

Week 13 Field Report

1. Introduction

The season for Bramor is over. This time we are flying Mavic 2 Pro. We have prepared the new 128 GB micro-SD card and went through the checklist for the flight. Mavic 2 Pro is a DJI quad multicopter, carrying a high-quality camera and a 3-axis stabilizer. It has several fantastic features that didn't even exist when I started using DJI's products, but we are just using the very basic features this time.

2. Field Outing

2.1 Site Description

The site was still at about 40.443864 North, -87.032616 West, but we had 4 flight crews doing the process at the same time, so we (crew 2) went south and chose a flat location. The launch pad was placed on the grass, so the propellers won't hit the grass. The logs were still there.

2.2 Weather Condition

Temperature (C)	2.7
Wind direction	West
Wind speed (m/s)	>5
Cloud (%)	5

Sun light was bright, so protect the eyes with the sunglasses was necessary. Wind speed was not constant, sometimes it's strong, sometimes it's calm.



Figure 1: Site condition and weather condition.

3. Operation

3.1 Preflight

The launchpad was anchored to the ground, and its pouch was anchored and put under the launch pad. We calibrated the GPS because the DJI GO 4 asked us to do that, and we restarted it.

The mission was simple. Climb to 100ft altitude, let the camera has the angle about 45 degrees and straight down and look at one point flying in a circle. To do this, (if flying counterclockwise) the pilot should push the roll to the left, push the pitch forward, and push the yaw to the left at the same time. After two cycles, then climb to 150 ft, 200, ft, 250 ft, 300 ft, 350 ft, and 400 ft, and take pictures with the camera pointing down at each altitude. Then change the shutter at 400 ft and take a picture. Finally, land the Mavic 2 Pro on the launch pad.



Figure 2: flight crew are waiting for the permission to take off.

3.2Flight

Three flights went smoothly. No incidents occurred.

Pilot: Dylan Klos

Take off battery (%)	98
Landing battery (%)	65
Take off time (hr:min)	9:55
Landing time (hr:min)	10:00

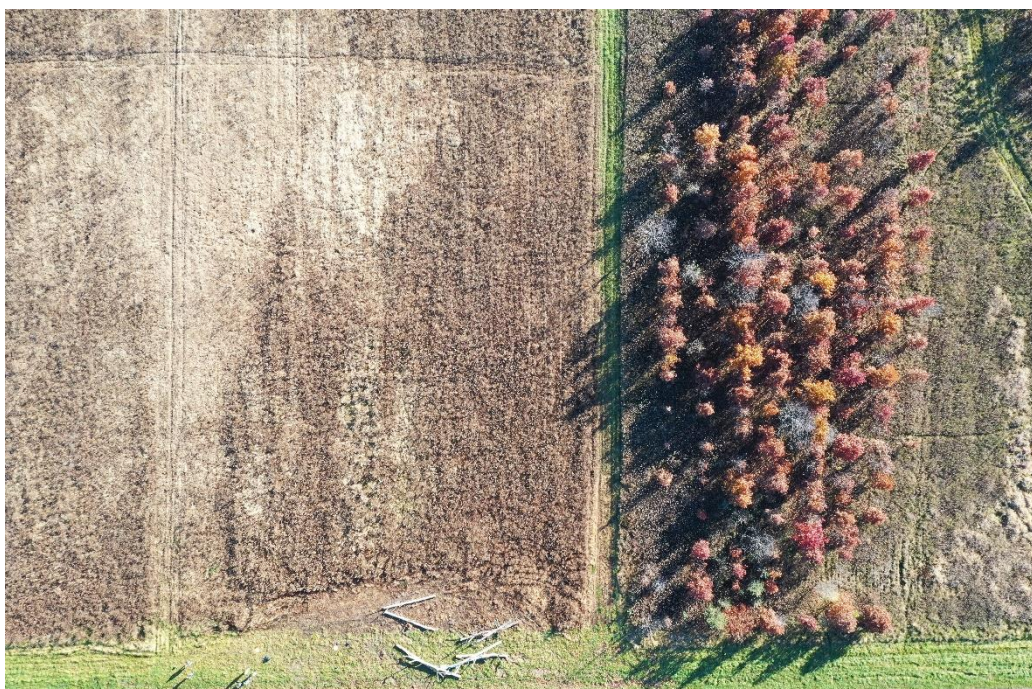


Figure 3. Picture taken at 400 ft

Pilot: Harrison Guinn

Take off battery (%)	65
Landing battery (%)	35
Take off time (hr:min)	10:02
Landing time (hr:min)	10:09

Pilot: Dingming Lu

Take off battery (%)	99
Landing battery (%)	65
Take off time (hr:min)	10:11
Landing time (hr:min)	10:23

3.3Result

Only part of the pictures and all videos were saved to the SD card. SD card was working, camera was working, and we did click the photo button several times.

