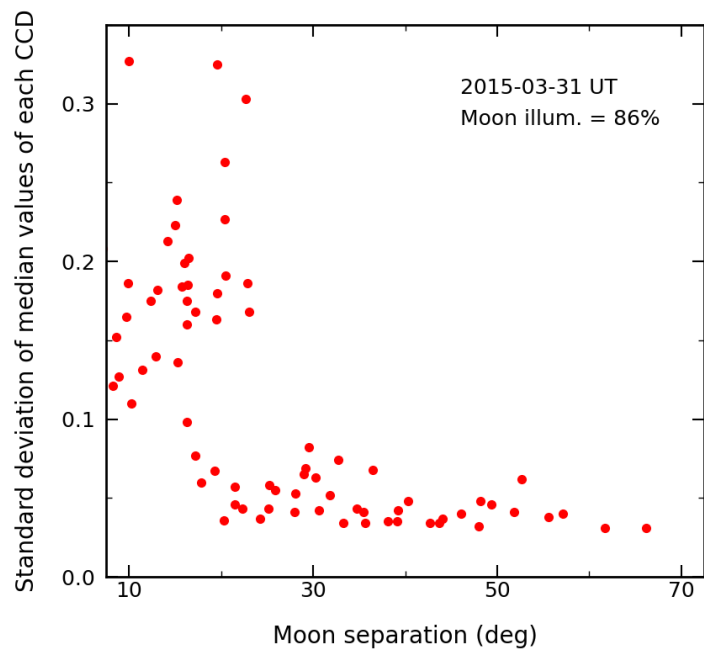


Moon sep = 42.7°



Moon sep = 43.7°

Moon separation vs. Standard deviation of median values of each CCD



Appendix

Moon phase vs. illuminated fraction