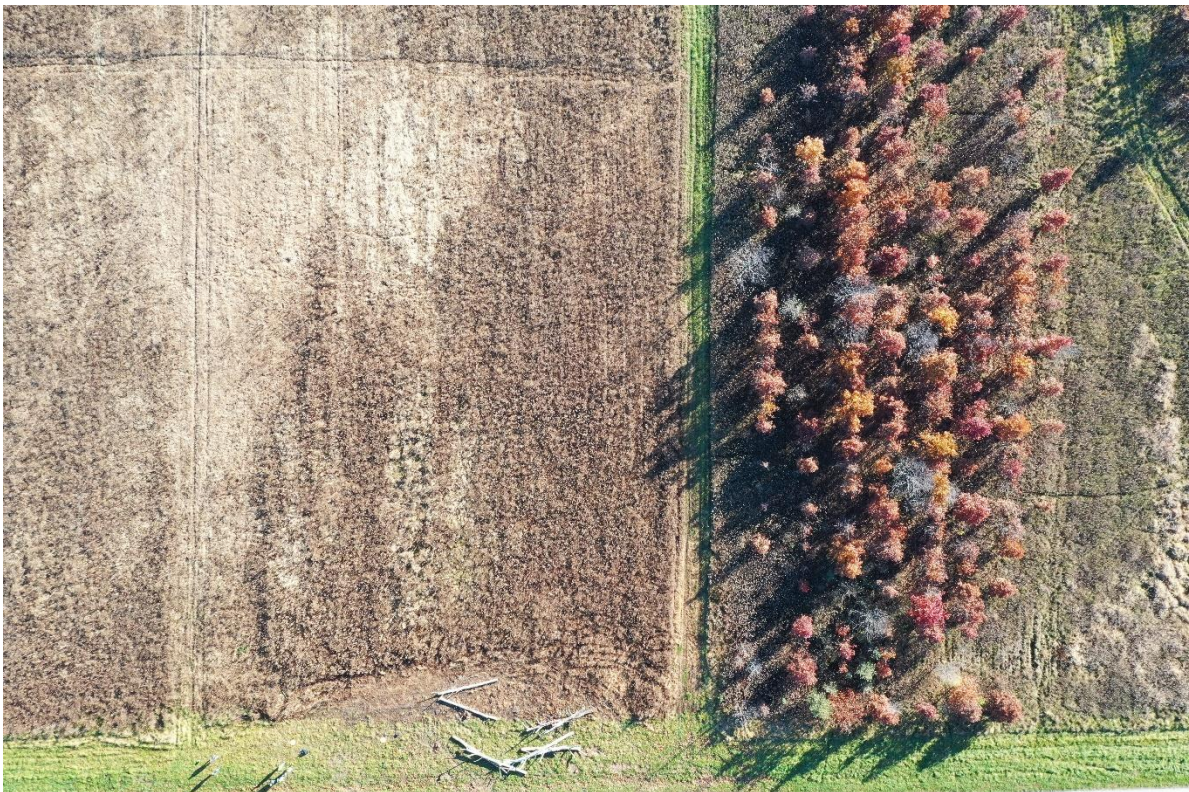


Figure 4.1: Picture taken at 400ft altitude with 1/200 sec, f/5.6, ISO-400. When the shutter speed is high, it took a shorter time (1/200 second) for the camera to capture the light, so the amount of light is limited. The image looks normal.

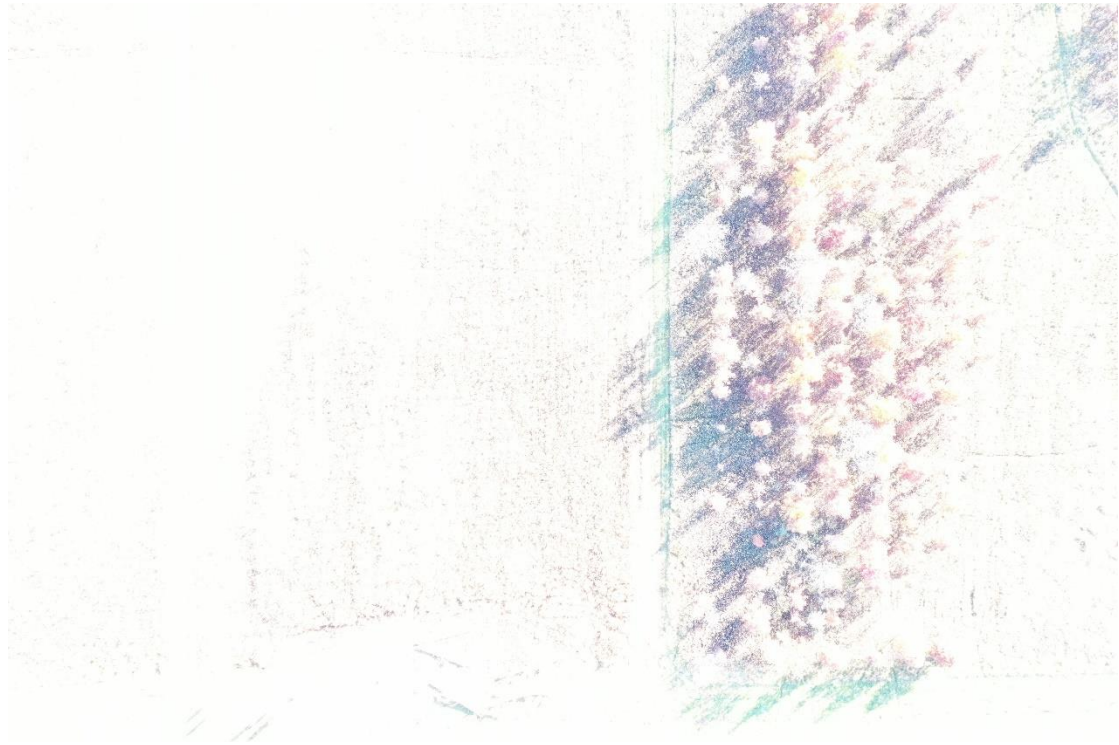
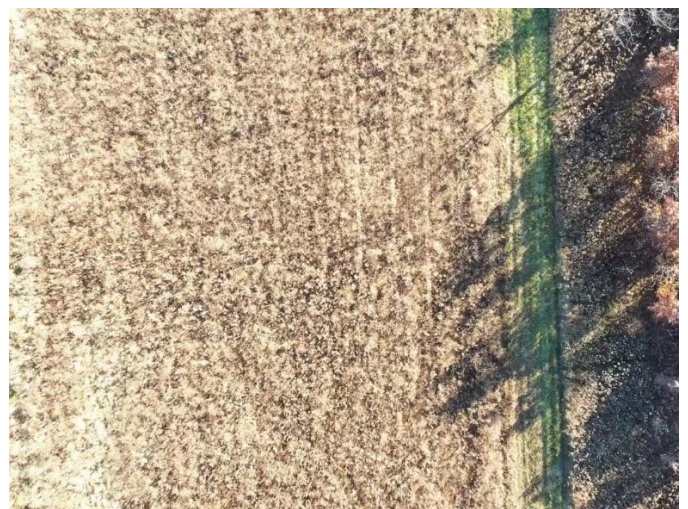


Figure 4.2: Picture taken at 400ft altitude with 1/25 sec, f/5.6, ISO-400. (Continued explaining from Figure 4.1) **When the shutter speed is low, it took the camera a longer time (1/25 second) to let the light coming in, so there is much more unexpected light going into the camera sensor. Now the image is over exposed (to light) (Figure 4.2). Vice versa, if the shutter speed is way too high, the time that allows the light to come in will be very short, then not enough light is captured and the image will be appearing dark.**

While the Mavic was increasing the altitude, it was very clear to see that the area of the ground was increasing.



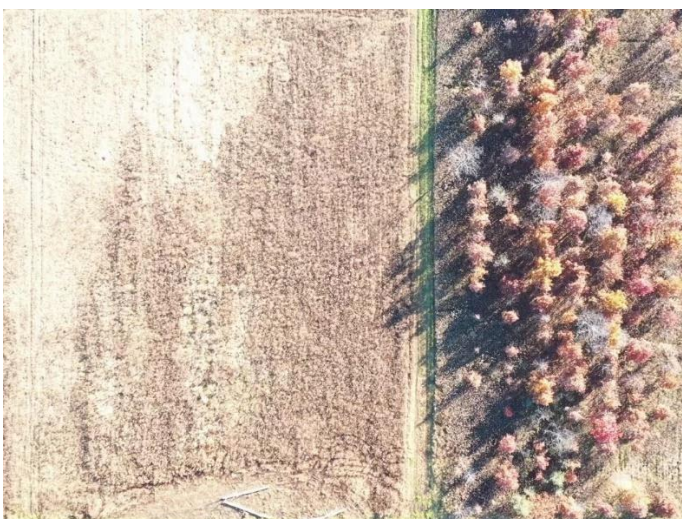
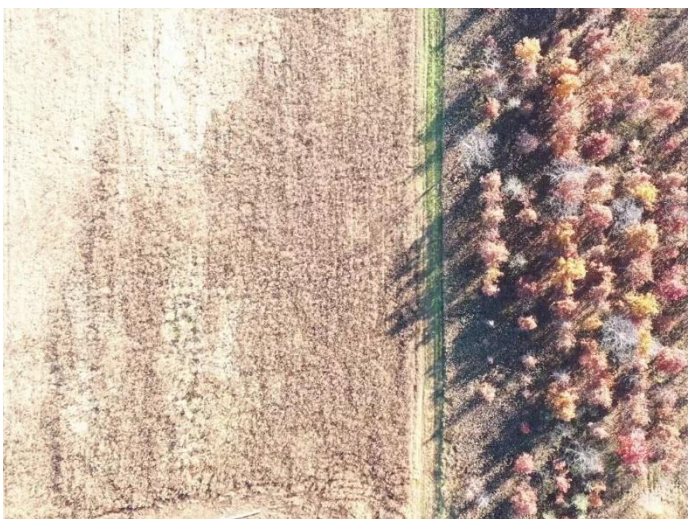
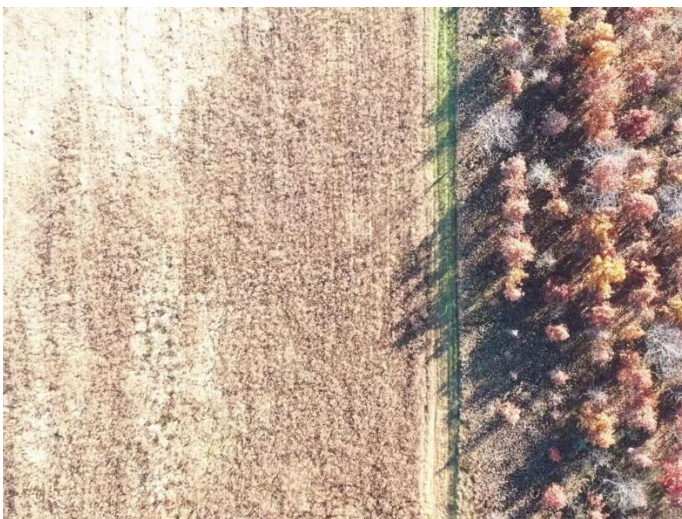


Figure group 5: The pictures were taken from altitude of 100ft to 378ft with increment of 50ft. As the altitude increased, we can see more and more area on the ground, but the resolution of each object decreases because each pixel needs to cover a larger area.

4. Conclusion

In cold weather, the battery will last shorter. But eventually, it depends on each battery. It could be one of the reasons why I used half of their uses (98% to 65% and 65% to 35%) and flew the same duration.

This is just an assumption. The response time of the camera can be very slow, so we need to wait for it to finish the first picture before taking the next one, otherwise, it won't save either of them. However, when we climb 50 ft each time, the time for the camera to respond was more than enough, so there might be another reason.